

R&S®SMW-K144/-K145/-K148

5G New Radio, 5G NR Closed-Loop BS Test, 5G NR Release 16

User Manual



1178801302
Version 10



This document describes the following software options:

- R&S®SMW-K144/-K145
1423.8608.xx, 1414.6506.xx
- R&S®SMW-K148
1414.6664.02

This manual describes firmware version FW 4.80.041.xx and later of the R&S®SMW200A.

© 2020 Rohde & Schwarz GmbH & Co. KG

Mühldorfstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

Subject to change – data without tolerance limits is not binding.

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.

Trade names are trademarks of the owners.

1178.8013.02 | Version 10 | R&S®SMW-K144/-K145/-K148

The following abbreviations are used throughout this manual: R&S®SMW200A is abbreviated as R&S SMW

Contents

1	Preface.....	11
1.1	About this Manual.....	11
1.2	Documentation Overview.....	11
1.2.1	Getting Started Manual.....	12
1.2.2	User Manuals and Help.....	12
1.2.3	Tutorials.....	12
1.2.4	Service Manual.....	12
1.2.5	Instrument Security Procedures.....	12
1.2.6	Printed Safety Instructions.....	13
1.2.7	Data Sheets and Brochures.....	13
1.2.8	Release Notes and Open Source Acknowledgment (OSA).....	13
1.2.9	Application Notes, Application Cards, White Papers, etc.....	13
2	Welcome to the 5G New Radio Option.....	14
2.1	Accessing the 5G New Radio Dialog.....	15
2.2	Scope.....	16
2.3	Notes on Screenshots.....	16
3	About the 5G New Radio Option.....	17
3.1	Required Options.....	17
3.2	5G NR Numerology.....	18
3.3	Multiple Accesses Schemes.....	18
3.4	Frame Structure, Slots and Slot Formats.....	19
3.5	Resource Blocks and Resource Grid.....	19
3.6	Transmission Bandwidths TxBW.....	20
3.7	Synchronization Signals and SS/PBCH Block.....	22
3.8	Carrier Bandwidth Part (BWP).....	24
3.9	Carrier Aggregation.....	25
3.10	Antenna Port Mapping.....	26
3.11	5G NR Channels and Signals Overview.....	27
3.12	Conflict Handling.....	28
4	Find Out the Implemented 3GPP Specification.....	30

5	5G New Radio Quick Settings.....	31
5.1	General Settings.....	31
5.2	Frame Format.....	34
6	5G New Radio Configuration and Settings.....	37
6.1	General Settings.....	37
6.2	Node Settings.....	43
6.2.1	Scheduling.....	43
6.2.2	Carriers Settings.....	45
6.2.3	Transmission Bandwidth (TxBW) Settings.....	51
6.2.4	System Information Settings.....	54
6.2.5	LTE-CRS Coexistence Settings.....	56
6.2.6	SS/PBCH Settings.....	58
6.2.7	PRS settings.....	65
6.2.8	Dummy REs Settings.....	70
6.2.9	Carrier-Mapping Settings.....	72
6.2.10	PBCH Settings.....	73
6.3	Users/BWPs Settings.....	78
6.3.1	General Settings.....	78
6.3.2	Properties Settings.....	79
6.3.3	DL/UL BWPs Settings.....	82
6.3.4	DL BWP Configuration Settings.....	86
6.3.4.1	User, Carrier, BWP Settings.....	87
6.3.4.2	PDSCH Settings.....	87
6.3.4.3	PDCCH Settings.....	99
6.3.4.4	Control Settings.....	99
6.3.4.5	ZP CSI-RS Settings.....	103
6.3.4.6	NZP CSI-RS Settings.....	106
6.3.4.7	Rate Match Settings.....	112
6.3.5	UL BWP Configuration Settings.....	114
6.3.5.1	User, Carrier, BWP Settings.....	115
6.3.5.2	PUCCH Settings.....	116
6.3.5.3	FRC Settings.....	117
6.3.5.4	PUSCH Settings.....	121

6.3.5.5	PUSCH UCI Settings.....	132
6.3.5.6	SRS Settings.....	134
6.4	Scheduling Settings.....	142
6.5	PDSCH/PUSCH Settings.....	153
6.5.1	General Settings.....	154
6.5.2	TxScheme Settings.....	158
6.5.3	DMRS Settings.....	160
6.5.4	Channel Coding Settings.....	163
6.5.5	UCI Settings.....	165
6.5.6	PTRS Settings.....	167
6.5.7	PTRS Settings with Enabled Transform Precoding.....	169
6.5.8	Antenna Ports.....	171
6.5.9	Info.....	173
6.6	CORESET Settings.....	173
6.6.1	General Settings.....	174
6.6.2	Payload Settings.....	178
6.6.3	Info.....	199
6.7	PUCCH Settings.....	199
6.7.1	General Settings.....	200
6.7.2	Payload Settings.....	202
6.7.3	Info.....	204
6.8	PRACH Settings.....	205
7	Signal Control and Signal Characteristics.....	208
7.1	Trigger Settings.....	208
7.2	Marker Settings.....	214
7.3	TDD UL/DL Marker Mode.....	216
7.4	Clock Settings.....	219
7.5	Local and Global Connector Settings.....	220
7.6	Output Settings.....	220
7.7	Time Domain Windowing Settings.....	224
7.8	Adjusting the Signal Power.....	226
7.8.1	Power Settings.....	227
7.9	Crest Factor Reduction Settings.....	232

8	Observing Current Allocations on the Time Plan.....	234
9	Performing BS Tests According to TS 38.141 Specifications.....	237
9.1	Introduction to BS Conformance Testing.....	237
9.2	Required Options.....	238
9.3	Supported Test Cases.....	239
9.3.1	Generic Structure of the Description of the Implemented Test Cases.....	241
9.4	Exemplary Test Setups.....	241
9.4.1	Exemplary Test Setups for Conducted Tests (TS 38.141-1).....	242
9.4.1.1	Exemplary Test Setup - One Path.....	242
9.4.1.2	Exemplary Test Setup - Two Paths.....	242
9.4.2	Exemplary Test Setups for Radiated (OTA) Tests (TS 38.141-2).....	243
9.4.2.1	Exemplary Test Setup - One Path.....	243
9.4.2.2	Exemplary Test Setup - Two Paths.....	244
9.5	General Considerations.....	244
9.5.1	General Considerations for Radiated (OTA) Tests.....	245
9.6	User Interface.....	247
9.6.1	General Settings.....	248
9.6.2	Test Case Settings.....	249
9.6.3	OTA Declaration.....	250
9.6.4	Instrument Settings.....	252
9.6.5	Antenna Settings.....	253
9.6.6	Wanted Signal Settings.....	254
9.6.7	Frequency Allocation Settings.....	259
9.6.8	Interfering Signal Settings.....	260
9.6.9	Feedback Settings.....	264
9.6.10	AWGN Settings	265
9.7	Conducted Transmitter Characteristics (TS 38.141-1, Chapter 6).....	266
9.7.1	Required Options.....	266
9.7.2	Prior Considerations.....	267
9.7.3	General Workflow for Carrying Out a Transmitter Test.....	268
9.7.4	Test Case 6.7: Transmitter Intermodulation.....	269
9.8	Conducted Receiver Characteristics (TS 38.141-1, Chapter 7).....	270
9.8.1	Required Options.....	270

9.8.2	Prior Considerations.....	271
9.8.3	General Workflow for Carrying Out a Receiver Test.....	272
9.8.4	Test Case 7.2: Reference Sensitivity Level.....	273
9.8.5	Test Case 7.3: Dynamic Range.....	275
9.8.6	Test Case 7.4.1: Adjacent Channel Selectivity (ACS).....	278
9.8.7	Test Case 7.4.2A: In-Band General Blocking.....	279
9.8.8	Test Case 7.4.2B: In-Band Narrowband Blocking.....	282
9.8.9	Test Case 7.5: Out-of-Band Blocking.....	283
9.8.10	Test Case 7.7: Receiver Intermodulation	285
9.8.11	Test Case 7.8: In-Channel Selectivity.....	289
9.9	Conducted Performance Characteristics (TS 38.141-1, Chapter 8).....	291
9.9.1	Required Options.....	292
9.9.2	General.....	294
9.9.3	General Workflow for Carrying Out a Performance Test.....	295
9.9.4	Test Case 8.2.1: PUSCH Transform Precoding Disabled.....	296
9.9.5	Test Case 8.2.2: PUSCH Transform Precoding Enabled.....	309
9.9.6	Test Case 8.2.3: UCI Multiplexed on PUSCH.....	311
9.9.7	Test Case 8.3.1: Performance Requirements for PUCCH Format 0.....	314
9.9.8	Test Case 8.3.2.1: NACK to ACK Detection for PUCCH Format 1.....	316
9.9.9	Test Case 8.3.2.2: ACK Missed Detection for PUCCH Format 1.....	319
9.9.10	Test Case 8.3.3.1: ACK Missed Detection for PUCCH Format 2.....	321
9.9.11	Test Case 8.3.3.2: UCI BLER for PUCCH Format 2.....	323
9.9.12	Test Case 8.3.4: Performance Requirements for PUCCH Format 3.....	324
9.9.13	Test Case 8.3.5: Performance Requirements for PUCCH Format 4.....	327
9.9.14	Test Case 8.3.6.1A: NACK to ACK Detection for Multi-Slot PUCCH Format 1.....	330
9.9.15	Test Case 8.3.6.1B: ACK Missed Detection for Multi-Slot PUCCH Format 1.....	331
9.9.16	Test Case 8.4.1: PRACH False Alarm Probability and Missed Detection.....	333
9.10	Radiated Transmitter Characteristics (TS 38.141-2, Chapter 6).....	336
9.10.1	Required Options.....	337
9.10.2	Prior Considerations.....	337
9.10.3	General Workflow for Carrying Out a Radiated Transmitter Test.....	337
9.10.4	Test Case 6.8: OTA Transmitter Intermodulation.....	338
9.11	Radiated Receiver Characteristics (TS 38.141-2, Chapter 7).....	340

9.11.1	Required Options.....	340
9.11.2	Prior Considerations.....	341
9.11.3	General Workflow for Carrying Out a Receiver Test.....	345
9.11.4	Test Case 7.2: OTA Sensitivity.....	346
9.11.5	Test Case 7.3: OTA Reference Sensitivity Level.....	347
9.11.6	Test Case 7.4: OTA Dynamic Range.....	350
9.11.7	Test Case 7.5.1: OTA Adjacent Channel Selectivity (ACS).....	351
9.11.8	Test Case 7.5.2A: OTA In-Band General Blocking.....	353
9.11.9	Test Case 7.5.2B: OTA In-Band Narrowband Blocking.....	356
9.11.10	Test Case 7.6: OTA Out-of-Band Blocking.....	358
9.11.11	Test Case 7.8: OTA Receiver Intermodulation	360
9.11.12	Test Case 7.9: OTA In-Channel Selectivity.....	363
9.12	Radiated Performance Characteristics (TS 38.141-2, Chapter 8).....	365
9.12.1	Required Options.....	365
9.12.2	General.....	367
9.12.3	General Workflow for Carrying Out a Radiated Performance Test.....	368
9.12.4	Test Case 8.2.1: OTA PUSCH Transform Precoding Disabled.....	369
9.12.5	Test Case 8.2.2: OTA PUSCH Transform Precoding Enabled.....	370
9.12.6	Test Case 8.2.3: OTA UCI Multiplexed on PUSCH.....	372
9.12.7	Test Case 8.3.1: OTA Performance Requirements for PUCCH Format 0.....	373
9.12.8	Test Case 8.3.2.1: OTA NACK to ACK Detection for PUCCH Format 1.....	375
9.12.9	Test Case 8.3.2.2: OTA ACK Missed Detection for PUCCH Format 1.....	376
9.12.10	Test Case 8.3.3.1: OTA ACK Missed Detection for PUCCH Format 2.....	378
9.12.11	Test Case 8.3.3.2: OTA UCI BLER for PUCCH Format 2.....	379
9.12.12	Test Case 8.3.4: OTA Performance Requirements for PUCCH Format 3.....	381
9.12.13	Test Case 8.3.5: OTA Performance Requirements for PUCCH Format 4.....	382
9.12.14	Test Case 8.3.6.1A: OTA NACK to ACK Detection for Multi-Slot PUCCH Format 1...384	
9.12.15	Test Case 8.3.6.1B: OTA ACK Missed Detection for Multi-Slot PUCCH Format 1.....	385
9.12.16	Test Case 8.4.1: OTA PRACH False Alarm Probability and Missed Detection.....	387
10	Real-time Feedback for Closed Loop BS Tests.....	389
10.1	Exemplary Testing Scenario.....	390
10.2	Feedback Modes.....	391
10.2.1	Serial Modes.....	392

10.2.2	Structure of a Serial and 3x8 Serial Feedback Command.....	393
10.3	Timing Aspects.....	395
10.4	Real-Time Feedback Configuration Settings.....	396
11	Generating Logfiles for Design Cross-Verification.....	401
11.1	Required Options.....	401
11.2	Output Files.....	401
11.3	How to Generate Logfiles.....	402
11.4	Logfile Generation Settings.....	403
12	Remote-Control Commands.....	405
12.1	Programming Examples.....	406
12.2	General Commands.....	432
12.3	Quick Settings Command.....	437
12.4	Carrier Commands.....	444
12.5	TxBW Commands.....	448
12.6	System Information Commands.....	451
12.7	LTE-CRS Coexistence Commands.....	452
12.8	SS/PBCH Commands.....	454
12.9	PRS Commands.....	465
12.10	Dummy Resource Elements Commands.....	471
12.11	Carrier Mapping Commands.....	473
12.12	User Commands.....	474
12.13	DL/UL BWP Commands.....	479
12.14	BWP Configuration Commands.....	485
12.14.1	PDSCH Commands.....	485
12.14.2	PUCCH Commands.....	496
12.14.3	Uplink Commands.....	496
12.14.4	ZP and NZP CSI-RS Commands.....	498
12.14.5	Rate Match Commands.....	505
12.14.6	PUCCH Commands.....	509
12.14.7	FRC Commands.....	511
12.14.8	PUSCH Commands.....	514
12.14.9	PUSCH UCI Commands.....	525
12.14.10	SRS Commands.....	527

12.14.11	PTRS Commands.....	536
12.15	Scheduling Commands.....	541
12.16	PDSCH/PUSCH Commands.....	551
12.17	CORESET Commands.....	571
12.18	PUCCH Commands.....	609
12.19	PRACH Commands.....	613
12.20	Output Commands.....	616
12.21	Trigger Commands.....	625
12.22	Marker Commands.....	630
12.23	Clock Commands.....	635
12.24	Real-time Feedback.....	636
12.25	Logging Commands.....	640
12.26	Test Case Wizard Remote-Control Commands.....	641
	Glossary: Abbreviations.....	664
	Glossary: 5G NR 3GPP Specification References.....	666
	List of commands.....	667
	Index.....	692

1 Preface

1.1 About this Manual

This user manual provides all the information **specific to the 5G New Radio option**. All general instrument functions and settings common to all applications and operating modes are described in the main R&S SMW user manual.

The main focus in this manual is on the provided settings and the tasks required to generate a signal. The following topics are included:

- **Welcome to the 5G New Radio option**
Introduction to and getting familiar with the option
- **About the 5G New Radio option**
Background information on basic terms and principles in the context of the signal generation
- **5G New Radio Configuration and Settings**
A concise description of all functions and settings available to configure signal generation with their corresponding remote control command
- **Remote Control Commands**
Remote commands required to configure and perform signal generation in a remote environment, sorted by tasks
(Commands required to set up the instrument or to perform common tasks on the instrument are provided in the main R&S SMW user manual)
Programming examples demonstrate the use of many commands and can usually be executed directly for test purposes
- **List of remote commands**
Alphabetical list of all remote commands described in the manual
- **Index**
- **Abbreviations**
- **List of documents and reference information**

1.2 Documentation Overview

This section provides an overview of the R&S SMW user documentation. Unless specified otherwise, you find the documents on the R&S SMW product page at:

www.rohde-schwarz.com/manual/smw200a

1.2.1 Getting Started Manual

Introduces the R&S SMW and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.2.2 User Manuals and Help

Separate manuals for the base unit and the software options are provided for download:

- **Base unit manual**
Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.
- **Software option manual**
Contains the description of the specific functions of an option. Basic information on operating the R&S SMW is not included.

The contents of the user manuals are available as help in the R&S SMW. The help offers quick, context-sensitive access to the complete information for the base unit and the software options.

All user manuals are also available for download or for immediate display on the Internet.

1.2.3 Tutorials

The R&S SMW provides interactive examples and demonstrations on operating the instrument in form of tutorials. A set of tutorials is available directly on the instrument.

1.2.4 Service Manual

Describes the performance test for checking compliance with rated specifications, firmware update, troubleshooting, adjustments, installing options and maintenance.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

<https://gloris.rohde-schwarz.com>

1.2.5 Instrument Security Procedures

Deals with security issues when working with the R&S SMW in secure areas. It is available for download on the Internet.

1.2.6 Printed Safety Instructions

Provides safety information in many languages. The printed document is delivered with the product.

1.2.7 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S SMW. It also lists the options and their order numbers and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/smw200a

1.2.8 Release Notes and Open Source Acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The open-source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/smw200a

1.2.9 Application Notes, Application Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/smw200a and www.rohde-schwarz.com/manual/smw200a

2 Welcome to the 5G New Radio Option

The R&S SMW-K144/-K148 are firmware applications that add functionality to generate signals in accordance with the 3GPP standard 5G New Radio.

Preamble

All supported features are in line with the official 3GPP specifications as follows:

- R&S SMW-K144: in line with Release 15, Specification Versions 16.2.0
- R&S SMW-K148: in line with Release 16, Specification Versions 16.2.0

The R&S SMW-K144 key features

The R&S SMW simulates signals at the physical channel level. The following list gives an overview of the functions provided for generating an 5G New Radio signal:

- Supports uplink and downlink
- Intuitive user interface with graphical display of time plan
- PSS/SSS, PBCH (incl. MIB), PDCCH (i.e. CORESET), PDSCH, CSI-RS, PDSCH PTRS, PUSCH, PUCCH, SRS, PRACH supported
PBCH, PDSCH, PDCCH and PUSCH incl. DMRS
- Support of downlink and uplink DCI content inside CORESET;
Supported are DCI formats 0_0, 0_1, 1_0, 1_1, 2_0, 2_1, 2_2, 2_3 and custom
- Automatic PDSCH scheduling from DCI
- PDSCH time domain scheduling
- Support of two codewords for PDSCH
- Support of SRS codebook
- PUSCH/PUCCH spatial multiplexing
- Configurable multilayer transmissions for PDSCH and PUSCH, incl. USCH channel coding and antenna ports
- Support of FRCs and TMs
- All modulation schemes supported
- Carrier aggregation, including cross-carrier scheduling
- Test case wizard for 3GPP 38.141 test cases

The R&S SMW-K148 key features

The following list gives an overview of the functions provided for generating an 5G New Radio signal:

- PRS (positioning reference signals)
- Support of the DCI types and their corresponding RNTI types included in the release 16
- MIB system frame number (SFN) increments independently from the configured ARB sequence length
- Uplink timing adjustment commands can be received
Requires also the option R&S SMW-K145

- Support of up-to 50 users

This user manual contains a description of the functionality that the application provides, including remote control operation.

All functions not discussed in this manual are the same as in the base unit and are described in the R&S SMW user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMW200A

Installation

You can find detailed installation instructions in the delivery of the option or in the R&S SMW service manual.



You can generate signals via play-back of waveform files at the signal generator. To create the waveform file using R&S WinIQSIM2, you do not need a specific option.

To play back the waveform file at the signal generator, you have two options:

- Install the R&S WinIQSIM2 option of the digital standard, e.g. R&S SMW-K255 for playing LTE waveforms
- If supported, install the real-time option of the digital standard, e.g. R&S SMW-K55 for playing LTE waveforms

2.1 Accessing the 5G New Radio Dialog

To open the dialog with 5G New Radio settings

- In the block diagram of the R&S SMW, select "Baseband > 5G NR".

A dialog box opens that displays the provided general settings.

The signal generation is not started immediately. To start signal generation with the default settings, select "State > On".

2.2 Scope



Tasks (in manual or remote operation) that are also performed in the base unit in the same way are not described here.

In particular, it includes:

- Managing settings and data lists, like saving and loading settings, creating and accessing data lists, or accessing files in a particular directory.
- Information on regular trigger, marker and clock signals and filter settings, if appropriate.
- General instrument configuration, such as checking the system configuration, configuring networks and remote operation
- Using the common status registers

For a description of such tasks, see the R&S SMW user manual.

2.3 Notes on Screenshots

When describing the functions of the product, we use sample screenshots. These screenshots are meant to illustrate as many as possible of the provided functions and possible interdependencies between parameters. The shown values may not represent realistic usage scenarios.

The screenshots usually show a fully equipped product, that is: with all options installed. Thus, some functions shown in the screenshots may not be available in your particular product configuration.

3 About the 5G New Radio Option

The implementation of the option 5G New Radio R&S SMW-K144 is based on the 3GPP Rel. 15 specification group TS 38.xxx. According to these specifications, the 3GPP defines a great flexibility of the signal on the air interface.

This section is a brief summary of the main air interface parameters, see [Table 3-1](#).

Table 3-1: Main air interface parameters

Parameter	Frequency range FR1*	Frequency range FR2*
Frequency bands**	3.3 GHz to 3.8 GHz 4.4 GHz to 6 GHz	24 GHz to 29 GHz 27 GHz to 43.5 GHz
Carrier aggregation	≤ 16 carriers Initially 1	≤ 16 carriers
Channel bandwidth	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90 MHz and 100 MHz	50, 100, 200 MHz and 400 MHz
Subcarrier spacing (SCS)	15 kHz, 30 kHz and 60 kHz	60 kHz and 120 kHz
Modulation schemes	Up to 256QAM	Up to 256QAM
MIMO schemes	- DL: 2x2 and 4x4 MIMO (≤ 8 layers) - UL: SISO and 2x2 MIMO (≤ 4 layers)	≤ 2 layers: - DL: 2x2 MIMO - UL: SISO and 2x2 MIMO
Multiple access schemes	- DL: CP-OFDMA - UL: CP-OFDMA and optionally DFT-s-OFDM	- DL: CP-OFDMA - UL: CP-OFDMA and optionally DFT-s-OFDM

*) Throughout this description, the designations are used interchangeably.

**) Frequency bands as defined by the 3GPP Rel. 15 specification group TS 38.104. You can however select also any other frequency within the frequency range your R&S SMW supports (see [Chapter 3.1, "Required Options"](#), on page 17).

3.1 Required Options

The basic equipment layout for generating 5G New Radio signals includes the options:

- Standard or wideband baseband generator (R&S SMW-B10/-B9)
- Baseband main module (R&S SMW-B13) or wideband baseband main module (R&S SMW-B13XT)
- Option 5G New Radio (R&S SMW-K144) (per signal path)
- Frequency option (e.g. R&S SMW-B1003)
- Optional, option logfile generation (R&S SMW-K81)
- Optional, option real-time feedback (R&S SMW-K145)

- Optional, option 5G NR Release 16 (R&S SMW-K148)

You can generate signals via play-back of waveform files at the signal generator. To create the waveform file using R&S WinIQSIM2, you do not need a specific option.

To play back the waveform file at the signal generator, you have two options:

- Install the R&S WinIQSIM2 option of the digital standard, e.g. R&S SMW-K255 for playing LTE waveforms
- If supported, install the real-time option of the digital standard, e.g. R&S SMW-K55 for playing LTE waveforms

For more information, see data sheet.

3.2 5G NR Numerology

5G NR signals can be transmitted in several frequency ranges. For each of the frequency range, the 3GPP specifies the allowed subcarrier spacing (SCS) and the supported cyclic prefix (CP), see [Table 3-2](#).

However, not all combinations of frequency range, SCS and CP are allowed. Moreover, the 3GPP specification defines the allowed combinations indirectly, as the so called numerology. A numerology is thus the combination of the SCS and the CP, where the SCS is defined as follows:

$$\Delta f = 15 \text{ kHz} * 2^{\mu}, \text{ with } \mu = 0 \text{ to } 4.$$

Table 3-2: Supported combinations of SCS and CP per frequency range

μ	SCS, kHz (Δf)	Max. channel bandwidth, MHz	$N_{\text{symbol}}^{\text{slot}}$	$N_{\text{slot}}^{\text{frames}}$	$N_{\text{sub-frame}}^{\text{slot}}$	Symbol duration μs	Normal cyclic prefix (NCP)	Extended cyclic prefix (ECP)	Supported for data	Supported for synchronization	FR1	FR2
0	15	50	14	10	1	66.67	x	-	x	x	x	-
1	30	100	14	20	2	33.33	x	-	x	x	x	-
2	60	100 (FR1) 200 (FR2)	14 (NCP) 12 (ECP)	40	4	16.67	x	x	x	-	x	x
3	120	400	14	80	8	8.33	x	-	x	x	-	x
4	240	-	14	160	16	4.17	x	-	-	x	-	x

3.3 Multiple Accesses Schemes

5G NR supports two channel access methods for uplink signals, CP-OFDM and DFT-s-OFDM (see [Table 3-1](#)). Depending on the use case, one or the other has advantages over the other. For DFT-s-OFDM, an additional signal processing stage, transform precoding, is applied. Transform precoding is the term for the digital Fourier transformation (DFT) used in the 5G NR standard.

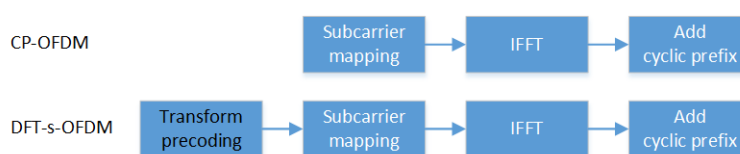


Figure 3-1: Signal processing depending on multiple access schemes

In this implementation, you can define per PUSCh which of the two access schemes is used.

3.4 Frame Structure, Slots and Slot Formats

Frame structure

As it is in LTE, the 5G NR **frame** is 10 ms long; a half-frame lasts 5 ms. Frames consist of 10 subframes, each of them with a length of 1 ms.

Subframes contain a *variable number of slots*, depending on the subcarrier spacing (SCS). Moreover, subframes can use different SCS in different bandwidth parts (BWP), see [Figure 3-4](#).

Because the frame (subframe) lengths are constant but the number of slots and their lengths varies, the common time boundaries between the different numerologies are the frames (or the subframes).

Slots and slots formats

The basic transmission unit in 5G NR is the **slot**. Slots can have different formats; slots comprise of 14 or 12 OFDM symbols, depending on the used cyclic prefix (CP). Hence, depending on the used CP, there are different numbers of slots per frame (and sub-frame) and the CP itself depends on the used numerology, see [Table 3-2](#).

Slots can have different formats, defined by the slot format index (SFI). The SFI is signaled by group common PDCCHs. The slot formats differ in the number of symbols that can be used for DL (D) and UL (U) transmission. Most of the symbols are usually used for transmission of user data (payload). Slots can also contain flexible symbols (x), that can be used for dynamic DL/UL transmission or as a gap for the DL to UL and vice versa switching.

The slot formats are defined in [TS 38.211](#), table 4.3.2-3.

3.5 Resource Blocks and Resource Grid

Resource grid

The basic granularity in 5G NR resource grid is the **resource element** (RE), which consists of one OFDM symbol over one subcarrier and is the same as in LTE. Another

granularity unit is a resource block (RB), which spans 12 subcarriers in frequency domain.

Resource blocks

The 5G NR specification defines different types of resource blocks:

- Common resource blocks (CRB)
The term CRB is typically used when referring to the whole carrier. A CRB grid is defined for each numerology.
The center of subcarrier #0 of the CRB#0 is referred as **Reference point A**; it is signaled relative to SS/PBCH or ARFCN.
See [Figure 3-2](#) and [Figure 3-3](#).
- Usable resource blocks (URBs)
The term URB is used to specify the subset of the CRBs of a specific numerology where transmission is allowed; that is, these RBs are not in the guard bands. The URBs define the so called transmission bandwidth (TxBW) for the respective numerology, see [Chapter 3.6, "Transmission Bandwidths TxBW"](#), on page 20.
- Physical resource blocks (PRB)
The term PRB describes the RBs inside the bandwidth parts (BWP). PRBs are numbered relative to the beginning of the bandwidth part.
See [Carrier Bandwidth Part \(BWP\)](#) and [Figure 6-4](#).

3.6 Transmission Bandwidths TxBW

As listed in [Table 3-2](#), there are different numerologies (that is different combinations of subcarrier spacing SCS and cyclic prefix CP) supported for each deployment and channel bandwidth combination. The different SCSs results in transmission bandwidths TxBW, which span different frequency ranges and according to [TS 38.104](#) use different number of resource blocks N_{RB} . The start of the TxBW is signaled relative to the Reference point A and is numerology-specific.

To achieve a common alignment between the different TxBW within a carrier, the 3GPP specification defines the following rules:

- Alignment is achieved, if the center of the first subcarrier (SC#0) of an RB is aligned to the center of the SC#0 of the RBs of all numerologies with a smaller μ .
- The TxBW are centered on the carrier center, that is around the center of the "Channel Bandwidth" for the corresponding carrier.
- If not applicable, the TxBW can be shifted with ± 6 subcarriers relative to the carrier center, where for each TxBW the corresponding SCS applies.

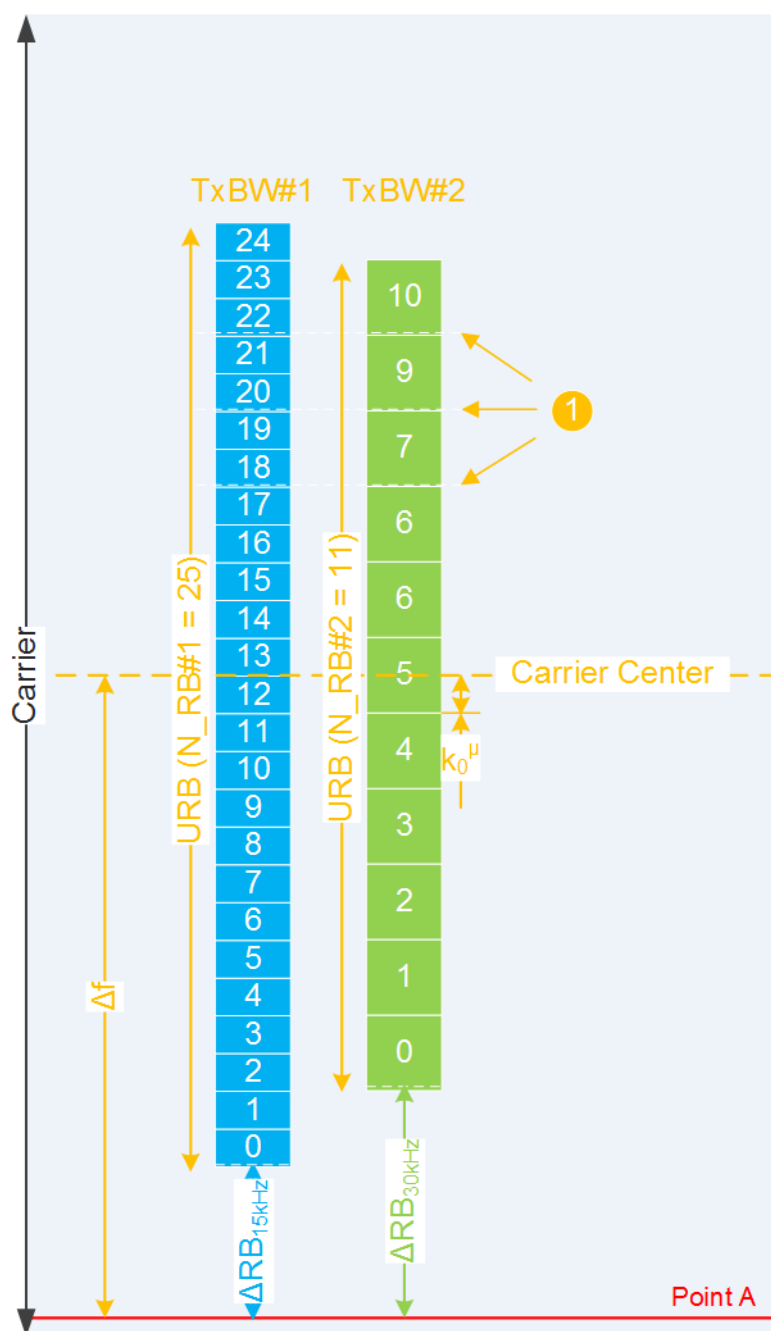


Figure 3-2: Transmission bandwidth (example)

- Carrier = Channel bandwidth = 5 MHz
 RB = Resource blocks
 SCS = Subcarrier spacing
 TxBW = Transmission bandwidth
 TxBW#1 = SCS 15 kHz, usable resource blocks USB = " $N\_RB = 25$ "; TxBW is not centered on the carrier center, a frequency shift with $k_0^\mu = -6$ subcarriers is applied
 TxBW#2 = SCS 30 kHz, usable resource blocks USB = " $N\_RB = 11$ "; TxBW is centered on the carrier center (" $k_0^\mu = 0$ ")
 k_0^μ = Number of subcarriers the Tx BW is shifted related to the carrier center, see k_0^μ
 ΔRB = Usable RB to common RBs, see [Tx BW Offset](#)

1	= Aligned centers of the first subcarrier (SC#0) of resource blocks
Point A	= Common reference point for all numerologies and TxBW; does not have to be within the carrier bandwidth. Point A is the center of subcarrier #0 of the CRB#0
Carrier center	= Center frequency of the carrier
Δf	= Offset between the carrier center frequency and the reference point A, see Point A to Carrier Center .

From all possible TxBW; for a specific channel bandwidth, the base station decides which TxBW; to use. The base station/network signals the position of the used TxBW; to the users as function of the following:

- The position of the Reference point A, that is common to all numerologies.
- The frequency offset ΔRB between the usable resource blocks of the TxBW; and the Reference point A, see [TxBW Offset](#).
- The used frequency shift $k_0^\mu = \{-6, 0, 6\}$, see [k0μ](#).

3.7 Synchronization Signals and SS/PBCH Block

The 3GPP specifies two synchronization signals (SS), the primary synchronization signal (PSS) and the secondary synchronization signal (SSS). Together with the physical broadcast channel (PBCH), they are bundled in a synchronization signal block (SS/PBCH block). PSS/SSS are used for radio frame synchronization and detection of the physical layer cell ID. The location of the synchronization signal is variable.

The PBCH carries general system information. It is polar-coded and QPSK modulated. The PBCH symbols carry its own DMRS, which position depends on the physical layer cell ID.

An SS/PBCH block is transmitted on a fixed schedule. Each half-frame contains of either 4, 8 or 64 SS/PBCH blocks, depending on the subcarrier spacing (SCS). The SS/PBCH block is transmitted twice in a slot, if that slot carries the synchronization signal.

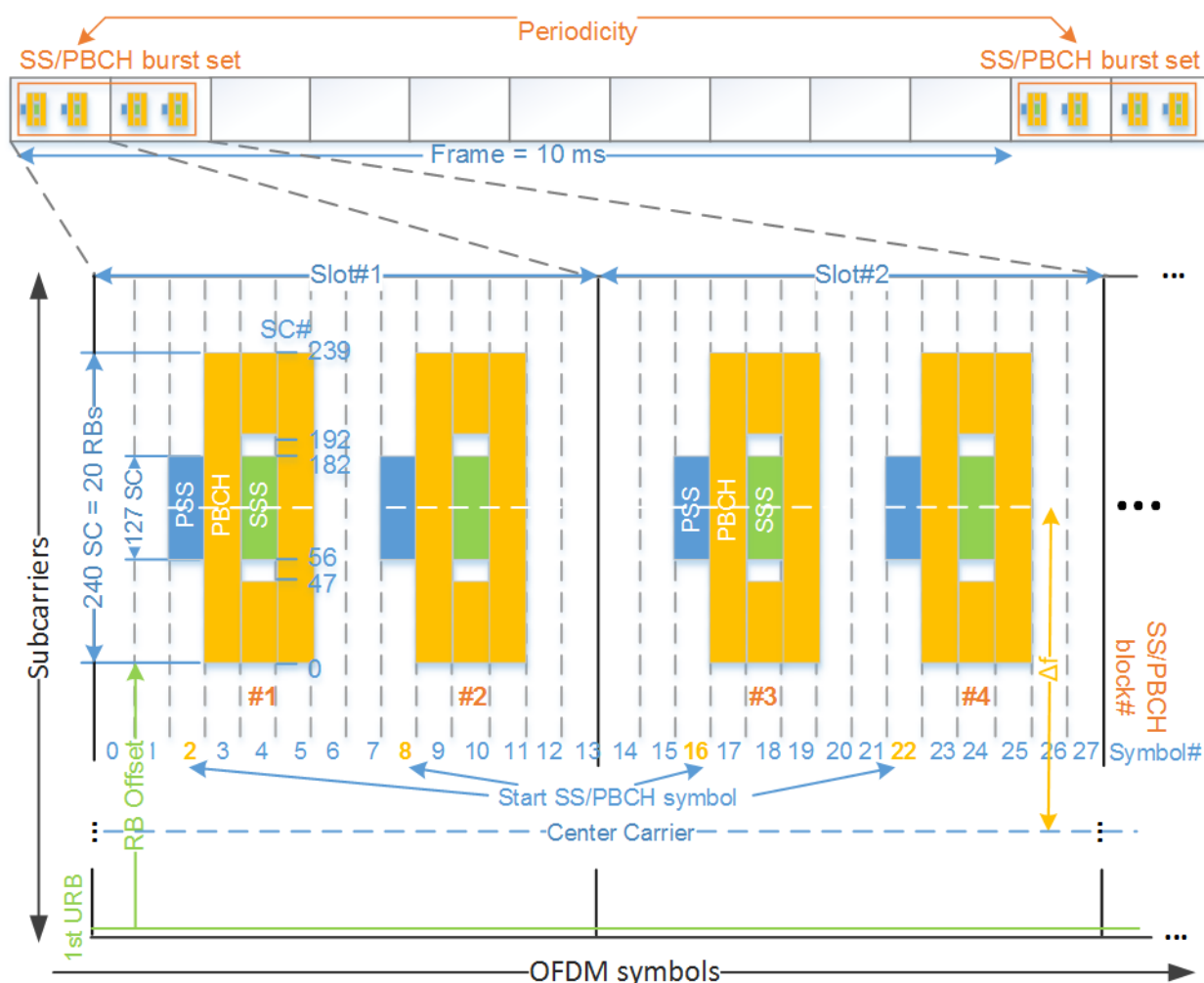


Figure 3-3: Location of synchronization signals in a succession of several slots (Case A - 15 kHz SCS, $f < 3$ GHz)

PSS/SSS	= Primary/secondary synchronization signals
PBCH	= Physical broadcast channel
SS/PBCH block	= SS and PBCH are always transmitted together in a block
SS/PBCH burst set	= A group of 4, 8 or 64 SS/PBCH blocks, depending on the SCS (in this example, burst set = 4 blocks)
Frame	= 10 ms = 10 slots
1 slot	= 1 subframe = 1 ms
SC	= Subcarrier
Start SS/PBCH symbol	= $\{2, 8\} + 14n$, where $n = 0, 1$; Start symbols = 2, 8, 16 and 22
RB offset	= Defines the SS/PBCH allocation position in the frequency (see RB Offset/RB Offset (15 kHz SCS)/RB Offset (60 kHz SCS)); within an RB, the allocation can be further shifted (see SC Offset/SC Offset (15 kHz SCS)/SC Offset (60 kHz SCS))
Periodicity	= Defines how often the burst set is repeated (in this example, periodicity = 10 ms; the SS/PBCH burst set is repeated every frame), see Burst Set Periodicity
1st URB	= First usable resource block (URB), that is the first RB within the TxBW, see Figure 3-2
Carrier center	= Center frequency of the cell
Δf	= Offset between the center frequency of SS/PBCH block and the carrier center frequency

The SSs are allocated on predefined symbols but the allocated resource blocks and subcarriers are user-defined. The TS 38.213 specifies the number of and the start of the symbols depending on the used SCS and frequency range, see Figure 3-3. In 3GPP, these different start positions of the SS/PBCH blocks are referred as case A to case E.

3.8 Carrier Bandwidth Part (BWP)

In 5G NR, the bandwidth used for the communication with a specific user (UE) is typically smaller than the channel bandwidth. These user-specific bandwidths are managed by the different-sized, so called (carrier) bandwidth parts (BWP). Each of BWP uses its own numerology and thus can use different SCS, symbol duration and CP length (see Table 3-2).

Using BWPs with different bandwidths allows flexible resource allocation, for example, for support of UE with reduced bandwidth capabilities or supporting non-contiguous spectrum. Bandwidth parts can overlap, in which case UEs share the resource elements.

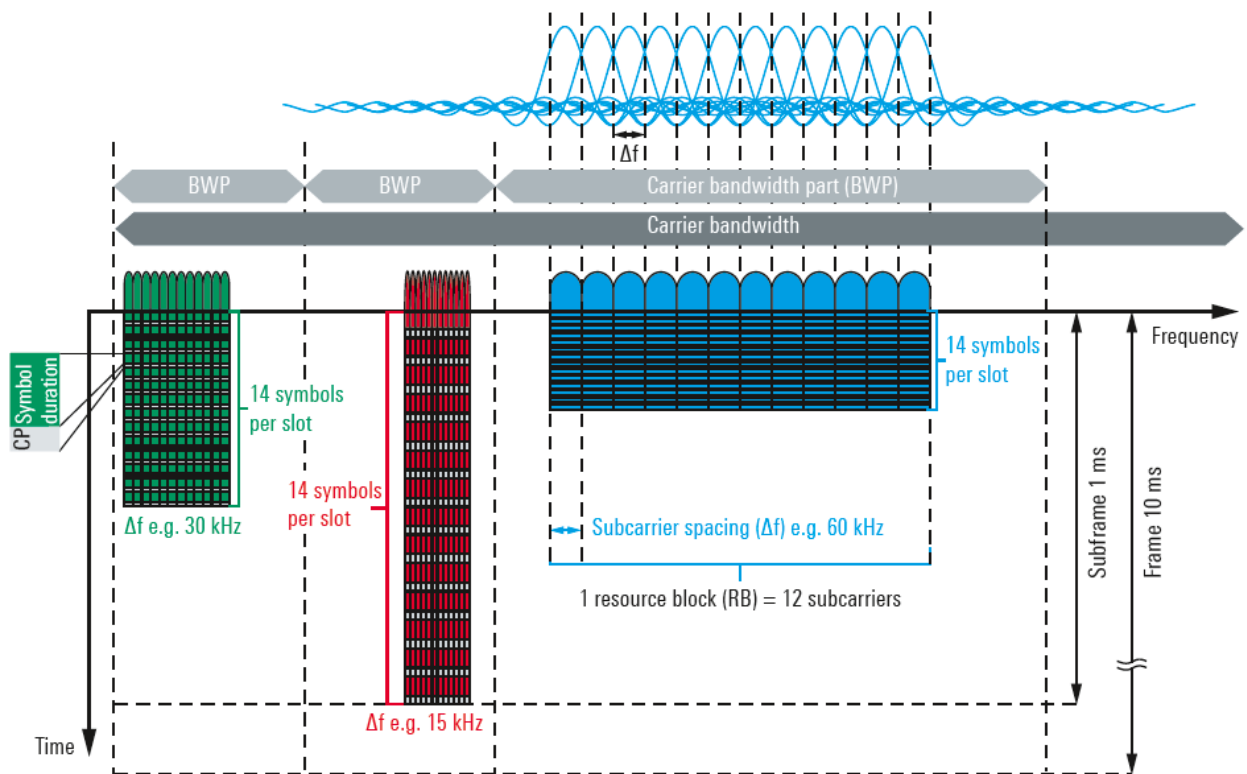


Figure 3-4: 5G NR numerology and BWP [1]

A BWP is a contiguous set of physical resource blocks that has the same subcarrier spacing and thus numerology. UEs can be configured with up to 4 BWPs in DL and UL, but only one can be active at a time. UEs are not expected to receive and transmit outside its active BWP.

3.9 Carrier Aggregation

The 5G NR specification defines the aggregation of multiple 5G carriers. Two up to 16 component carriers (CC, in 5G phase 1) can be grouped to provide wider transmission bandwidths. Up to 1 GHz of spectrum can be aggregated. A UE could simultaneously receive or transmit on one or multiple CCs depending on its capabilities.

Spectrum deployment can be either contiguous with adjacent component carriers, or non-contiguous with non-adjacent component carriers. The individual component carriers can belong to the same frequency band (intra-band) or to different frequency bands (inter-band). Component carriers transmitted by the same base station provide the same cell coverage.

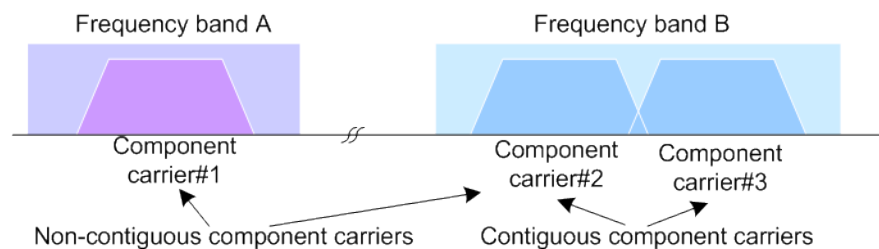


Figure 3-5: Carrier aggregation

The 5G NR specification defines two different approaches about informing the UE about the scheduling for each band: a separate PDCCH for each carrier or a common PDCCH for multiple carriers (cross-carrier scheduling).

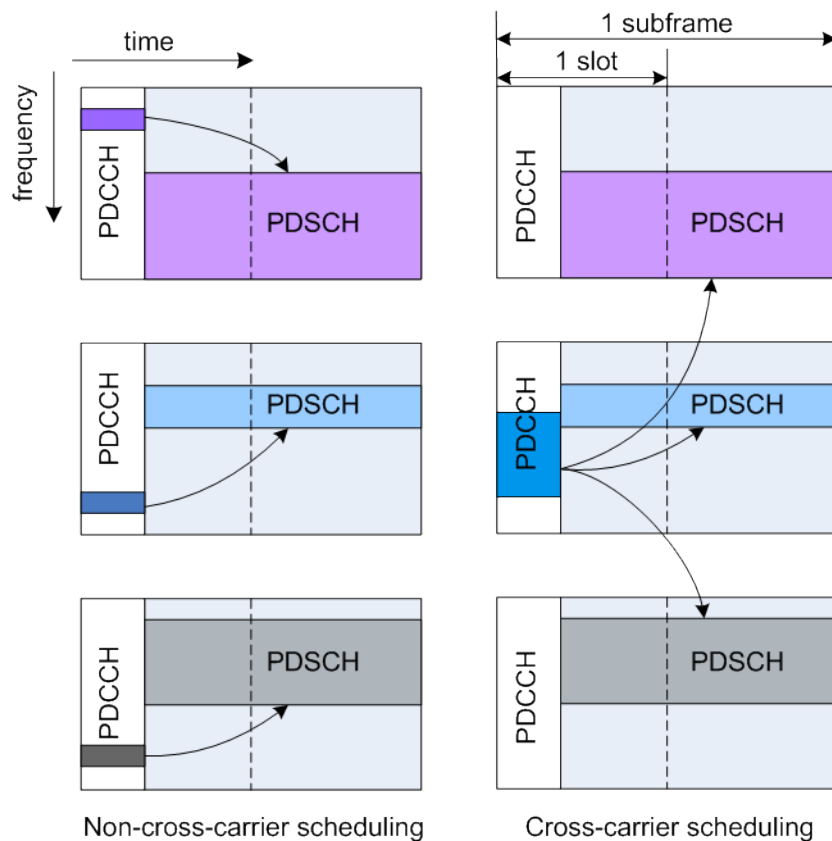


Figure 3-6: 5G NR scheduling approaches

In the dedicated/non-cross-carrier approach, the PDCCH on a component carrier assigns PDSCH resources on the same component carrier.

In the cross-carrier approach, the PDCCH on a component carrier assigns resources on one of multiple component carriers. The component carriers are identified by the DCI field CIF (carrier indicator field).

Related settings

See:

- Enable fading on the SMW.
Set "System Config > System Configuration > Fading/Baseband Config > Mode" to "Advanced".
- [Chapter 6.2.2, "Carriers Settings"](#), on page 45
Set at least 2 carrier.

3.10 Antenna Port Mapping

Antenna ports are not physical antennas, but rather are a logical concept. Each antenna port carries certain signal components (= physical channels) that have to be transmitted under the same conditions. Physical channels can be transmitted on a sin-

gle antenna port, or on several antenna ports. Each antenna port in turn can be mapped to one of the physical antennas. Typically, one physical antenna combines several antenna ports. However, one specific antenna port can also be transmitted on more than one physical antenna.

In this implementation, you can map the antenna ports used by the various physical channels defined by 3GPP to one or two layer configurations in the dedicated "Antenna Ports" dialogs.

These dialogs display the antenna port-mapping settings in a table form, as an antenna port-mapping table.

The mapping table is a matrix with number of rows equal to the number of physical Tx antennas (basebands) and number of columns equal of the number of antenna ports (AP). The available antenna ports depend on the current configuration. The yellow matrix elements in the mapping table indicate the default antenna port to physical antenna (TX antenna/baseband) mapping.

The number of rows depends on the selected "System Configuration".

Related settings:

- "Users/BWPs > UL BWPs > NZP CSI-RS" > [Resource-Settings > Antenna Port Mapping](#)
- "Users/BWPs > UL BWPs > SRS > SRS Resource Set Settings" > [Antenna Ports > Config](#)
- "Scheduling > PDSCH/PUSCH" > [Antenna Ports](#)

3.11 5G NR Channels and Signals Overview

Channels:

- DL: PBCH, PDCCH (CORESET), PDSCH
- UL: PRACH, PUCCH, PUSCH

Signals:

- DL: PSS/SSS, CSI-RS, DMRS (for PBCH, PDCCH, PDSCH), TRS, PTRS
- UL: DMRS (for PUCCH, PUSCH), PTRS, SRS

The following channels and signals are supported in the current firmware version:

- PSS/SSS, PBCH, PDCCH (CORESET), PDSCH, PUSCH, PUCCH; PBCH incl. MIB, PDSCH, PDCCH and PUSCH incl. DMRS, PTRS, SRS, CSI-RS

Related settings:

- [Chapter 6.2.10, "PBCH Settings"](#), on page 73
- [Chapter 6.3.4.5, "ZP CSI-RS Settings"](#), on page 103 and [Chapter 6.3.4.6, "NZP CSI-RS Settings"](#), on page 106
- ["PTRS Config ..."](#) on page 95 and [Chapter 6.5.6, "PTRS Settings"](#), on page 167

- [Chapter 6.3.4.2, "PDSCH Settings"](#), on page 87
- [Chapter 6.3.5.4, "PUSCH Settings"](#), on page 121 and [Chapter 6.3.5.5, "PUSCH UCI Settings"](#), on page 132
- [Chapter 6.3.5.6, "SRS Settings"](#), on page 134
- [Chapter 6.5, "PDSCH/PUSCH Settings"](#), on page 153
- [Chapter 6.6, "CORESET Settings"](#), on page 173
- [Chapter 6.3.5.2, "PUCCH Settings"](#), on page 116 and [Chapter 6.7, "PUCCH Settings"](#), on page 199
- [Chapter 6.8, "PRACH Settings"](#), on page 205

3.12 Conflict Handling

The [TS 38.211](#) defines channels and signals that share the available resources in the time-frequency domain.

Flexible scheduling is one of the main functions in 5G new radio. But this flexibility in scheduling can lead to allocations of the same or different type that overlap fully or partly in the time-frequency domain. Because the specification does not define all possible combinations of channels and signals, a proprietary internal mechanism decides what bits are mapped to the affected subcarriers.

Conflict handling depends on the priority of the overlapping channels, see [Table 3-3](#).

Table 3-3: Priority

Priority	Channel or signal
High	CORESET, PBCH, PDSCH, PRACH, PUCCH All signals
Middle	PDSCH PUSCH
Low	Dummy allocations

Conflict handling rules:

- Overlapping of signals and/or channels with different priorities
The channel with the higher priority is transmitted completely. Conflict is not indicated, not in the "Scheduling" dialog or in the "Time Plan".
- Overlapping of allocations with the same priority
If channels with the same priority are scheduled to share resources, the signals of the channels are added.
Both the "Scheduling" dialog and the "Time Plan" indicate conflict.

Example: Unresolved conflict

Figure 3-7 shows the scheduling table and the time plan of overlapping allocations (PDSCH) with the same priorities.

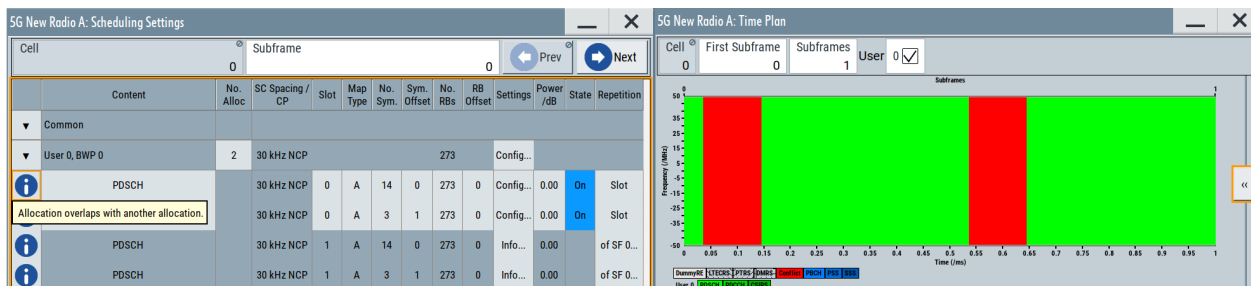


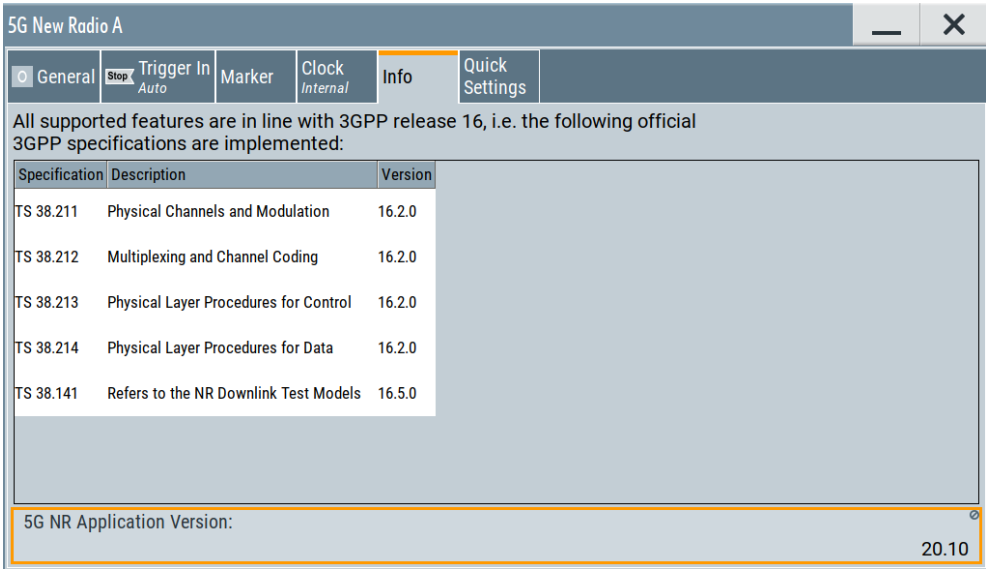
Figure 3-7: Overlapping allocations

4 Find Out the Implemented 3GPP Specification

The "Info" dialog displays the currently supported version of the 3GPP standard and the installed version of the 5G New Radio application.

Access:

- Select "5G New Radio > Info".



Settings:

3GPP Specification Table.....	30
5G NR Application Version.....	30

3GPP Specification Table

Displays the 3GPP specifications and versions implemented in the R&S SMW features.

Remote command:

[:SOURce] :BB:NR5G:VERSion? on page 436

5G NR Application Version

Displays the installed version of the 5G New Radio application.

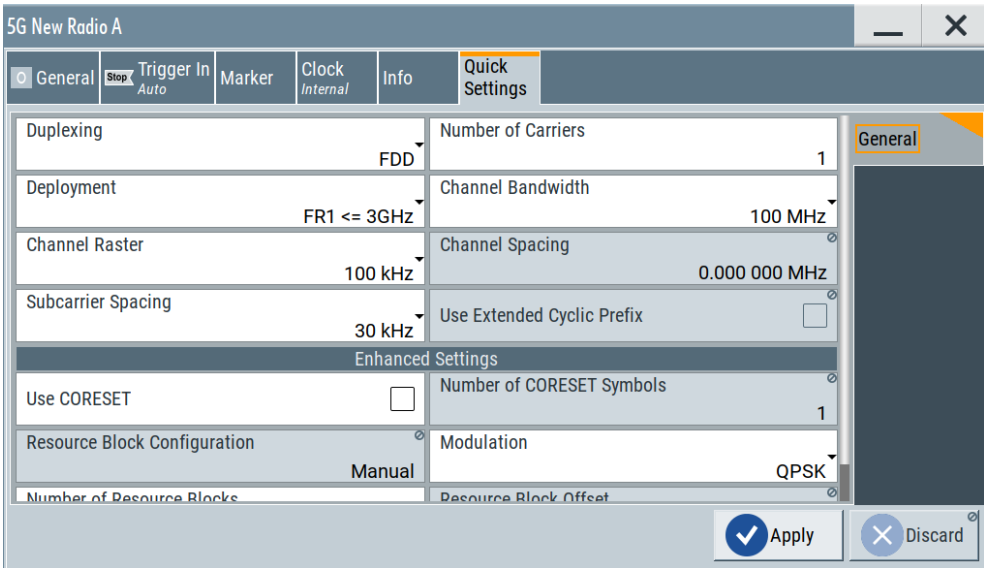
Remote command:

[:SOURce] :BB:NR5G:PLVersion? on page 437

5 5G New Radio Quick Settings

Access:

- 1. Select "Baseband > 5G NR".
- 2. Select "Quick Settings".



With the provided settings, you can quickly configure a 5G new radio signal. Configured is signal with the selected settings and one BWP, one user, one frame and if TDD is used, the power mode active subframe is selected automatically. If enabled, CORESET is configured, too (see "Use CORESET" on page 33).

The remote commands required to define these settings are described in [Chapter 12, "Remote-Control Commands"](#), on page 405.

Settings:

5.1 General Settings

Access:

- 1. Select "Baseband > 5G NR".
- 2. Select "Quick Settings > General".

Settings:

Duplexing.....	32
Number of Carriers.....	32
Deployment.....	32

Channel Bandwidth.....	32
Channel Raster.....	32
Channel Spacing.....	32
Subcarrier Spacing.....	33
Use Extended Cyclic Prefix.....	33
Use CORESET.....	33
Number of CORESET Symbols.....	33
Resource Block Configuration.....	33
Modulation.....	33
Number of Resource Blocks.....	34
Resource Block Offset.....	34
Apply.....	34
Discard.....	34

Duplexing

Selects the duplexing mode.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:DUPLexing` on page 439

Number of Carriers

Selects the number of carriers. Needed for carrier aggregation.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:NCARier` on page 439

Deployment

Selects one of the frequency ranges, specified for 5G NR transmission, see [Table 3-1](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:CARDepty` on page 438

Channel Bandwidth

Selects the bandwidth of the node carrier from a list with predefined values, see [Table 3-1](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:CBW` on page 438

Channel Raster

Sets the "Channel Raster" based on the set "Deployment".

If "Deployment" is set to "FR1 ≤ 3GHz" or "FR1 > 3GHz", the "Channel Raster" can be set to 15 kHz or 100 kHz.

If "Deployment" is set to "FR2", the "Channel Raster" is set to 60 kHz.

"Channel Raster" is not displayed when the "Number of Carriers" is shown inactive.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:CHRaster` on page 438

Channel Spacing

Displays the value for the "Channel Spacing". It is by default automatically calculated by the set "Channel Raster" and the set "Channel Bandwidth".

The value can be adjusted manually, but is recalculated if the "Channel Raster" or the "Channel Bandwidth" is adjusted.

"Channel Spacing" is not displayed when the "Number of Carriers" is shown inactive. In this case, it is used like "Carrier Spacing" equals 0.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:CHSPacing` on page 438

Subcarrier Spacing

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:SCSPacing` on page 439

Use Extended Cyclic Prefix

Show if the extended cyclic prefix is enabled or disabled.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:ECPState` on page 439

Use CORESET

If enabled, a CORESET is scheduled with the number of symbols, set with the parameter [Number of CORESET Symbols](#).

All other configurations are performed automatically. The CORESET is scheduled at the beginning of the slot. PDSCH is shortened or reallocated automatically.

CORESET is fully allocated; dummy REs are used.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:ES:CS:STATE` on page 440

Number of CORESET Symbols

Sets the number of symbols in the CORESET.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:ES:CSTLength` on page 440

Resource Block Configuration

Sets the configuration mode for the resource block configuration.

This value is according to TS 38.521 table 6.1-1.

The setting is only configurable, when the following preconditions are met.

- Link direction is set to uplink.
- Deployment scenario for FR1 must be ≤ 3 GHz or ≥ 3 GHz.
- Channel bandwidth is not set to 70 MHz, 200 MHz or 400 MHz

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:GENeral:ES:RBConfig` on page 440

Modulation

Sets the modulation scheme.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:ES:MOD` on page 440

Number of Resource Blocks

Sets the number of resource blocks.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:ES:RBNumber` on page 441

Resource Block Offset

Sets the resource block offset.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:GENeral:ES:RBOffset` on page 441

Apply

Select to apply the configuration.

Note: Settings which are not configured by the "Quick Settings" are set to their default values by using the "Apply" button.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:APPLY` on page 443

Discard

Ignores the configuration, i.e. the configuration in the "Quick Settings" dialog is not applied; configurations made in this dialog are lost.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:DISCard` on page 443

5.2 Frame Format

Access:

1. Select "Baseband > 5G NR".
2. Select "Quick Settings > General".
3. Select "Duplexing > TDD".
4. Select "Frame Format".

You can configure the number of slots in the frame, the slot format and the special slot configuration. The resulting configuration is graphically represented.

5G New Radio A

General **Step Trigger In** Marker Clock Info **Quick Settings***

Slot Period: 10 Slots

Number of DL Slots: 9 Number of Special Slots: 1 Number of UL Slots: 0

General Frame Format

Special Slot Configuration

Slot Format Index: 0

Number of DL Symbols: 14 Number of Guarded Symbols: 0 Number of UL Symbols: 0

Apply Discard

Settings:

Slot Period	35
Number of DL Slots	35
Number of Special Slots	35
Number of UL Slots	35
Slot Format Index	36
Number of DL Symbols	36
Number of Guarded Symbols	36
Number of UL Symbols	36

Slot Period

Sets the duration of the frame in slots.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:FRMFormat:SLENgth` on page 441

Number of DL Slots

If "Link Direction > Downlink", sets the number of DL slots in the frame.

In uplink duration, the value is calculated as follows:

"Number of DL Slots" = "Slot Period" - "Number of UL Slots" - "Special Slots".

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:FRMFormat:NDLSlots` on page 441

Number of Special Slots

Indicates that there is 1 special slot in the frame.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:QCKSet:FRMFormat:NSSLots?` on page 442

Number of UL Slots

If "Link Direction > Downlink", sets the number of UL slots in the frame.

In downlink duration, the value is calculated as follows:

"Number of UL Slots" = "Slot Period" - "Number of DL Slots" - "Special Slots".

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:FRMFormat:NULSlots` on page 442

Slot Format Index

Sets the special slot format index according to [TS 38.213](#) and thus defines the slot structure.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:FRMFormat:SSC:SLFMT` on page 442

Number of DL Symbols

Indicates the number of DL symbols, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:FRMFormat:SSC:NDLSymbols` on page 442

Number of Guarded Symbols

Indicates the number of guard symbols, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:FRMFormat:SSC:NGSYmbols` on page 443

Number of UL Symbols

Indicates the number of UL symbols, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:QCKSet:FRMFormat:SSC:NULSymbols` on page 443

6 5G New Radio Configuration and Settings

Access:

- Select "Baseband > 5G NR".

The remote commands required to define these settings are described in [Chapter 12, "Remote-Control Commands"](#), on page 405.

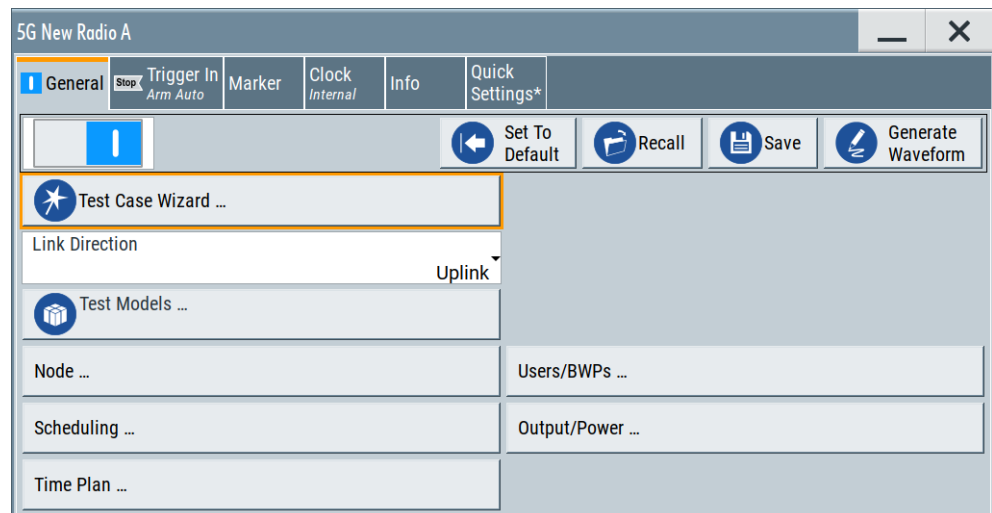
Settings:

• General Settings	37
• Node Settings	43
• Users/BWPs Settings	78
• Scheduling Settings	142
• PDSCH/PUSCH Settings	153
• CORESET Settings	173
• PUCCH Settings	199
• PRACH Settings	205

6.1 General Settings

Access:

- Select "Baseband > 5G NR".



This dialog comprises the standard general settings, the default and the "Save/Recall" settings, and access to dialogs with further settings.

Settings:

State.....	38
Set to Default.....	38
Save/Recall.....	38
Generate Waveform File.....	39
Test Case Wizard.....	40
Link Direction.....	40
Test Models.....	40
L User Files.....	40
L Filter Test Models.....	41
L Test Models.....	41
L Frequency Range.....	42
L Duplexing.....	42
L Bandwidth.....	42
L Subcarrier Spacing.....	42
L Select.....	42
Node.....	42
Users/BWPs.....	42
Scheduling.....	42
Output/Power.....	42
Logfile Generation.....	43

State

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Remote command:

[:SOURce<hw>] :BB:NR5G:STATe on page 436

Set to Default

Calls the default settings. The values of the main parameters are listed in the following table.

Parameter	Values
"State"	Not affected by "Set to Default"
"Link direction"	Downlink
"Channel bandwidth"	100 MHz
"Dummy REs > State"	On
"Dummy REs > SC Spacing/CP"	30 kHz NCP

Remote command:

[:SOURce<hw>] :BB:NR5G:PRESet on page 432

Save/Recall

Accesses the "Save/Recall" dialog, that is the standard instrument function for storing and recalling the complete dialog-related (or in coupled sources entity-related) settings in a file. The provided navigation possibilities in the dialog are self-explanatory.

The filename and the directory, in which the settings are stored, are user-definable; the file extension is predefined.

On recall, the instrument checks if the saved configuration is compatible with the software and hardware options installed on the current instrument. For example, the number of block outputs (see [Output Settings](#)) and the number of internal entities (i.e. the currently selected system configuration) have to be the same.

See also, chapter "File and Data Management" in the R&S SMW user manual.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:CATalog?` on page 433

`[ :SOURce<hw> ] :BB:NR5G:SETTing:LOAD` on page 433

`[ :SOURce<hw> ] :BB:NR5G:SETTing:STORe` on page 433

`[ :SOURce<hw> ] :BB:NR5G:SETTing:DEL` on page 433

Generate Waveform File

With enabled signal generation, triggers the instrument to save the current settings of an arbitrary waveform signal in a waveform file with predefined extension `*.wv`. You can define the filename and the directory, in that you want to save the file.

Using the ARB modulation source, you can play back waveform files and/or process the file to generate multi-carrier or multi-segment signals.

If the current configuration uses coupled baseband sources and the baseband block has more than one output, with this function you trigger the software to generate the signals for all outputs. Created is a subset of waveform files, where the number of files corresponds to the number the outputs and the filenames follows the structure:

`<user-defined file name>_<output#-1>.wv.`

Example:

Select "System Config > Fading/Baseband Config > Mode > Advanced"

Select "System Config > Fading/Baseband Config > Baseband (Tx Antennas) = 4"

Select "System Config > Fading/Baseband Config > BB Source Config > Coupled"

Select "Apply"

Select "Baseband > 5G New Radio > General > State > On"

Select "Baseband > 5G New Radio > Output/Power > Output" and observe the number of outputs.

Select "5G New Radio > General > Generate Waveform > On"

In the "Generate Waveform" dialog, use the default directory and enter "Filename = 5gnr". Select "Save".

Select SAVE/RCL, select "File/Recall > File Manager" and in the directory tree open the default directory.

Displayed are four files, 5gnr.wv, 5gnr1.wv, 5gnr2.wv and 5gnr3.wv.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:WAVEform:CREate` on page 436

Test Case Wizard

Accesses the "Test Case Wizard" dialog, see [Chapter 9, "Performing BS Tests According to TS 38.141 Specifications"](#), on page 237.

Link Direction

Selects the transmission direction.

"Downlink" The transmission direction selected is base station to user equipment. The signal corresponds to that of a base station.

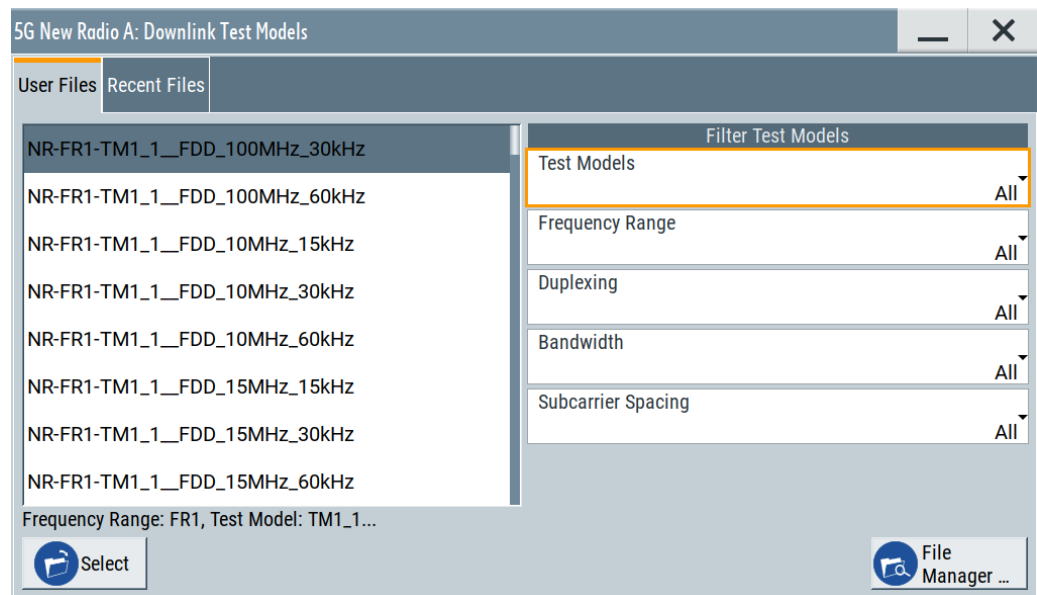
"Uplink" The transmission direction selected is user equipment to base station. The signal corresponds to that of a user equipment.

Remote command:

[:SOURce<hw>] :BB:NR5G:LINK on page 432

Test Models

Accesses a dialog for selecting of files with predefined 5G NR configurations.

**User Files ← Test Models**

You can select one of the 5G NR Test Models (NR TM) defined in [TS 38.141-1/TS 38.141-2](#) and [TS 38.104](#).

The NR FR1/FR2 test models are predefined configurations of 5G NR settings. The 3GPP specifications define three main groups of test models, the NR-RF-TM1, NR-FR-TM2 and NR-FR-TM3. Each TM is defined for a subset of different channel bandwidths and subcarrier spacings.

The test model uses common physical channel parameters for PDSCH and PUCCH, and specific physical channels parameters per test model.

The following naming convention is used:

NR-<FR>-TM<TestModel>__<Duplexing>_<ChBW>MHz_<SCS>kHz, where:

- <FR> designates 5G NR test modules for the frequency range **FR1** and **FR2**
- <TestModel> is the TM designation according to [TS 38.141-1/TS 38.141-2](#)

- <Duplexing> indicates if FDD or TDD duplexing is used
- <ChBW> is one of the defined base station channel bandwidths: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz
- <SCS> indicates the subcarrier spacing of 15 kHz, 30 kHz or 60 kHz.

"NR FR1/FR2 Test Models"

The test models are defined for the following test purpose:

5G NR Test Model	Defined for tests on
NR-FR1-TM1.1 NR-FR2-TM1.1	• BS output power • TAE • Unwanted emissions • Occupied bandwidth • ACLR • Transmitter intermodulation • Transmitter spurious emissions • Operating band unwanted emissions
NR-FR1-TM1.2	• ACLR • Unwanted emissions • Operating band unwanted emissions
NR-FR1-TM2/2a* NR-FR2-TM2	• Total power dynamic range (lower OFDM symbol power limit at min power) • EVM of single 64QAM/256QAM* PRB allocation (at min power) • Frequency error (at min power)
NR-FR1-TM3.1/3.1a* NR-FR2-TM3.1	• Output power dynamics • Transmitted signal quality (Frequency error and EVM for 64QAM/256QAM* modulation, at max power) • Transmitted signal quality • Frequency error • EVM for 64QAM/256QAM* modulation (at max power)
NR-FR1-TM3.2	• Transmitted signal quality • Frequency error • EVM for 16QAM modulation
NR-FR1-TM3.3	• Transmitted signal quality • Frequency error • EVM for QPSK modulation

Remote command:

[:SOURce<hw>] :BB:NR5G:SETTing:TMOdel:UL:CATalog? on page 434

[:SOURce<hw>] :BB:NR5G:SETTing:TMOdel:DL:CATalog? on page 434

Filter Test Models ← Test Models

Applies the selected filter to the files shown in [User Files](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:SETTing:TMOdel:FILTer:CATalog on page 436

Test Models ← Filter Test Models ← Test Models

Applies a test model filter to the files listed in [User Files](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:SETTing:TMOdel:FILTer:TMOdel on page 434

Frequency Range ← Filter Test Models ← Test Models

Applies a frequency range filter to the files listed in [User Files](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:FILTer:FREQ` on page 435

Duplexing ← Filter Test Models ← Test Models

Applies a duplexing filter to the files listed in [User Files](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:FILTer:DUPLexing` on page 435

Bandwidth ← Filter Test Models ← Test Models

Applies a bandwidth filter to the files listed in [User Files](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:FILTer:BW` on page 435

Subcarrier Spacing ← Filter Test Models ← Test Models

Applies a subcarrier spacing filter to the files listed in [User Files](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:FILTer:SCS` on page 435

Select ← Test Models

Loads the settings defined in the selected test model.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:UL` on page 434

`[ :SOURce<hw> ] :BB:NR5G:SETTing:TMODe1:DL` on page 434

Node

Accesses the "Node" dialog, see [Chapter 6.2, "Node Settings"](#), on page 43.

Remote command:

n.a.

Users/BWPs

Accesses the "Users/BWPs" dialog, see [Chapter 6.3, "Users/BWPs Settings"](#), on page 78.

Remote command:

n.a.

Scheduling

Accesses the "Scheduling" dialog, see [Chapter 6.4, "Scheduling Settings"](#), on page 142.

Remote command:

n.a.

Output/Power

Accesses the "Output/Power" dialog for setting the signal output and power-related settings.

The symbol  in the "Output/Power" field indicates the presence of [Conflicts](#) in the [Output Settings](#).

See:

- [Chapter 7.6, "Output Settings"](#), on page 220
- [Chapter 7.7, "Time Domain Windowing Settings"](#), on page 224.

Remote command:

n.a.

Logfile Generation

Accesses the "Logfile Generation" dialog, see [Chapter 11, "Generating Logfiles for Design Cross-Verification"](#), on page 401.

6.2 Node Settings

Access:

- Select "Baseband > 5G New Radio > Node".

The settings in this dialog describe the basic physical structure of the generated signal.

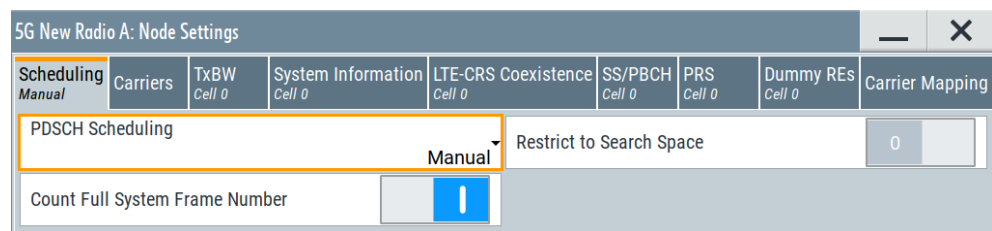
Settings:

• Scheduling	43
• Carriers Settings	45
• Transmission Bandwidth (TxBW) Settings	51
• System Information Settings	54
• LTE-CRS Coexistence Settings	56
• SS/PBCH Settings	58
• PRS settings	65
• Dummy REs Settings	70
• Carrier-Mapping Settings	72
• PBCH Settings	73

6.2.1 Scheduling

Access:

1. Select "5G New Radio > Link > Downlink".
2. Select "5G New Radio > General > Node > Scheduling".

**Settings:**

PDSCH Scheduling	44
Restrict to Search Space	44
Count Full System Frame Number	45

PDSCH Scheduling

Defines whether the PDSCH scheduling is performed manually or according to the configuration made for the DCIs.

- "Manual" This mode is the default scheduling mode and the mode with full flexibility; you can configure any of the available settings. There is no cross-reference between the settings made for the CORESET DCIs and the PDSCHs settings. You are responsible for the content of the PDSCH allocations.
- "Auto/DCI" This mode assures a 3GPP compliant signal; the PDSCH allocations are configured automatically according to the configuration of the CORESET DCIs.
- The following settings are configured automatically:
- "Users/BWPs > Properties" > [DSCH Channel Coding](#) = "On"
 - "Scheduling > CORESET > Custom DCI" > [Channel Coding](#) = "On"
 - For all DCI 1_1 and 1_0 in "Scheduling > CORESET > DCI Table", [Create PDSCH](#) = "On"
 - In the "Scheduling" dialog, you can configure only [Content](#) = "CORSET" (the PDSCH allocations are configured automatically).

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:SCHeduling:MODE](#) on page 542

Restrict to Search Space

The term search space describes a set of CCEs that a UE monitors. The UE can decode only the control information on a PDCCH/CORESET that is transmitted over CCEs within the search space this UE monitors.

This parameter defines how the search space and the CCE indexes are defined. Together with other parameters it influences the way the search space is defined. For details, see ["Search Space"](#) on page 177.

- "Off" Define the search space by the CCE start index, see [CCE Index](#).

"On" The CCE start indexes are selected automatically so that they are within the search space.
The "Scheduling > CORESET > Payload" > [CCE Index](#) indicates the selected CCE index where the value is defined by the combination of [Aggregation Level](#) and candidate number ([Candidate](#)).

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:SCHeduling:RSSPace](#) on page 542

Count Full System Frame Number

Option: R&S SMW-B9/-K148.

Enables the full counting of the system frame number carried by the PBCH block from 0 to 1023, independent of the configured ARB [Sequence Length](#).

If [System Frame Number Offset](#) is set, the counting starts at the configured SFN offset value and restarts when the SFN offset value is reached again, as follows: offset, (offset+1), (offset+2), ..., 1023, 0, 1, 2, ..., (offset-1).

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:SCHeduling:SFN:STATe](#) on page 543

6.2.2 Carriers Settings

Access:

1. **Carriers** settings for downlink:

- Select "5G New Radio > General > Link Direction > Downlink".
- Select "5G New Radio > General > Node > Carriers".

Carrier	Cell ID	CIF Pres.	Sched. By	CIF	Deployment	Frequency /GHz	Channel BW	DMRS TypeA Position	Power /dB	Δf to Output /MHz	Cell Mapped
Cell 0	0	☐	Cell 0	0	FR1 <= 3GHz	1.000 000 0	100 MHz	2	0.00	0.000 000	On

This dialog comprises the carrier settings for downlink.

2. **Carriers** settings for uplink:

- Select "5G New Radio > General > Link Direction > Uplink".
- Select "5G New Radio > General > Node > Carriers".

, Cell 0, 0, FR1 <= 3GHz, 1.000 000 0, 100 MHz, 0, 2, 0.00, 0.000 000, and On."/>

Carrier	Cell ID	CIF Pres.	Sched. By	CIF	Deployment	Frequency /GHz	Channel BW	Timing Advance Offset	DMRS TypeA Position	Power /dB	Δf to Output /MHz	Cell Mapped
Cell 0	0	☐	Cell 0	0	FR1 <= 3GHz	1.000 000 0	100 MHz	0	2	0.00	0.000 000	On

This dialog comprises the carrier settings for uplink.

Settings:

Number of Carriers	46
RF Phase Compensation	48
Carrier table	48
L Carrier	48
L Cell Indicator	48
L Cell ID	48
L N1 ID/N2 ID	49
L CIF Present	49
L Scheduled By	49
L CIF	49
L Deployment	49
L Frequency in GHz	49
L Channel Bandwidth	50
L Timing Advance Offset	50
L DMRS Type A Position	51
L Delta f to Output/MHz	51
L Cell Mapped	51

Number of Carriers

Sets the number of simulated carriers. The carrier table displays one carrier per row.

According to the 3GPP specifications, carrier aggregation is user-specific and thus different users served by the same base station can use different carriers. Moreover, the different users can also have different primary cell (PCell). In this implementation, however, all users use the same carrier aggregation configuration, or with other words, the primary and secondary cells (SCells) are the same for all configured users. Hence, there are *16 carriers per node, not per user*.

The number of simulated carriers is set automatically. It has the following default values depending on the selected system configuration:

- For "System Configuration > BB Sources" = "Separate", "Number of Carriers" = 1.
- For "System Configuration > BB Sources" = "Coupled", "Number of Carriers" = "System Configuration > Entities".
- For "System Configuration > BB Sources" = "Coupled Sources per Entity", "Number of Carriers" = 1.

You can reconfigure the "Number of Carriers" according to your needs.

The changes in the number of carriers are reflected in the [Carriers Settings](#) tab and in the [Carrier-Mapping Settings](#) tab.

Set the "Number of Carriers ≥ 2 " to enable carrier aggregation. The maximum value is 16 carriers.

Example: Reconfiguring the number of carriers

Usually the "System Configuration" of the instrument determines the usage.

You can change the "Number of Carriers" if you need to use an existing system configuration originally intended for [Carrier Aggregation](#) for other purposes.

For example, you can configure MIMO or multi-user usage in instruments with no fading boards, i.e. R&S SMW-B14 or R&S SMW-B15 by changing the number of carriers.

If you configure a 2x1x1 coupled system in an R&S SMW-B14 or R&S SMW-B15, you cannot use this configuration for MIMO.

The mapping characteristics of a 2x1x1 coupled system are shown in [Figure 6-1](#).

5G New Radio A: Node Settings							
Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	Dummy REs Cell 0	Carrier Mapping
Output	Carrier						
BB A	Cell 0						
BB B	Cell 1						

Figure 6-1: Carrier Mapping of a 2x1x1 coupled system

You can reduce the number of carriers from 2 to 1 to be able to use the instrument for MIMO.

If you reduce the number of carriers of a 2x1x1 system, the "Cell 1" is deactivated and the [Carrier-Mapping Settings](#) tab is adjusted automatically, as shown in [Figure 6-2](#).

5G New Radio A: Node Settings							
Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	Dummy REs Cell 0	Carrier Mapping
Output	Carrier						
BB A	Cell 0						
BB B	Cell 0						

Figure 6-2: Carrier Mapping of a 1x2x2 system

See [Example "Reconfiguring a 2x1x1 coupled system for MIMO usage"](#) on page 432 for a programming example.

Depending on the required number of carriers with MIMO configuration, you can need more than one R&S SMW. The signal generators need to be synchronized, for example, via a common trigger source and a connected external reference.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:NCARrier` on page 444

RF Phase Compensation

This parameter compensates the symbol phase difference caused by uplink/downlink processes, as specified in TS 38.211.

It uses the parameter [Frequency in GHz](#) to set the carrier frequency to be compensated.

If you set the "RF Phase Compensation" to "Manual", the [Frequency in GHz](#) field activates for manual input of the carrier frequency value to be compensated.

If you set the "RF Phase Compensation" to "Auto", the system determines the phase compensation frequency value from one of the configured RF frequencies automatically. If an "RF Phase Compensation" is assigned automatically, the [Frequency in GHz](#) grays out and is not editable. If no "RF Phase Compensation" can be assigned automatically, the system assigns a default value of 1 GHz and activates the [Frequency in GHz](#) field so that you can edit the default value.

If you set the "RF Phase Compensation" to "Off", the phase compensation is disabled and the [Frequency in GHz](#) shows a "-" symbol.

This value is set to "Auto" by default.

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:RFPhase:MODE](#) on page 444

Carrier table

Comprises the carrier settings. There is one table row per carrier.

Carrier ← Carrier table

Displays the automatically assigned carrier names.

Remote command:

via suffix at [CELL<ch>](#)

Cell Indicator ← Carrier table

Sets the cell indicator, to identify each of up to 16 carriers.

The cell indicator is unique and unambiguous index used to address the cell, for example for cross-carrier scheduling.

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:CINDicator](#) on page 446

Cell ID ← Carrier table

Sets the cell identity of the selected cell.

The physical layer cell ID N_{ID}^{cell} is used for synchronization between network and user equipment. It identifies a specific radio cell in the 5G NR network. The cell ID is a value between 0 and 1007, calculated as follows:

$$N_{ID}^{cell} = 3N_{ID}^{(1)} + N_{ID}^{(2)}$$

Unlike the [Cell Indicator](#), cells can use the same "Cell ID".

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:CELLid](#) on page 445

N1 ID/N2 ID ← Carrier table

Indicates the physical cell indicator group ($N_{ID}^{(1)}$) and the physical layer identity ($N_{ID}^{(2)}$), derived from the selected N_{ID}^{cell} ([Cell ID](#)).

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:N1ID? on page 446

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:N2ID? on page 446

CIF Present ← Carrier table

Defines whether the carrier indicator field (CIF) is included in the PDCCH DCI formats transmitted from the corresponding cell.

The CIF is present in each DCI format and identifies the component carrier that carries the PDSCH or PUSCH for the particular PDCCH in the cross-carrier approach.

According to the 5G NR specification, cross-carrier scheduling is enabled by higher-level signaling. To simulate a cross-carrier scheduling in this implementation, enable the "Node > Carriers > CIF Present" per each cell.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:CIFPresent on page 445

Scheduled By ← Carrier table

Displays in which cell coordinates the carrier aggregation, if there is intra-band CA.

Defines the component carrier/cell that signals the UL and DL grants for the selected cell. The signaling cell is determined by its cell index.

According to the 5G NR specification, cross-carrier scheduling has to be enabled per user and per component carrier.

To enable signaling for one particular cell on the primary cell, i.e. cross-carrier scheduling, set the "Scheduled By" to 0.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SCHBy on page 447

CIF ← Carrier table

Displays the value of the carrier indicator field (CIF).

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:CIF on page 445

Deployment ← Carrier table

Selects one of the frequency ranges, specified for 5G NR transmission, see [Table 3-1](#).

The selected frequency range (FR) determines the following parameters:

- [SC Spacing/CP](#)
- [Case](#) (i.e. the synchronization signal pattern).

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:CARDeplly on page 446

Frequency in GHz ← Carrier table

Sets the carrier frequency at which the [RF Phase Compensation](#) is applied.

If [RF Phase Compensation](#) is set to "Manual", this field is enabled for manual input of the carrier frequency value at which the phase compensation is applied.

If [RF Phase Compensation](#) is set to "Auto", this field is grayed out and the carrier frequency value is set automatically.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PCFReq on page 447

Channel Bandwidth ← Carrier table

Selects the bandwidth of the node carrier from a list with predefined values, see [Table 3-1](#).

The available values depend on the selected [Deployment](#). Together with the selected SCS ([SCS](#) or [SC Spacing/CP](#)), the channel bandwidth affects the number of available RBs ([N_RB](#) and [No. RBs](#)).

Signals, channels (e.g. SS/PBCH) and bandwidth parts (BWPs) can only be configured within the selected channel bandwidth. Thus, the value selected here sets the upper limit for the bandwidth-related settings.

You can select channel bandwidths that are larger than the baseband bandwidth available in the R&S SMW, because the used sample rate can be smaller than the channel bandwidth.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:CBW on page 446

Timing Advance Offset ← Carrier table

Option: R&S SMW-K148

If [Link Direction](#) > "Uplink", sets an offset ($N_{TA\ offset}$) to the timing advance value for UL/DL switching synchronization as specified in [TS 38.211](#).

The timing advance offset is set to 0 by default. The available $N_{TA\ offset}$ values depend on the set [Deployment](#).

[TS 38.133](#) specifies the $N_{TA\ offset}$ value as shown in [Table 6-1](#).

Table 6-1: Value of $N_{TA\ offset}$ as specified in TS 38.133

Frequency range and band of cell used for uplink transmission	$N_{TA\ offset}$ (unit: T_C)
FR1 FDD or TDD band with neither E-UTRA–NR nor NB-IoT–NR coexistence case	25600 (see note below)
FR1 FDD band with E-UTRA–NR and/or NB-IoT–NR coexistence case	0 (see note below)
FR1 TDD band with E-UTRA–NR and/or NB-IoT–NR coexistence case	39936 (see note below)
FR2	13792
Note: The UE identifies $N_{TA\ offset}$ based on the information $n\text{-TimingAdvanceOffset}$ as specified in TS 38.331 . If the UE is not provided with the information $n\text{-TimingAdvanceOffset}$, the default value of $N_{TA\ offset}$ is set as 25600 for FR1 band. In case of multiple UL carriers in the same timing advance group (TAG), the UE expects that the same value of $n\text{-TimingAdvanceOffset}$ is provided for all the UL carriers according to TS 38.213 and the value 39936 of $N_{TA\ offset}$ can also be provided for an FDD serving cell.	

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TAOffset on page 448

DMRS Type A Position ← Carrier table

Depending on the used mapping type (A or B), the demodulation reference signals (DMRS) are mapped to different symbols of the PDSCH/PUSCH allocation.

This parameter defines the position of the first DMRS symbol I_0 (dmrs-TypeA-Position) within the slot, if mapping type A is used.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TAPos on page 448

Delta f to Output/MHz ← Carrier table

("System Configuration > BB Source Config > Separated")

Shifts the signal relative to the center output frequency.

Use different frequency offsets to separate the channels of the configured and enabled cells.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:DFReq on page 447

Cell Mapped ← Carrier table

If enabled, the signal of the selected cell is mapped to the output.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch>:MAPped on page 447

6.2.3 Transmission Bandwidth (TxBW) Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "5G New Radio > General > Node > TxBW".

5G New Radio A: Node Settings									
Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	PRS Cell 0	Dummy REs Cell 0	Carrier Mapping	
Carrier: Cell		0							
Point A to Carrier Center				-49.140 MHz		Channel Bandwidth			
						100 MHz			
Resolve Conflicts									
	Use	N_RB	TxBW Offset	k0μ					
30 kHz	☒	273	0	0.0					
60 kHz	☐	135	0	-					

This dialog comprises the settings, related to the transmission bandwidths (TxBW). These settings include: the frequency offset between the center carrier and the Point A, the transmission bandwidth width in number of RBs and the $k_0\mu$.

Settings:

Cell.....	52
Point A to Carrier Center.....	52
Channel Bandwidth.....	52
Resolve Conflicts.....	53
TxBW table.....	53
L SCS.....	53
L Use.....	53
L N_RB.....	53
L TxBW Offset.....	53
L $k_0\mu$	54

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at CELL<ch>

Point A to Carrier Center

Sets the frequency offset between the reference Point A and the center carrier frequency.

The Point A is the reference point for the frequency-dependent parameters, for example TxBW Offset and RB Offset/RB Offset (15 kHz SCS)/RB Offset (60 kHz SCS).

See Chapter 3.6, "Transmission Bandwidths Tx BWs", on page 20.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:POINTa on page 449

Channel Bandwidth

Selects the bandwidth of the node carrier from a list with predefined values, see Table 3-1.

The available values depend on the selected Deployment. Together with the selected SCS (SCS or SC Spacing/CP), the channel bandwidth affects the number of available RBs (N_RB and No. RBs).

Signals, channels (e.g. SS/PBCH) and bandwidth parts (BWPs) can only be configured within the selected channel bandwidth. Thus, the value selected here sets the upper limit for the bandwidth-related settings.

You can select channel bandwidths that are larger than the baseband bandwidth available in the R&S SMW, because the used sample rate can be smaller than the channel bandwidth.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:CBW on page 446

Resolve Conflicts

Recalculates the frequency-dependent settings and thus redefines the frequency position of the TxBW.

Conflicts arise if:

- **TxBW Offset** is not a multiple integer of RBs for the corresponding numerology
- $k0\mu \neq \{-6, 0, 6\}$.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:RESolve on page 449

TxBW table

Comprises the frequency-related settings of the subcarrier spacings (SCS) supported for the selected **Deployment**.

Displayed are all supported SCS combinations. To enable a specific SCS, set **Use** > "On".

See [Chapter 3.6, "Transmission Bandwidths TxBW"](#), on page 20.

SCS ← TxBW table

Indicates the SCS to that the settings apply.

Remote command:

via block S<SCS>K

Use ← TxBW table

From all possible TxBW for a specific channel bandwidth, the base station decides which TxBW to use. This parameter defines whether the SCS is supported in the particular cell and if it is used by the base station.

At least one SCS must be used.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:USE on page 450
etc.

N_RB ← TxBW table

Indicates the number of available RBs N_{RB} within the TxBW for the selected **SCS** and **Channel Bandwidth**.

See [Chapter 3.6, "Transmission Bandwidths TxBW"](#), on page 20.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:NRB? on page 450
etc.

TxBW Offset ← TxBW table

Sets the usable RB to common RBs offset.

See [Chapter 3.6, "Transmission Bandwidths TxBW"](#), on page 20.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:OFFSet on page 450
etc.

$k_0\mu$ ← TxBW table

Indicates the value of the parameter $k_0\mu$, that defines the number of subcarriers the transmission bandwidth is shifted related to the carrier center.

The value is calculated automatically, based on the selected SCS and "Channel Bandwidth".

According to the specification, $k_0\mu = \{-6, 0, 6\}$. If value different than these allowed values is displayed, a conflict is indicated. Use the [Resolve Conflicts](#) function to recalculate the values.

The value $k_0\mu = \text{"-"}$ indicates that the SCS is not used ([Use](#) > "Off").

See [Chapter 3.6, "Transmission Bandwidths TxBW"](#), on page 20.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:KOMU? on page 451 etc.

6.2.4 System Information Settings

Access:

- Select "5G New Radio > General > Node > TxBW".

Scheduling <i>Manual</i>	Carriers	TxBW <i>Cell 0</i>	System Information <i>Cell 0</i>	LTE-CRS Coexistence <i>Cell 0</i>	SS/PBCH <i>Cell 0</i>	PRS <i>Cell 0</i>	Dummy REs <i>Cell 0</i>	Carrier Mapping
Carrier: Cell				0				
System Frame Number Offset				0				
SUL				off				
				PDSCH HARQ ACK Codebook semi-static				

This dialog comprises the system information settings. Use this dialog to configure an offset to the system frame number, for example, to change the hopping patterns.

A system frame number offset influences the following parameters:

- ZP CSI-RS [Bitmap](#)
- NZP CSI-RS [Bitmap](#)
- SRS positions (see [SRS Settings](#))
- [CCE Index](#) when [Restrict to Search Space](#) is enabled.
- SS/PBCH MIB [System Frame Number Start Offset](#)

Settings:

Cell.....	55
System Frame Number Offset.....	55
PDSCH HARQ ACK Codebook.....	55
SUL.....	55

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

System Frame Number Offset

Sets an offset value for the system frame number. The first generated frame starts with the given system frame number offset.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:SYINfo:SFOffset` on page 452

PDSCH HARQ ACK Codebook

Defines the HARQ ACK reporting according to the PDSCH HARQ ACK codebook.

"Semi-static"	Sets the HARQ ACK reporting according to the PDSCH HARQ ACK codebook to "semi-static". A UE reports HARQ ACK information for a corresponding PDSCH reception or SPS PDSCH release only in a HARQ ACK codebook that the UE transmits in a slot indicated by a value of a PDSCH-to-HARQ feedback timing indicator field in a corresponding DCI format 1_0 or DCI format 1_1. The UE reports NACK values for HARQ ACK information bits in an HARQ ACK codebook that the UE transmits in a slot not indicated by a value of a PDSCH-to-HARQ feedback timing indicator field in a corresponding DCI format 1_0 or DCI format 1_1.
"Dynamic"	Sets the HARQ ACK reporting according to the PDSCH HARQ ACK codebook to "dynamic". For a serving cell, an active DL BWP, and an active UL BWP the UE determines a set of occasions for candidate PDSCH receptions for which the UE can transmit corresponding HARQ ACK information in a PUCCH in slot . If the serving cell is deactivated, the UE uses as the active DL BWP for determining the set of occasions for candidate PDSCH receptions a DL BWP provided by the first active downlink BWP identifier.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:SYINfo:HACBook` on page 451

SUL

Defines whether the carrier supports supplementary uplink (SUL).

The supplementary uplink (SUL) uses one of several dedicated NR bands under 2 GHz (band n80 to n86). By this supplementary uplink, the lower frequency helps to increase the cell coverage in UL direction and the UL performance at the cell edge.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:SYINfo:SUL:STATe` on page 452

6.2.5 LTE-CRS Coexistence Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Enable a carrier that **supports SCS of 15 kHz**, for example select "5G New Radio > General > Node > Carriers > Carrier x > Channel BW = 50 MHz".
3. Select "Node > TxBW > 15 kHz > Use = On".
4. Select "Resolve Conflicts".
5. Select "LTE-CRS Coexistence".

Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	PRS Cell 0	Dummy REs Cell 0	Carrier Mapping
Carrier: Cell				0				
State				On				
Offset to Point A / 15 kHz SC Spacing				0	LTE Bandwidth / RBs		6	
vShift				0	LTE Antenna Ports		1	

You can configure LTE CRS signals, if the carrier supports 15 kHz subcarrier spacing, because 15 kHz is the subcarrier spacing used in LTE.

In this dialog, you configure the allocation of the LTE-CRS as defined in [TS 38.214](#) in terms of:

- Frequency position as offset to Point A and bandwidth within the RS are spread.
- Number of RS and their configuration defined based on the number of used LTE antenna ports and position of the CRS patterns in the frequency domain (vShift).

The resources reserved for the transmission of the LTE CRS are omitted by 5G NR, which influences among others the PDSCH resource mapping. The LTE CRS allocation must be known by the UE and by the BS.

Observe the LTE CRS resources on the "Time Plan". In the "Scheduling" dialog, observe how enabled LTE CRS reduces the number of available physical resources for PDSCH.

Settings:

Cell.....	57
State.....	57
Offset to Point A / 15 kHz SC Spacing.....	57
vShift.....	57
LTE Bandwidth / RBs.....	57
LTE Antenna Ports.....	57

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

State

Enable the LTE-CRS so that the configured resources are omitted by the 5G NR allocations.

This setting is useful if you simulate LTE and 5G NR coexistence scenarios, where the same frequency band is shared between LTE and 5G NR allocations.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:LTE:STATE` on page 453

Offset to Point A / 15 kHz SC Spacing

Sets the LTE carrier center subcarrier location (`carrierFreqDL`) as offset from (reference) point A.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:LTE:POINTa` on page 453

vShift

Sets the parameter `v-Shift` required to configure the LTE-CRS allocation.

In LTE, `vShift` is defined as function of the cell ID. This parameter is used to shift the CRS patterns in LTE neighbor cells in the range of 0 to 5 subcarriers and thus prevent CRS pattern overlapping.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:LTE:VShift` on page 453

LTE Bandwidth / RBs

Sets the LTE bandwidth (`carrierBandwidthDL`) as number of RBs and thus defines the bandwidth used for the LTE-CRS. The LTE-CRS always span the whole LTE bandwidth.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:LTE:CBW` on page 453

LTE Antenna Ports

Sets the parameter `nrofCRS-Ports` giving the number of antenna ports used for LTE-CRS.

The number of antenna ports defines the number and position of LTE CRS.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:LTE:NAP` on page 453

6.2.6 SS/PBCH Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "5G New Radio > General > Node > SS/PBCH".

5G New Radio A: Node Settings												
Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	PRS Cell 0	Dummy REs Cell 0	Carrier Mapping				
Carrier: Cell 0												
Number of SS/PBCH Patterns				Antenna Port		Offset Relative to						
1				4000		TxBw						
0	30 kHz NCP	126	6	0.000 000	B	4	1100	10 ms	0	Settings...	Config...	On

This dialog comprises the settings of the broadcast channel (PBCH) and the synchronization signals (SS). The SS and the PBCH are cell-specific and are always transmitted in a block. For more information, see [Chapter 3.7, "Synchronization Signals and SS/PBCH Block"](#), on page 22.

Settings:

Cell.....	58
Number of SS/PBCH Patterns.....	59
Antenna Port.....	59
Offset Relative to.....	59
SS/PBCH patterns table.....	59
L SC Spacing/CP.....	59
L RB Offset/RB Offset (15 kHz SCS)/RB Offset (60 kHz SCS).....	60
L SC Offset/SC Offset (15 kHz SCS)/SC Offset (60 kHz SCS).....	60
L Delta f to Carrier (Centers).....	61
L Case.....	61
L L.....	61
L Positions.....	62
L Burst Set Periodicity.....	62
L Half Frame Index.....	62
L PBCH Config.....	63
L Power/Antenna Ports Config.....	63
L PSS/SSS Power.....	64
L PBCH Power.....	64
L Position Index.....	64
L Mapping Coordinates.....	64
L Mapping table.....	64
L State.....	65

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:
via suffix at CELL<ch>

Number of SS/PBCH Patterns

Defines how many patterns for the synchronization signals and the PBCH are configured. There is one table row per pattern.

See also [Chapter 3.7, "Synchronization Signals and SS/PBCH Block"](#), on page 22.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:NSSPbch on page 455

Antenna Port

Indicates that antenna port 4000 is used.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CARMapping:AP4000 [:ROW<ch0>]
on page 455

Offset Relative to

Defines the reference point, relative to which the SS/PBCH is allocated in frequency domain.

"TxBW"	The frequency position of the SS/PBCH is set relative to the usable RBs that apply for the current numerology, i.e. to the start of the TxBW. If this reference point is used, you can select the SC Spacing/CP for that the following applies: • TxBW spans at least 20 RBs (i.e. N_RB > 20) • TxBW is enabled for this SCS (i.e. Use > "On").
"Point A"	The frequency position of the SS/PBCH is set relative to the position of point A.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:OFFSet on page 455

SS/PBCH patterns table

Comprises the configuration of the SS/PBCH transmissions.

You can enable different SS/PBCH patterns and configure their individual settings in the SS/PBCH pattern table. There is one table row per pattern. Each row describes a periodically repeating burst set with definable timing and frequency position, defined as follows:

- Frequency: [SC Spacing/CP](#), [RB Offset/RB Offset \(15 kHz SCS\)/RB Offset \(60 kHz SCS\)](#), [SC Offset/SC Offset \(15 kHz SCS\)/SC Offset \(60 kHz SCS\)](#) and [Delta f to Carrier \(Centers\)](#)
- Timing: [Case](#), [Positions](#), [Burst Set Periodicity](#) and [Half Frame Index](#)

See also [Figure 3-3](#).

SC Spacing/CP ← SS/PBCH patterns table

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

The available values also depend on the following:

- SCSs that span at least 20 RBs (i.e. [N_RB](#) > 20)
- For [Offset Relative to](#) = "TxBW", only SCSs that are enabled for the TxBW (i.e. [Use](#) > "On").
- For "SC Spacing / CP" = 240 kHz, the "Offset Relative to" must be set "Point A". Additional the "Node Settings" > "TxBW" > "Use" value and the "Node Settings" > "Carriers" > "Deployment" value has an impact on the possible "SC Spacing / CP" values.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCSPacing
```

on page 456

RB Offset/RB Offset (15 kHz SCS)/RB Offset (60 kHz SCS) ← SS/PBCH patterns table

Sets the start resource block of the selected allocation and thus defines the allocation's position in the frequency domain.

The name of the parameter changes depending on the selected [Offset Relative to](#) as follows:

- "RB Offset": If [Offset Relative to](#) = "TxBW"
- "RB Offset (15 kHz SCS)": If [Offset Relative to](#) = "Point A" and [Deployment](#) = "f <= 3GHz" or "3GHz < f <= 6GHz"
- "RB Offset (60 kHz SCS)": If [Offset Relative to](#) = "Point A" and [Deployment](#) = "f > 6GHz"

For [Offset Relative to](#) = "TxBW", the value is set relative to the usable RBs that apply for the current numerology, i.e. to the start of the TxBWs ([SC Spacing/CP](#)), see [Figure 3-3](#).

Example:

- If "RB Offset = 0", the SS/PBCH block is allocated on the first subcarrier in the channel.
- If "RB Offset = 10", the SS/PBCH block is allocated on the 10*12 = 120th subcarrier in the channel.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:RBOffset
```

on page 456

SC Offset/SC Offset (15 kHz SCS)/SC Offset (60 kHz SCS) ← SS/PBCH patterns table

Sets the start subcarrier of the selected allocation within a resource block, where the latter is defined with the parameter [RB Offset/RB Offset \(15 kHz SCS\)/RB Offset \(60 kHz SCS\)](#).

Example:

- If "RB Offset = 0" and "SC Offset = 10", the SS/PBCH block is allocated on the 10th subcarrier in the channel.
- If "RB Offset = 10" and "SC Offset = 0", the SS/PBCH block is allocated on the $10 \cdot 12 = 120$ th subcarrier in the channel.

See also [Figure 3-3](#).

The name of the parameter changes depending on the selected [Offset Relative to](#) as follows:

- "SC Offset": If [Offset Relative to](#) = "TxBW"
- "SC Offset (15 kHz SCS)": If [Offset Relative to](#) = "Point A" and [Deployment](#) = "f <= 3GHz" or "3GHz < f <= 6GHz"
- "SC Offset (60 kHz SCS)": If [Offset Relative to](#) = "Point A" and [Deployment](#) = "f > 6GHz"

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCOffset](#)
on page 456

Delta f to Carrier (Centers) ← SS/PBCH patterns table

Indicates the frequency offset between the center of the SS/PBCH block to the center of the carrier; thus indicates the allocation's position in the frequency domain.

The value is calculated automatically, based on the selected SCS, channel bandwidth, deployment method, RB and SC offsets.

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:DFreq?](#)
on page 457

Case ← SS/PBCH patterns table

Selects one of the SS/PBCH cases, as specified in [TS 38.213](#). The case defines which symbols in a slot carry the synchronization signals.

The SS/PBCH cases depend on the deployment and the used SCS.

SS/PBCH case	SCS	Frequency
Case A	15 KHz	< 6 GHz
Case B*	30 KHz	< 6 GHz
Case C*	30 KHz	< 6 GHz
Case D	120 KHz	> 6 GHz
Case E	240 KHz	> 6 GHz

*) The start symbol index in case B and case C is different.

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CASE](#) on page 457

L ← SS/PBCH patterns table

Sets the number of SS/PBCH blocks, transmitted per burst.

This value sets the pattern length, used to define the [Positions](#) of the transmitted SS/PBCH blocks.

The available values for "L" depend on the selected [Deployment](#) as follows:

- "Deployment" = " $f \leq 3$ GHz": L = 4 or 8, where
L = 8 is supported for the unpaired spectrum below 3 GHz if [Case](#) = "C"
- "Deployment" = " $3 \text{ GHz} < f \leq 6 \text{ GHz}$ ": L = 8
- "Deployment" = " $f > 6 \text{ GHz}$ ": L = 64

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:L](#) on page 457

Positions ← SS/PBCH patterns table

A half-frame contains 4, 8 or 64 SS/PBCH blocks, depending on the selected subcarrier spacing and deployment and as set in the parameter [L](#). The group of 4, 8 or 64 blocks is referred to as burst set, see [Figure 3-3](#).

The "Positions" parameter defines which of these theoretically possible maximum numbers of SS/PBCH blocks are transmitted in each burst set. The definition is an internally generated sequence according to a bit pattern, where:

- Pattern length = 4, 8 or 64 and corresponds to the maximum number of SS/PBCH blocks
- Each bit applies to one SS/PBCH block
- 1: SS/PBCH block is present
- 0: SS/PBCH transmission is suppressed.

Use the "Pattern" box to define the bit pattern.

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSITION:PATTERN](#) on page 457

Burst Set Periodicity ← SS/PBCH patterns table

Defines how often a SS/PBCH burst set is transmitted.

The "Burst Set Periodicity = 10", for example, corresponds to a transmission in every frame.

See also [Figure 3-3](#).

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:BSPeriodicity](#) on page 458

Half Frame Index ← SS/PBCH patterns table

SS/PBCH time occasions are defined within a half-frame, i.e. 5 ms. This index defines in which half-frame of the time structure the first SS/PBCH block occasion is located.

This value depends on the configured [Burst Set Periodicity](#). It can be set to values from 0 to $\lceil \text{"Burst Set Periodicity"} / 5 - 1 \rceil$.

The default value is 0, it locates the first SS/PBCH occasion in the first half-frame. If you set the value to 1, the first SS/PBCH occasion is in the second half-frame (after 5 ms). A "Half Frame Index" of 2, sets the first SS/PBCH occasion in the third half-frame (after 10 ms), and so forth.

For example, if you set the [Burst Set Periodicity](#) to 20 and the "Half Frame Idx." to 2, the first SS/PBCH block occasion is located in the third half-frame, i.e. after 10 ms, as shown in [Figure 6-3](#).

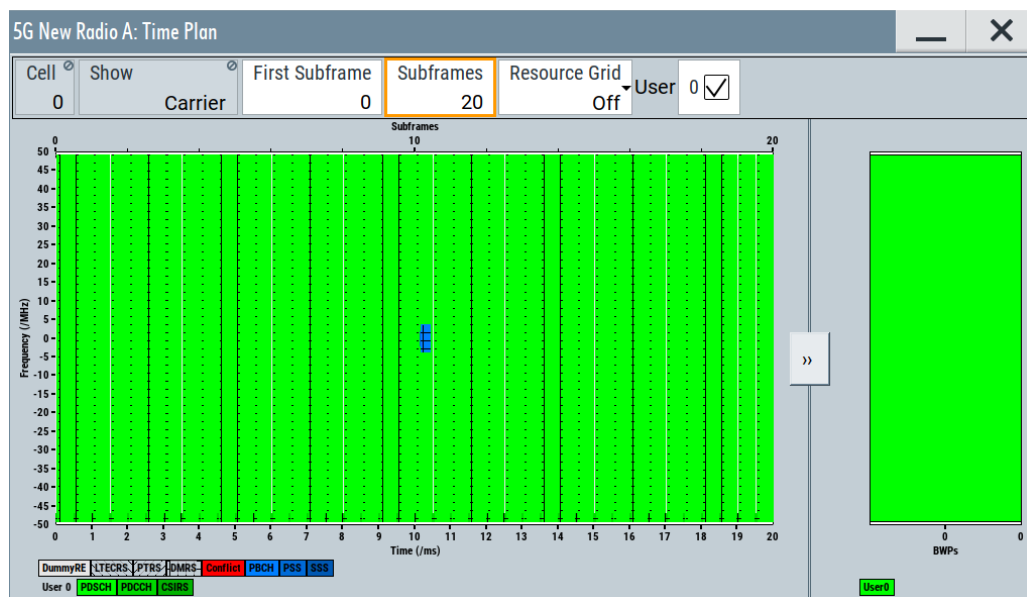


Figure 6-3: SS/PBCH in the Time Plan tab with a Half Frame Index = 2

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:HFRMidx
```

on page 458

PBCH Config ← SS/PBCH patterns table

Accesses the dialog with PBCH settings, see [Chapter 6.2.10, "PBCH Settings"](#), on page 73.

Power/Antenna Ports Config ← SS/PBCH patterns table

Accesses a dialog with the power and antenna port-mapping settings for the SS/PBCH pattern.

Power Settings		
PSS Power	0.00 dB	SSS Power
PBCH Power	0.00 dB	

Antenna Port Config		
Position Index	0	

Mapping		
Mapping Coordinates	Cartesian	

	AP 4000 Real	Imag
BB A	1.000+j0.000	

For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

PSS/SSS Power ← Power/Antenna Ports Config ← SS/PBCH patterns table

Sets the relative power of the allocations of the primary and the secondary synchronization signals (PSS and SSS).

The value is set relative to the power of the other resource elements.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:PSSPow`
on page 459

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SSSPow`
on page 459

PBCH Power ← Power/Antenna Ports Config ← SS/PBCH patterns table

Sets the relative power of the PBCH allocation.

The value is set relative to the power of the other resource elements.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POWER` on page 459

Position Index ← Power/Antenna Ports Config ← SS/PBCH patterns table

Defines the position of the SS/PBCH pattern to which the AP mapping configuration is applied.

The positions of a SS/PBCH pattern are defined in the [Positions](#) field.

You can configure the AP mapping independently for active positions, i.e. those with a value of 1. For example, if the [Positions](#) sequence is **1100**, you can set the "Position Index" to 0 or to 1, to configure the AP mapping of first and second position. The AP mapping settings for positions with a value of 0 are disabled.

Remote command:

via suffix at `APMap<dir0>`

Mapping Coordinates ← Power/Antenna Ports Config ← SS/PBCH patterns table

Switches representation between the "Cartesian" (Real/Imag) and "Cylindrical" (Magn./Phase) coordinates.

Mapping table ← Power/Antenna Ports Config ← SS/PBCH patterns table

The mapping table is a matrix with number of rows equal to the number of physical Tx antennas (basebands). It contains one column for the antenna port 4000. For SS/PBCH, only the antenna port 4000 is active. The headers indicate the type of coordinates being used ("Real/Imag" for Cartesian or "Magn./Phase" for cylindrical). The yellow matrix elements highlight the none zero entries.

The number of rows depends on the selected "System Configuration".

For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Remote command:

"Mapping Coordinates = Cartesian":

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:

APMap<dir0>:COL<gr0>:ROW<user0>:REAL on page 459

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:

APMap<dir0>:COL<gr0>:ROW<user0>:IMAGinary on page 459

"Mapping Coordinates = Cylindrical":

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:

APMap<dir0>:COL<gr0>:ROW<user0>:MAGNitude on page 460

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:

APMap<dir0>:COL<gr0>:ROW<user0>:PHASe on page 460

State ← SS/PBCH patterns table

Disables the transmission of SS/PBCH.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:STATe on page 455

6.2.7 PRS settings

Option: R&S SMW-K148

Access:

► PRS settings for downlink:

- Select "5G New Radio > General > Link Direction > Downlink".
- Select "5G New Radio > General > Node > PRS".

Scheduling	Carriers	TxBW	System Information	LTE-CRS Coexistence	SS/PBCH	PRS	Dummy RES	Carrier Mapping
Manual	Cell 0	Cell 0	Cell 0	Cell 0	Cell 0	Cell 0	Cell 0	
Carrier: Cell 0								
State 0						SC Spacing / CP 30 kHz NCP		
Number of PRS Resource Sets 1								
	Periodicity (T_per)	Slot Offset (T_offset)	Rep. Factor (T_rep)	Time Gap (T_gap)	No. RBs	Start RB (to PointA)	Comb Size (K_comb)	Resource
0	4 slots	0	1	1 slot	272	0	2	Config...

This dialog comprises the PRS (positioning reference signal) settings for downlink.

Settings:

Cell.....	66
State.....	66
SC Spacing / CP	66
Number of PRS Resource Sets.....	66
PRS Resource Sets Table.....	66
└ Periodicity (T_per).....	66

L Slot Offset (T_offset).....	67
L Repetition Factor (T_rep).....	67
L Time Gap (T_gap).....	67
L No. RBs.....	67
L Start RB (to point A).....	67
L Comb Size (K_comb).....	67
L Resource Config.....	68
L Number of PRS Resources.....	68
L Resources Table.....	68
L RE Offset (k_off.).....	68
L Resource Slot Offset (k_off.,res).....	68
L No. Symbols (L_PRS).....	68
L Symbol Offset (l_start).....	69
L Sequence ID.....	69
L Power / dB.....	69
L Antenna Ports Config.....	69
L Mapping Coordinates.....	69
L Mapping table.....	70

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

State

Enables/disables the DL PRS positioning frequency layer for the given carrier cell.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:STATE` on page 471

SC Spacing / CP

Sets a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP) for the DL PRS frequency layer.

The available values depend on the numerology of the set [Deployment](#).

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:SCSPacing` on page 470

Number of PRS Resource Sets

Sets the number of resource sets included in the DL PRS frequency layer.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:NRSets` on page 465

PRS Resource Sets Table

Comprises the settings of the PRS resource sets. There is one table row per resource set.

Periodicity (T_per) ← PRS Resource Sets Table

Sets the periodicity of the DL PRS allocation in slots for the resource set.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:PER on page 466

Slot Offset (T_offset) ← PRS Resource Sets Table

Sets a slot offset for the resource set with respect to SFN0 slot 0.

The maximum value is defined by [Periodicity \(T_per\)](#) - 1.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:SLOffset
on page 470

Repetition Factor (T_rep) ← PRS Resource Sets Table

Sets the number of repetitions of each resource within the resource set.

The set value is applied to all resources in a resource set.

The default value "1" means no resource repetition.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:REPFactor
on page 467

Time Gap (T_gap) ← PRS Resource Sets Table

Sets an offset in slots between two resources with the same resource ID within a resource set.

The time gap should not exceed the [Periodicity \(T_per\)](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:TGAP
on page 470

No. RBs ← PRS Resource Sets Table

Sets the number of resource blocks (RBs) for all resources in the resource set in multiples of 4 RBs.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBNumber
on page 466

Start RB (to point A) ← PRS Resource Sets Table

Sets the starting RB index of the resource set with respect to the reference point A.

The point A is defined as the absolute frequency of the reference resource block.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBStart
on page 467

Comb Size (K_comb) ← PRS Resource Sets Table

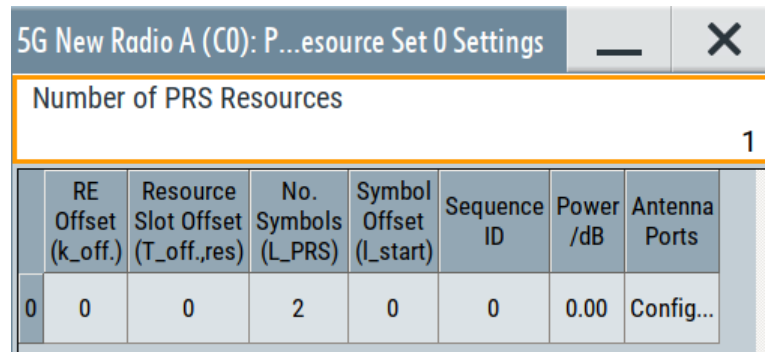
Sets the resource element (RE) spacing in each symbol of a resource within a resource set.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:CMBSIZE
on page 466

Resource Config ← PRS Resource Sets Table

Opens a dialog comprising the settings of the PRS resources. There is one table row per resource.



RE Offset (k_off.)	Resource Slot Offset (T_off.,res)	No. Symbols (L_PRS)	Symbol Offset (L_start)	Sequence ID	Power /dB	Antenna Ports
0	0	2	0	0	0.00	Config...

Number of PRS Resources ← Resource Config ← PRS Resource Sets Table

Sets the number of resources included in the resource set.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:NRESources`
on page 466

Resources Table ← Resource Config ← PRS Resource Sets Table

Comprises the settings of the PRS resources. There is one table row per resource.

RE Offset (k_off.) ← Resources Table ← Resource Config ← PRS Resource Sets Table

Sets the resource element (RE) offset in the frequency domain for the first symbol in a resource.

The maximum value is defined by [Comb Size \(K_comb\)](#) - 1.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:REOffset`
on page 469

Resource Slot Offset (k_off.,res) ← Resources Table ← Resource Config ← PRS Resource Sets Table

Set the starting slot of the resource with respect to the corresponding resource set [Slot Offset \(T_offset\)](#).

The maximum value is defined by [Periodicity \(T_per\)](#) - 1.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SLOffset`
on page 469

No. Symbols (L_PRS) ← Resources Table ← Resource Config ← PRS Resource Sets Table

Sets the number of symbols of the resource within a slot.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:NSymbol`
on page 468

Symbol Offset (I_start) ← Resources Table ← Resource Config ← PRS Resource Sets Table

Sets the starting symbol of the resource within a slot.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SYOffset` on page 470

Sequence ID ← Resources Table ← Resource Config ← PRS Resource Sets Table

Sets the resource ID to initialize the c_{init} value for the generation of the DL PRS sequence.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SQID` on page 469

Power / dB ← Resources Table ← Resource Config ← PRS Resource Sets Table

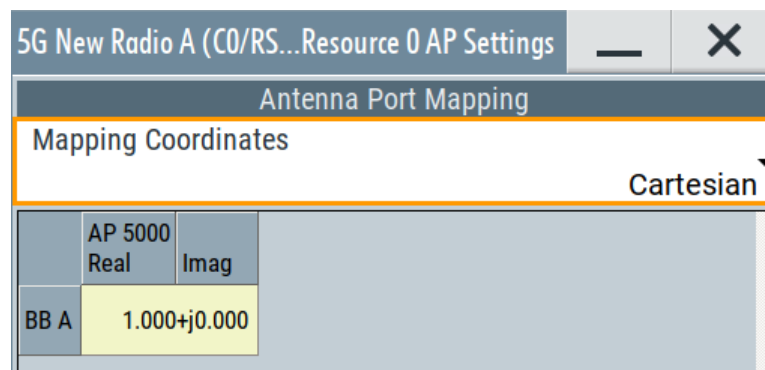
Sets the resource average EPRE (energy per resource element) used for PRS transmission.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:POWER` on page 468

Antenna Ports Config ← Resources Table ← Resource Config ← PRS Resource Sets Table

Opens a dialog comprising the resource antenna port settings.



For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Mapping Coordinates ← Antenna Ports Config ← Resources Table ← Resource Config ← PRS Resource Sets Table

Switches representation between the "Cartesian" (Real/Imag) and "Cylindrical" (Magn./Phase) coordinates.

Mapping table ← Antenna Ports Config ← Resources Table ← Resource Config ← PRS Resource Sets Table

The mapping table is a matrix with number of rows equal to the number of physical Tx antennas (basebands) and number of columns equal of the number of antenna ports (AP). The available antenna ports depend on the current configuration. The yellow matrix elements in the mapping table indicate the default antenna port to physical antenna (TX antenna/baseband) mapping.

The number of rows depends on the selected "System Configuration".

For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Remote command:

"Mapping Coordinates = Cartesian":

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>:ROW<user0>:REAL` on page 467

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>:ROW<user0>:IMAGinary` on page 467

"Mapping Coordinates = Cylindrical":

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>:ROW<user0>:MAGNitude` on page 468

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>:ROW<user0>:PHASe` on page 468

6.2.8 Dummy REs Settings

Access:

- Select "5G New Radio > General > Node > Dummy REs".

5G New Radio A: Node Settings		Carrier Mapping					
Scheduling Manual	Carriers	TxBW Cell 0	System Information Cell 0	LTE-CRS Coexistence Cell 0	SS/PBCH Cell 0	PRS Cell 0	Dummy REs Cell 0
Carrier: Cell 0							
State				Power			
SC Spacing / CP				Modulation			
Data Source							

With the provided settings, you define if and what is transmitted in the resource elements that are not allocated.

The dummy REs are the allocations with the lowest priority. They do not include **DMRS** or **PTRS**.

Settings:

Cell.....	71
State.....	71
Power.....	71
SC Spacing/CP.....	71
Modulation.....	71
Transform Precoding.....	71
Data Source.....	72

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

State

If enabled, the resource elements (RE) are filled in with dummy data, modulated and formatted as selected with the settings in the "Dummy REs" dialog.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:DUMRes:STATe` on page 471

Power

Sets the power of the resource elements filled in with dummy data. The value is set relative to the power of the other resource elements.

See also [Chapter 7.6, "Output Settings"](#), on page 220.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:DUMRes:POWer` on page 471

SC Spacing/CP

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:DUMRes:SCSPacing` on page 472

Modulation

Sets the modulation scheme for the dummy REs.

Note: "60 kHz ECP" is supported by the existing parameters "Dummy REs", for "DL-BWPs" and for "UL-BWPs".

Interdependency: The preset value from I1 is from 11 to 10 for extended cyclic prefix.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:NODE:CELL<ch0>:DUMRes:MODulation` on page 472

Transform Precoding

In uplink, enables using the optional DFT-S scheme.

If disabled, both DL and UL use the CP-OFDM.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:DUMRes:TPSTate on page 472

Data Source

Selects the data source for the dummy REs.

The following standard data sources are available:

- "All 0, All 1"
An internally generated sequence containing 0 data or 1 data.
- "PNxx"
An internally generated pseudo-random noise sequence.
- "Pattern"
An internally generated sequence according to a bit pattern.
Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.
 - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
 - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
 - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:DUMRes:DATA on page 473

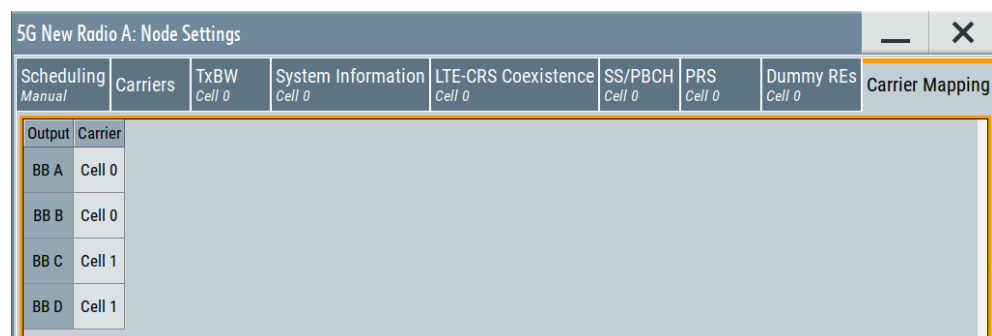
[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:DUMRes:DLISt on page 473

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:DUMRes:PATtern on page 473

6.2.9 Carrier-Mapping Settings

Access:

- Select "5G New Radio > General > Node > Carrier Mapping".



This dialog defines the carrier to basebands (baseband block outputs) mapping, where basebands are the number of output signals from the baseband bock.

Settings:

Output.....	73
Carrier.....	73

Output

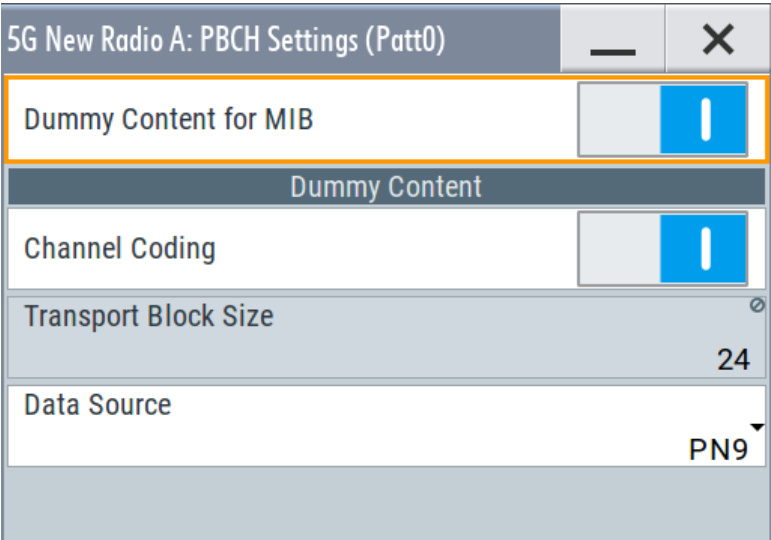
Indicates the baseband (BB) output.
 The number of the outputs at the baseband block depends on the selected "System Configuration", in particular on whether coupled sources are used.
 Remote command:
 via suffix at ROW<ch0>

Carrier

Defines which carrier is output at which baseband.
 If there is more than one carrier in the [Number of Carriers](#) field, select the carrier that you want to modify and enter the "Cell ID" that you want to use instead.
 Remote command:
[\[:SOURce<hw>\]:BB:NR5G:NODE:CARMapping:CELL\[:ROW<ch0>\]](#) on page 474

6.2.10 PBCH Settings

- Access:
1. Select "5G New Radio > General > Link Direction > Downlink".
 2. Select "5G New Radio > General > Node > SS/PBCH".
 3. Select "Node > SS/PBCH > SS/PBCH Pattern Table > Pattern# > PBCH > Config".



This dialog comprises the settings of the broadcast channel (PBCH) channel coding settings.

Settings:

Dummy Content for MIB.....	74
Dummy Content Settings.....	74
L Channel Coding.....	75
L Transport Block Size.....	75
L Data Source.....	75
MIB Content	76
L SCS Common.....	76
L DMRS Type A Position.....	76
L Auto Subcarrier Offset.....	76
L SSPBCH Subcarrier Offset.....	77
L System Frame Number Start Offset.....	77
L CORESET Zero.....	77
L Search Space Zero.....	77
L Cell Barred.....	77
L Intra Freq Reselection.....	77
L Spare.....	78

Dummy Content for MIB

Defines how the MIB is defined:

"On"	Faster way to define the MIB. You can define if channel coding is used or not and select an arbitrary data source; further settings are not required. See "Dummy Content Settings" on page 74.
"Off"	Disable this parameter if you wish to configure the MIB content according to TS 38.331. See "MIB Content " on page 76.

Remote command:

[:SOURce<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:STATe
on page 462

Dummy Content Settings

Available for "Dummy Content for MIB > On".

5G New Radio A: PBCH Settings (Patt0)

Dummy Content for MIB

Dummy Content

Channel Coding

Transport Block Size

Data Source

24

PN9

Channel Coding ← Dummy Content Settings

Enables PBCH channel coding.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:STATe`
on page 461

Transport Block Size ← Dummy Content Settings

Indicates the transport block size.

Data Source ← Dummy Content Settings

Selects the PBCH data source.

The following standard data sources are available:

- "All 0, All 1"
An internally generated sequence containing 0 data or 1 data.
- "PNxx"
An internally generated pseudo-random noise sequence.
- "Pattern"
An internally generated sequence according to a bit pattern.
Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.
 - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
 - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
 - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DATA
on page 461

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DLISt
on page 461

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:PATtern
on page 462

MIB Content

If "Dummy Content for MIB > Off", comprises the setting to configure the MIB as defined in the 3GPP specification.

5G New Radio A: PBCH Settings, Pattern 0	
Dummy Content for MIB	0
MIB Content	
SCS Common	15 or 60 kHz
Auto Subcarrier Offset	1
System Frame Number Start Offset	0
CORESET Zero	0
Cell Barred	Barred
Spare	☐
DMRS TypeA Position	2
SSPBCH Subcarrier Offset	0
Search Space Zero	0
Intra Freq Reselection	Allowed

SCS Common ← MIB Content

Selects the common SCS (subcarrier spacing).

The selected SCS defines the default SSPBCH subcarrier offset.

Remote command:

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCSC
on page 462

DMRS Type A Position ← MIB Content

Indicates the first symbol that the DMRS uses, as set with the parameter "Node > Carriers" > [DMRS Type A Position](#).

Auto Subcarrier Offset ← MIB Content

Defines if the "SSPBCH Subcarrier Offset" value is derived from the selected [SCS Common](#) or set manually with [SSPBCH Subcarrier Offset](#).

Remote command:

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:ASOF:STATe
on page 463

SSPBCH Subcarrier Offset ← MIB Content

Indicates or sets the SS/PBCH subcarrier offset:

- If **Auto Subcarrier Offset** = "On", the "SSPBCH Subcarrier Offset" is calculated automatically based on the selected "Node > SS/PBCH" > **SC Offset/SC Offset (15 kHz SCS)/SC Offset (60 kHz SCS)**.
- If **Auto Subcarrier Offset** = "Off", the SSPBCH subcarrier offset is user-definable.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCOffset
```

on page 463

System Frame Number Start Offset ← MIB Content

By default, the counting of the SFN (system frame number) starts with 0. Use this parameter to set a different start SFN value.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SFOffset?
```

on page 463

CORESET Zero ← MIB Content

Sets the common control resource set (CORESET) of the initial downlink BWP `controlResourceSetZero` carried by the `PDCCH-ConfigSIB1` information element, as defined in **TS 38.331**.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CSZero
```

on page 463

Search Space Zero ← MIB Content

Sets the common search space of the initial downlink BWP `searchSpaceZero` carried by the `PDCCH-ConfigSIB1` information element, as defined in **TS 38.331**.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SSZero
```

on page 464

Cell Barred ← MIB Content

Cell barring (`cellBarred`) is system information that indicates if UEs can camp on the particular cell `notBarred` or not barred.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CBARred
```

on page 464

Intra Freq Reselection ← MIB Content

Sets the value of the system information parameter `intraFreqReselection`.

Set "Intra Freq Reselection > Allowed" to allow UEs to perform cell reselection to intra-frequency cells.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:IFRResel
```

on page 464

Spare ← MIB Content

Sets the system information bit spare, as defined in TS 38.331.

Remote command:

[:SOURCE<hw>] :BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SPARe:STATe
on page 464

6.3 Users/BWPs Settings

Access:

- ▶ Select "Baseband > 5G NR > Users/BWPs".

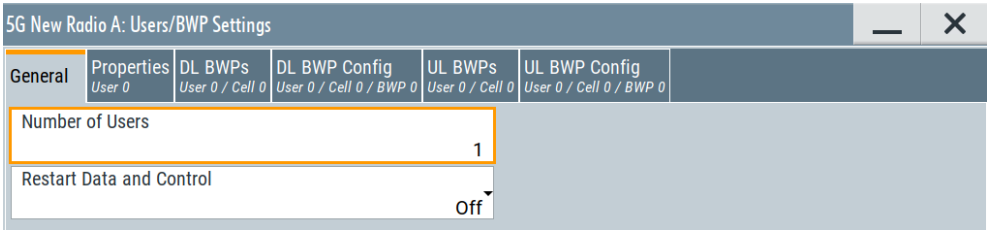
Settings:

• General Settings	78
• Properties Settings	79
• DL/UL BWPs Settings	82
• DL BWP Configuration Settings	86
• UL BWP Configuration Settings	114

6.3.1 General Settings

Access:

- ▶ Select "5G New Radio > General > Users/BWPs > General".



In this tab, you define the number of users to be simulated.

Settings:

Number of Users	78
Restart Data and Control	79

Number of Users

Option: R&S SMW-K148 supports up to 50 users.

Sets the number of simulated users.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:NUSer on page 474

Restart Data and Control

Enables you to select an option for restarting the configured data sources in customized DCIs.

Off Disables the restart of data and control. Data sources are initialized only once at the start of the generated signal.
This value is set by default.

After Each Codeword and Allocation

Enables the restart of data and control after each codeword and allocation. For example, the same payload is used for repeated allocations.

After Each Frame

Enables the restart of data and control after each frame. For example, the same payload is used for allocations which are repeated each frame.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:REStart on page 475

6.3.2 Properties Settings

Access:

- Select "5G New Radio > General > Users/BWPs > Properties".

5G New Radio A: Users/BWP Settings	
General	Properties User 0
User:	0
UE ID (C-RNTI)	0
MCS-C-RNTI	1
SFI-RNTI	1
RA-RNTI	1
DSCH Channel Coding	1
DSCH Data Source	PN9

This dialog comprises the user-specific general settings.

Settings:

User.....	80
UE ID (C-RNTI).....	80
CS-RNTI.....	80
MCS-C-RNTI.....	80
SP-CSI-RNTI.....	80

SFI-RNTI.....	80
Number of SFIs in DCI 2_0.....	81
RA-RNTI.....	81
TC-RNTI.....	81
DSCH/USCH Channel Coding.....	81
(P)DSCH/(P)USCH Data Source.....	81
Initialization.....	82

User

Selects the user to be configured.

Remote command:

via suffix at `USER<ch>`

UE ID (C-RNTI)

Sets the RNTI of the user. It is a unique UE identifier for the RRC connection and for scheduling.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:UEID` on page 477

CS-RNTI

Sets the CS-RNTI of the user. It is a unique UE identification used for semi-persistent scheduling in the downlink.

See also "Usage" on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:CS` on page 475

MCS-C-RNTI

Sets the MCS-C-RNTI of the user. It is a unique UE identification used for modulation coding scheme in the downlink.

See also "Usage" on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:MCSC` on page 476

SP-CSI-RNTI

Sets the SP-CSI-RNTI of the user. It is a unique UE identification used for semi-persistent CSI reporting on PUSCH.

See also "Usage" on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:SPCSi` on page 476

SFI-RNTI

Sets the SFI-RNTI of the user. It is used to identify the slot format.

See also "Usage" on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:SFI` on page 476

Number of SFIs in DCI 2_0

Sets how many slot format indicator (SFI) fields are transmitted in the DCI format 2_0.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:NUMSfi` on page 477

RA-RNTI

Sets the RA-RNTI of the user. It is an identifier for the random access response in the downlink during the random access procedure.

See also ["Usage"](#) on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:RA` on page 476

TC-RNTI

Sets the TC-RNTI of the user. It is a unique UE identifier for the RRC connection and for scheduling with a temporary cell.

See also ["Usage"](#) on page 181.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:RNTI:TC` on page 477

DSCH/USCH Channel Coding

Depending on the selected "Link Direction" direction, enables DSCH/USCH channel coding.

Configure the corresponding settings in "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config" > [Channel Coding Settings](#) dialog.

If [PDSCH Scheduling](#) = "Auto/DCI", the "DSCH Channel Coding" = "On".

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:DSCH:CCODing:STATe?`

on page 477

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:USCH:CCODing:STATe`

on page 477

(P)DSCH/(P)USCH Data Source

Depending on the selected "Link Direction", selects the PDSCH/PUSCH data source.

If channel coding is enabled, the parameter sets the DSCH/USCH data source.

The following standard data sources are available:

- "All 0, All 1"
An internally generated sequence containing 0 data or 1 data.
- "PNxx"
An internally generated pseudo-random noise sequence.
- "Pattern"
An internally generated sequence according to a bit pattern.
Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.

- Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
- Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
- Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:DSCH:DATA on page 478

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:DSCH:DLISt on page 478

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:DSCH:PATtern on page 479

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:USCH:DATA on page 478

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:USCH:DLISt on page 478

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:USCH:PATtern on page 479

Initialization

Sets an initialization value for the second m-sequence in the selected PN sequence.

Enabled if "Data Source > PNxx".

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:DSCH:INITpattern on page 478

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:USCH:INITpattern on page 478

6.3.3 DL/UL BWPs Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "General > Users/BWPs" > "DL BWPs".

General	Properties User 0	DL BWPs User 0 / Cell 0	DL BWP Config User 0 / Cell 0 / BWP 0	UL BWPs User 0 / Cell 0	UL BWP Config User 0 / Cell 0 / BWP 0
User:		0			
Carrier: Cell		0			
Number of DL BWPs		1			
BWP Indicator	SC Spacing / CP	No. RBs	RB Offset in Tx BW	RB Offset to Point A	Δf to Carrier (Centers) / MHz
0	0	30 kHz NCP	273	0	0.000 000

The dialog comprises the settings for the DL/UL bandwidth parts (BWP) configuration. The UL BWPs dialog is displayed for DL and UL direction, whereas the DL BWP - only for DL direction.

For each user and carrier combination, you can configure one or more BWPs. You can configure BWPs in the bandwidth part configuration table. This table consists of several rows, each of which corresponds to a BWP. The size of the table therefore depends on the number of BWPs you have selected.

Each BWP is indicated by a BWP indicator. The bandwidth of the BWP depends on the number of RBs it occupies. Its allocation in the frequency, on the selected RB offset. The resulting frequency offset between the BWP center and the center of the carrier is indicated, too.

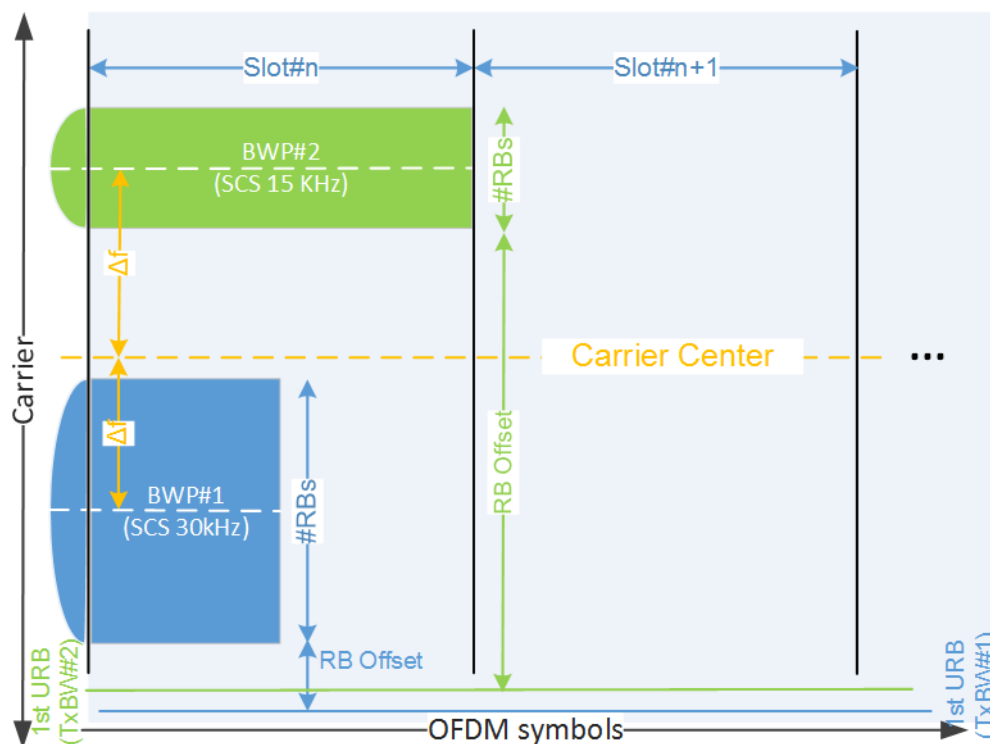


Figure 6-4: Bandwidth parts

BWP#	= Bandwidth part and indicator
SCS	= Subcarrier spacing
Center carrier	= Center frequency of the carrier (cell)
#RB	= Number of resource blocks or channel bandwidth per BWP
RB offset	= Frequency offset between the first usable resource block (URB) and the start of the BWP
1st URB	= First usable resource block (URB), that is the first RB within the transmission bandwidth TxBW, see Figure 3-2
Δf	= Frequency offset between the center frequency of the BWP and the center frequency of the carrier
Carrier	= Channel bandwidth of the carrier
OFDM symbol	= Represent the time domain

Settings:

User.....	84
Cell.....	84
Number of DL/UL BWPs.....	84
BWPs table.....	84

L BWP Indicator.....	84
L SC Spacing/CP.....	84
L No. RBs.....	85
L RB Offset in TxBW.....	85
L RB Offset to Point A.....	85
L Δf to Carrier (Centers) /MHz.....	86

User

Selects the user to be configured.

Remote command:

via suffix at `USER<ch>`

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

Number of DL/UL BWPs

Sets the number of downlink bandwidth parts (BWP).

There is one table row per enabled DL/UL BWP.

See also:

- [Figure 6-4](#)
- [Chapter 8, "Observing Current Allocations on the Time Plan"](#), on page 234.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:NBWParts`
on page 480

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:NBWParts`
on page 480

BWPs table

Comprises the BWPs settings.

There is one table row per enabled DL/UL BWP, see ["Number of DL/UL BWPs"](#) on page 84.

BWP Indicator ← BWPs table

Sets the unique indicator for the selected BWP, used to address the BWP within the DCI.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:`
`INDicator` on page 480

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:`
`INDicator` on page 480

SC Spacing/CP ← BWPs table

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

Note: The possible values for SC spacing depend on the selected "Node" > "TxBW" values.

Note: "60 kHz ECP" is supported by the existing parameters "Dummy REs", for "DL-BWPs" and for "UL-BWPs".

Interdependency: The preset value from I1 is changed from 11 to 10 for extended cyclic prefix.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
SCSPacing on page 482

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
SCSPacing on page 482

No. RBs ← BWPs table

Defines the number of resource blocks (RB) the bandwidth part (BWP) occupies. This value defines the frequency width of the BWP.

The number of available RBs (N_{RB}) depends on the [SC Spacing/CP](#) and [Channel Bandwidth](#), where the latter depends on the selected deployment.

The number of available RBs is updated whenever the SCS or channel bandwidth is changed. The selected value is the maximum number of RB for the combination of SCS and channel bandwidth.

See also [Figure 6-4](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RBNumber on page 483

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
RBNumber on page 483

RB Offset in TxBW ← BWPs table

Defines the offset between the first resource block in the BWP relative to the first usable resource blocks (URB).

See also [Figure 6-4](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RBOffset on page 484

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
RBOffset on page 484

RB Offset to Point A ← BWPs table

Indicates the frequency starting position of the BWP relative to the point A, calculated as follows:

"RB Offset to Point A" = [RB Offset in TxBW](#) + [TxBW Offset](#)

See also [Figure 6-4](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PRBoffset? on page 484

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PRBoffset? on page 484

Δf to Carrier (Centers) /MHz ← BWPs table

Indicates the frequency offset between the BWP center and the center frequency of the carrier; it thus defines the BWP position in the frequency domain.

The value is calculated automatically, based on the selected SCS, channel bandwidth, deployment method, number of RBs and RB offset.

See also [Figure 6-4](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
DFReq? on page 484

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
DFReq? on page 484

6.3.4 DL BWP Configuration Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "General > Users/BWPs" > "DL BWP Config".

5G New Radio A: Users/BWP Settings

General	Properties User 0	DL BWPs User 0 / Cell 0	DL BWP Config User 0 / Cell 0 / BWP 0	UL BWPs User 0 / Cell 0	UL BWP Config User 0 / Cell 0 / BWP 0
User:	0	Carrier: Cell	0	BWP	0
General Settings					
Use PDSCH Scrambling ID	☐	Data Scrambling ID	0	PDSCH	
Max. Number of Codewords Per DCI	2	VRB-to-PRB Interleaver	Non-Interleaved	PDCCH	
MCS Table	64QAM	Resource Allocation	Type 1	Control	
Resource Block Group Size	Config 1	Max Code Block Groups Per Transport Block	Disabled	ZP CSI-RS	
Code Block Group Flush Indicator	☐	Precoding	☐	NZP CSI-RS	
PRB Bundling Type	Not Configured	Static Bundle Size	N4	Rate Match	
Bundle Size Set 1		Bundle Size Set 2			

The dialog comprises the settings for the DL bandwidth parts (BWP) configuration.

Settings:

• User, Carrier, BWP Settings	87
• PDSCH Settings	87
• PDCCH Settings	99
• Control Settings	99
• ZP CSI-RS Settings	103
• NZP CSI-RS Settings	106
• Rate Match Settings	112

6.3.4.1 User, Carrier, BWP Settings

User	87
Cell	87
BWP	87

User

Selects the user to be configured.

Remote command:

via suffix at `USER<ch>`

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

BWP

Select the bandwidth parts (BWP) whose settings are displayed for configuration.

There are one or more BWPs, as set with the parameter "User/BWP Settings > DL BWPs" > [Number of DL/UL BWPs](#).

Remote command:

via suffix at `BWP<dir0>`

6.3.4.2 PDSCH Settings

Access:

- Select "User/BWP Settings > DL BWP Config > PDSCH".

The dialog comprises the DMRS and PTRS settings, divided per DMRS-mapping type A and B, as defined in [TS 38.211](#) and [TS 38.214](#).

For description of the remote-control commands, see [Chapter 12.14.1, "PDSCH Commands"](#), on page 485.

About PDSCH and DMRS sequence generation

According to [TS 38.211](#), the **PDSCH** sequence is generated based among others on the value of the variable n_{ID} , that can be:

- $n_{ID} = N_{ID}^{cell}$ (i.e. equal to the physical cell identifier) or
- $n_{ID} = dataScramblingIdentityPDSCH$ (higher-layer parameter).

In this implementation, you set which of the two variants is used by the parameter [Use PDSCH Scrambling ID](#) and the n_{ID} value on both case by the parameters "Node > Carriers" > [Cell ID](#) and [Data Scrambling ID](#).

According to [TS 38.211](#), the **DMRS** sequence is generated based among others on the values of the variables N_{ID}^0, N_{ID}^1 and $N_{ID}^{n\_SCID}$ or N_{ID}^0 and $N_{ID}^{n\_SCID}$ with $n\_SCID = \{0, 1\}$.

Which of these two combinations of variables is used depends on whether the PDSCH is scheduled by PDCCH using DCI format 1_1 or DCI format 1_0.

In this implementation, you define the values as follows:

- N_{ID}^0, N_{ID}^1 per DMRS type are set with "User/BWP > DL BWP > PDSCH" > [Scrambling ID 0/Scrambling ID 1](#).
- If N_{ID}^0 or N_{ID}^1 is used, is set with "Scheduling > PDSCH > DMRS" > [N_SCID](#).
- If $N_{ID}^{n\_SCID} = N_{ID}^{cell}$ or $N_{ID}^{n\_SCID} = N_{ID}^0$ or N_{ID}^1 is set with "Scheduling > PDSCH > DMRS" > [Sequence Generation](#).
- The [DCI Format 1_0](#) field "DMRS Sequence Initialization".

Settings:

Use PDSCH Scrambling ID.....	89
Data Scrambling ID.....	90
Max. Number of Codewords per DCI.....	90
VRB-to-PRB Interleaver.....	90
MCS Table.....	90
Resource Allocation.....	91
Resource Block Group Size.....	91
Max Code Block Groups Per Transport Block.....	91
Code Block Group Flush Indicator.....	92
Precoding	92
PRB Bundling Type	92
Static Bundle Size	93
Bundle Size Set 1.....	93
Bundle Size Set 2	93
Minimum Scheduling Offset Available.....	94
Same Settings for Type A and Type B.....	94
Config Type.....	94
Additional Position Index.....	94
Max Length.....	95
Scrambling ID 0/Scrambling ID 1.....	95
PTRS Config	95
L State.....	96
L RE-offset.....	96
L EPRE Ratio.....	97
L I_MCS_1/I_MCS_2/I_MCS_3.....	97
L N_RB_1/N_RB_2.....	97
Time Domain Allocation List.....	98
L Time Domain Allocations.....	98
L K0.....	98
L Mapping Type.....	98
L Start.....	98
L Length.....	98
L SLIV.....	99

Use PDSCH Scrambling ID

Defines the value of the variable n_{ID} used for the initialization of the generator of the PDSCH scrambling sequence.

"Off" $n_{ID} = N_{ID}^{cell}$ (i.e. the physical layer cell identity)

"On" n_{ID} is the values set with the parameter "Data Scrambling ID" on page 90.

See also "About PDSCH and DMRS sequence generation" on page 88.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:SCRambling:STAtE on page 491

Data Scrambling ID

If [Use PDSCH Scrambling ID](#) > "On", sets the identifier

`dataScramblingIdentityPDSCH` used to initialize data scrambling (`c_init`) for PDSCH.

The value of this parameter influences the PDSCH allocations.

See also ["About PDSCH and DMRS sequence generation"](#) on page 88.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DSID on page 492
```

Max. Number of Codewords per DCI

Sets if one or two codewords are transmitted.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:MCWDci on page 492
```

VRB-to-PRB Interleaver

As defined in [TS 38.211](#), the virtual resource blocks (VRB) are mapped to the physical resource blocks (PRB) interleaved or non-interleaved.

With this parameter, you set whether the interleaved or non-interleaved mapping is used in general, *for all PDSCH allocations*.

"Non-interleaved"

Sets non-interleaved VRB-to-PRB mapping. The value applies for all PDSCH allocations, also for those allocations configured automatically from DCI format 1_0 or 1_1, if "Node > Scheduling > PDSCH Scheduling = Auto/DCI".

For all PDDCHs scheduled by DCI formats expect the 1_0 format, the VRB number n is mapped to PRB number n .

For all PDDCHs scheduled by DCI format 1_0 in common search space, the VRB number n is mapped to PRB number $n + N_{\text{start}}^{\text{CORE-SET}}$.

"2", "4"

Set one of these values to enable VRB-to-PRB interleaving in general and define the PRB bundle size, carried by the higher-level parameter `vrb-ToPRB-Interleaved`, defined in [TS 38.331](#).

You can change the *interleaving state per PDSCH* later:

- If "Node > Scheduling > PDSCH Scheduling = Manual", with this parameter.
- If "Node > Scheduling > PDSCH Scheduling = Auto/DCI", for PDSCH created automatically from DCI formats 1_0 and 1_1, with the DCI field [VRB-to-PRB Mapping](#).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:VPINter on page 495
```

MCS Table

Sets the MCS table and thus defines the used modulation scheme.

Remote command:

```
[ :SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:MCSTable on page 492
```

Resource Allocation

Sets the PDSCH resource allocation scheme and defines the allocation in the frequency domain.

"Type 0", "Type 1"

Selects the downlink resource allocation scheme, according to [TS 38.214](#).

"Dynamic Switch"

- If [PDSCH Scheduling](#) > "Auto/DCI":
UE uses downlink resource allocation type 0 or type 1, as defined by the DCI field "Frequency domain resource assignment".
- If [PDSCH Scheduling](#) > "Manual":
UE uses downlink resource allocation type 0 or type 1, as set with the parameter [Resource Allocation](#).

This parameter defines the **PDSCH** allocation in the frequency domain globally and if you configure the allocations manually.

To configure the PDSCH based on the DCI:

- Set "Node > Scheduling > PDSCH Scheduling = Auto/DCI"
- Enable a DCI format 1_1 ("Scheduling > CORESET > Payload > DCI Format = 1_1") with "Config > Frequency Domain Resource Assignment = 262 143"
Set "Create PDSCH > On"
- Observe the allocation information for PDSCH ("Scheduling > PDSCH > Info > Content > frequency domain allocation")

Remote command:

```
[ :SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RESalloc on page 493
[ :SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:RESalloc on page 520
```

Resource Block Group Size

For [Resource Allocation](#) = "Type 0/Dynamic Switch", the resource block assignment is defined in terms of resource block groups (RBG). An RBG is a set of consecutive virtual resource blocks and its size (*rbg-Size*) is defined as function of the BWP size and one of two possible configurations.

This parameter sets which of the two configurations defined in [TS 38.214](#) is used.

Remote command:

```
[ :SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RBGSize on page 493
[ :SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PUSCh:RBGSize on page 520
```

Max Code Block Groups Per Transport Block

Enables limiting the number of code block groups per transport block.

The precoding matrices change according to the precoding granularity (defined per PDSCH allocation) following the PDSCH PRB bundling concept. The precoder chooses the matrices randomly.

Disabled	Default value, which disabled the limitation of code block groups per transport block.
2, 4, 6, 8	Limits the number of code block groups per transport block to 2, 4, 6, or 8.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:MCBGroups on page 489
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MCBGroups on page 518
```

Code Block Group Flush Indicator

Indicates if the code block group buffer is empty.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:CBGF:STATe on page 486
```

Precoding

Enabled or disables precoding.

The precoding matrices change according to the precoding granularity (defined per PDSCH allocation) following the PDSCH PRB bundling concept.

The precoder chooses the matrices randomly.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:STATe on page 491
```

PRB Bundling Type

Indicates the PRB bundle type and bundle sizes. If "dynamic" is chosen, the actual bundle size set to use is indicated via DCI.

Only available if "Precoding" is enabled.

The PRB bundling type supports the UE to reduce the computational effort to receive the information which PRBs use the same precoding. The UE only has to do channel estimation per PRB bundle not per PRB. Without this information, the UE has to decode all the information itself based on the DMRS.

PRB Bundling Type, Static Bundle Size, Bundle Size Set 1, and Bundle Size Set 2 are RRC parameters relevant only for the Node > Scheduling > PDSCH Scheduling > Auto/DCI mode. For the Manual mode, the precoding granularity for a PDSCH allocation can be set under "Scheduling > Config > Precoding Granularity".

"Not Configured"

PRB bundling is not configured.

"Static"

PRB bundling is set to static and can be adjusted by the "Static Bundle Size".

"Dynamic" PRB bundling is set to dynamic and can be adjusted by the "Bundle Size Set 1" and "Bundle Size Set 2".

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BTYPe on page 491
```

Static Bundle Size

Configures the static PRB bundle type.

Only available if "Precoding" is enabled and "Static" is selected as "PRB Bundling Type".

PRB Bundling Type, Static Bundle Size, Bundle Size Set 1, and Bundle Size Set 2 are RRC parameters relevant only for the Auto/DCI mode. For the Manual mode, the precoding granularity for a PDSCH allocation can be set under "Scheduling > Config > Precoding Granularity".

"N4" Static PRB bundle is set to N4.

"Wideband" Static PRB bundle is set to wideband.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BSIZE on page 490
```

Bundle Size Set 1

Configures the dynamic PRB bundle type.

Only available if "Precoding" is enabled and "Dynamic" is selected as "PRB Bundling Type".

PRB Bundling Type, Static Bundle Size, Bundle Size Set 1, and Bundle Size Set 2 are RRC parameters relevant only for the Auto/DCI mode. For the Manual mode, the precoding granularity for a PDSCH allocation can be set under "Scheduling > Config > Precoding Granularity".

"N4" Dynamic PRB bundle size set 1 is set to N4.

"Wideband" Dynamic PRB bundle size set 1 is set to wideband.

"N2-Wideband" Dynamic PRB bundle size set 1 is set to N2-wideband.

"N4-Wideband" Dynamic PRB bundle size set 1 is set to N4-wideband.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BBSet1 on page 489
```

Bundle Size Set 2

Configures the dynamic PRB bundle type.

Only available if "Precoding" is enabled and "Dynamic" is selected as "PRB Bundling Type".

PRB Bundling Type, Static Bundle Size, Bundle Size Set 1, and Bundle Size Set 2 are RRC parameters relevant only for the Auto/DCI mode. For the Manual mode, the pre-coding granularity for a PDSCH allocation can be set under "Scheduling > Config > Precoding Granularity".

"N4" Dynamic PRB bundle size set 2 is set to N4.

"Wideband" Dynamic PRB bundle size set 2 is set to wideband.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BSSet2 on page 490
```

Minimum Scheduling Offset Available

Option: R&S SMW-K148.

Enables/disables the configuration of the minimum applicable scheduling offset indicator for the DCI format 1_1.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:OI11 on page 493
```

Same Settings for Type A and Type B

Per default, the same configuration applies for DMRS mapping type A and B. Disable "Same Settings for Type A and Type B" to modify the mapping type B settings.

Mapping type A and B define the DMRS position in the P_xSCH, the starting symbol and length. The UE informs the BS about the mapping type supportability via the UE capability information message.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:BSAMe on page 487
```

Config Type

Sets the configuration type (type 1 or type 2). It thus defines the mapping of the demodulation reference signal (DMRS) to the physical resource elements in the frequency domain, as defined in TS 38.211.

The configuration type is carried by the higher-layer parameter `dmrs-Type`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:CTYPE on page 487
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:CTYPE on page 487
```

Additional Position Index

Sets the parameter `dmrs-AdditionalPosition` that is required to select the positions of the DMRS symbols l , as defined in TS 38.211.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:APIndex on page 488

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:APIndex on page 488

Max Length

Sets the parameter `maxLength` and defines whether single- or double-symbol DMRS is used.

If "Max Length = 1", only single-symbol DMRS is allowed.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:MLENgtH on page 488

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:MLENgtH on page 488

Scrambling ID 0/Scrambling ID 1

Sets the higher-layer parameters `scramblingID0` and `scramblingID1` (N_{ID}^0, N_{ID}^1).

The values are used to calculate the initialization sequence of the pseudo-random sequence generator.

See also "About PDSCH and DMRS sequence generation" on page 88.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:SID0 on page 488

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:SID1 on page 488

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:SID0 on page 488

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:SID1 on page 488

PTRS Config ...

Comprises the settings of the phase-tracking reference signals (PTRS) for P_xSCH, as defined in TS 38.214.

5G New Radio A: PTRS Settings - Mapping Type A (U0/C0/B0)	
State	0
RE-offset	00
EPRE Ratio	0
Threshold Time Density	
I_MCS_1	0
I_MCS_2	0
I_MCS_3	0
Threshold Frequency Density	
N_RB_0	1
N_RB_1	276

The phase tracking reference signal (PTRS) is a UE-specific reference signal that is used to compensate for the phase noise of the oscillator. Phase-tracking reference signals can be transmitted only in the resource blocks used for the P_xSCH and if the transmission is enabled.

If the PTRS "State" is on, you can define its "Power" relative to the P_xSCH and its location in the resource grid.

State ← PTRS Config ...

If [DSCH/USCH Channel Coding](#) > "On", enables the transmission of phase-tracking reference signals.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSch:DMTA:PTRS:STATe on page 538
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSch:DMTB:PTRS:STATe on page 538
```

RE-offset ← PTRS Config ...

Sets the parameter `resourceElementOffset` $k_{\text{ref}}^{\text{RE}}$ required to define the precoding and mapping to the physical resources.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:REOF on page 538
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:REOF on page 538
```

EPRE Ratio ← PTRS Config ...

Sets the higher layer parameter `epre-Ratio` ratio, needed to define the ratio of PTRS EPRE to PDSCH EPRE per layer per RE for PTRS port.

The abbreviation EPRE stands for energy per resource element.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:EPRE on page 539
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:EPRE on page 539
```

I_MCS_1/I_MCS_2/I_MCS_3 ← PTRS Config ...

Sets the threshold values `ptrs-MCSl` with $l = \{1, 2, 3\}$ transmitted by the higher-layer parameter `timeDensity` in `PTRS-DownlinkConfig`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:MCS1 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:MCS2 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:MCS3 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:MCS1 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:MCS2 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:MCS3 on page 540
```

N_RB_1/N_RB_2 ← PTRS Config ...

Sets the threshold values `NRBl` with $l = \{0, 1\}$ transmitted by the higher-layer parameter `frequencyDensity` in `PTRS-DownlinkConfig`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:RB0 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:RB1 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:RB0 on page 541
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:RB1 on page 541
```

Time Domain Allocation List

Use these settings to define the PDSCH time domain scheduling, according to [TS 38.214](#).

Time Domain Allocation List					
Time Domain Allocations					
	K0	Mapping Type	Start	Length	SLIV
0	0	A	0	3	28
1	0	B	0	2	14

Time Domain Allocations ← Time Domain Allocation List

Sets the number of allocations.

There is one row per allocation in the time domain allocation table.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TDANum on page 493
```

K0 ← Time Domain Allocation List

Sets the slot offset K_0 .

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:KNULl on page 494
```

Mapping Type ← Time Domain Allocation List

Sets the DMRS-mapping type A and B, as defined in [TS 38.211](#)

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:MAPPING on page 494
```

Start ← Time Domain Allocation List

Sets the start OFDM symbol (S) of the allocation, where the value range depends on the selected [SC Spacing/CP](#).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:START on page 494
```

Length ← Time Domain Allocation List

Sets the number of consecutive OFDM symbols (L) the allocation spans, where the value depends on the selected [SC Spacing/CP](#) and the following applies:

- $S + L \leq 14$, if normal cyclic prefix is used (NCP)
- $S + L \leq 12$, if extended cyclic prefix is used (ECP)

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:LENGTH on page 495
```

SLIV ← Time Domain Allocation List

Indicates the resulting start and length indicator SLIV, selected automatically from the values of the parameters **K0**, **Start** and **Length**.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:SLIV? on page 495

6.3.4.3 PDCCH Settings

Access:

- Select "User/BWP Settings > DL BWP Config > PDCCH".

The dialog comprises the RNTI and DCI-related settings.

The screenshot shows a software interface for configuring 5G New Radio settings. The main window is titled '5G New Radio A: Users/BWP Settings'. It has several tabs: 'General', 'Properties', 'DL BWPs', 'DL BWP Config' (which is active), 'UL BWPs', and 'UL BWP Config'. Below the tabs, there are input fields for 'User:' (0), 'Carrier: Cell' (0), and 'BWP' (0). The 'DL BWP Config' tab contains a 'General Settings' section with two fields: 'INT-RNTI' (set to 1) and 'Number of Pre-Emption Indications' (set to 1). On the right side of the dialog, there are two buttons: 'PDSCH' and 'PDCCH', with 'PDCCH' being the active selection.

Settings:

INT-RNTI

Sets the RNTI of the user.

See also "**Usage**" on page 181.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RNTI:INT on page 496

Number of Pre-Emption Indications in DCI 2_1

Sets how many pre-emption indication fields are transmitted in the DCI format 2_1.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDCCh:NUMPreempt on page 496

6.3.4.4 Control Settings

Access:

- Select "User/BWP Settings > DL BWP Config > Control".

The dialog comprises the uplink-related (control) settings that are transmitted in the downlink.

For description of the remote-control commands, see [Chapter 12.14.3, "Uplink Commands"](#), on page 496.

Settings:

Report Trigger Size	100
TPC-PUSCH-RNTI	100
TPC-PUCCH-RNTI	101
TwoPUSCH-PC Adjustment	101
TwoPUCCH-PC Adjustment	101
Number of PUSCH Blocks	101
Number of PUCCH Blocks in DCI 2_2	101
TPC-SRS-RNTI	101
SRS-TPC-PDCCH-Group Type	102
Number of Blocks	102
CI-RNTI	102
Cancellation Indication Length	102
Number of Cancellation Indications	102
PS-RNTI	102
Number of Dormancy Indications	103
Number of SCell Groups	103

Report Trigger Size

Defines the trigger size of the CSI (channel state information) request field in DCI (bits).

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSI:RTSize` on page 499

TPC-PUSCH-RNTI

Sets the corresponding RNTI of the user. It is a unique UE identification to control the power of PUSCH.

See also "[Usage](#)" on page 181.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
RNTI:PUSCh on page 497
```

TPC-PUCCH-RNTI

Sets the corresponding RNTI of the user. It is a unique UE identification to control the power of PUCCH.

See also "[Usage](#)" on page 181.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
RNTI:PUCCh on page 497
```

TwoPUSCH-PC Adjustment

If enabled, the DCI format 2_2 filed closed loop indicator is transmitted.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
PUSCh:TPAS on page 497
```

TwoPUCCH-PC Adjustment

If enabled, the DCI format 2_2 filed closed loop indicator is transmitted.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
PUCCh:TPAS on page 497
```

Number of PUSCH Blocks

Sets the number of blocks (i.e. couples of closed loop indicators and TPC command fields) in the DCI format 2_2.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
PUSCh:BD22 on page 497
```

Number of PUCCH Blocks in DCI 2_2

Sets the number of blocks (i.e. couples of closed loop indicators and TPC command fields) in the DCI format 2_2.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
PUCCh:BD22 on page 497
```

TPC-SRS-RNTI

Sets the corresponding RNTI of the user.

See also "[Usage](#)" on page 181.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
RNTI:SRS on page 497
```

SRS-TPC-PDCCH-Group Type

Sets the SRS-TPC-PDCCH-Group type.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:GTYPe on page 483

Number of Blocks

Sets the number of blocks (i.e. couples of SRS requests and TPC command fields) in the DCI format 2_3.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:BD23 on page 483

CI-RNTI

Option: R&S SMW-K148.

Sets the CI-RNTI of the user. It is a unique UE identifier for the cancellation indication in the DCI format 2_4.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:CIRNti on page 481

Cancellation Indication Length

Option: R&S SMW-K148.

Sets the length for each cancellation indication in the DCI format 2_4.

The "Cancellation Indication Length" and [Number of Cancellation Indications](#) set the size of the DCI format 2_4 [pattern](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CILength on page 480

Number of Cancellation Indications

Option: R&S SMW-K148.

Sets the number of cancellation indications in the DCI format 2_4.

The maximum number of cancellation indications depends on the [Cancellation Indication Length](#) value.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:NCIND on page 481

PS-RNTI

Option: R&S SMW-K148.

Sets the PS-RNTI of the user. It is a unique UE identifier for the starting position block in the DCI format 2_6.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RNTI:PSRNTi on page 481

Number of Dormancy Indications

Option: R&S SMW-K148.

Sets the number of blocks in the DCI format 2_6.

Each block contains one 1-bit wakeup indication and one SCell dormancy indication.
The number of bits of a SCell dormancy indication is defined by [Number of SCell Groups](#).

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
NB26 on page 482

Number of SCell Groups

Option: R&S SMW-K148.

Sets the number of bits for the "SCell Dormancy Indication" pattern in the DCI format 2_6.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
NSCG on page 482

6.3.4.5 ZP CSI-RS Settings

Access:

- Select "User/BWP Settings > DL BWP Config > ZP CSI-RS".

The dialog comprises the zero-power (ZP) CSI-RS settings, as defined in [TS 38.211](#).

The screenshot shows the '5G New Radio A: Users/BWP Settings' dialog box, specifically the 'DL BWP Config' tab. The 'User' is set to 0, 'Carrier: Cell' is 0, and 'BWP' is 0. The 'Periodic ZP CSI-RS' section is active, showing a 'State' dropdown set to 'I' and 'Resources' set to 2. Below this is a table with two rows of configuration data.

	Periodicity	Slot Offset	No. RBs	Start RB	Row	Density	CDM-Type	Bitmap	Ports	I0	I1
0	4 slots	0	273	0	1	3	No CDM	1111	1	9	11
1	8 slots	1	100	50	1	3	No CDM	1111	1	9	11

On the right side of the dialog, there are buttons for 'PDSCH', 'PDCCH', 'ZP CSI-RS' (which is highlighted with an orange arrow), and 'NZP CSI-RS'.

For description of the remote-control commands, see [Chapter 12.14.4, "ZP and NZP CSI-RS Commands"](#), on page 498.

State.....	104
Resources.....	104
Periodic ZP CSI-RS resource table.....	104
L Periodicity.....	104
L Slot Offset.....	104
L No. RBs.....	105
L Start RB.....	105
L Row.....	105
L Density.....	105
L CDM-Type.....	105
L Bitmap.....	106
L Ports.....	106
L I0/I1.....	106

State

Enables the ZP CSI-RS transmission.

The CSI-RS can be used among others for time or frequency tracking or CSI calculation.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:STATe on page 500
```

Resources

Sets the number of periodicCSI-RS resources.

There is one table row per resource.

See "Periodic ZP CSI-RS resource table" on page 104.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:NRESources on page 500
```

Periodic ZP CSI-RS resource table

Each periodic ZP CSI-RS is configured individually; there is one table row per resource, where the number of rows is defined by the parameter [Resources](#).

Periodicity ← Periodic ZP CSI-RS resource table

For periodic ZP CSI-RS:

Sets the periodicity $T_{\text{CSI-RS}}$ (in slots) transmitted by the higher-layer parameter CSI-ResourcePeriodicityAndOffset.

Thus, this parameter defines how often the CSI-RS is transmitted.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:PER on page 500
```

Slot Offset ← Periodic ZP CSI-RS resource table

For periodic ZP CSI-RS:

Sets the slot offset T_{offset} transmitted by the higher-layer parameter
CSI-ResourcePeriodicityAndOffset.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
CSIRs:ZP:SET<gr0>:RES<user0>:OFFSet on page 500
```

No. RBs ← Periodic ZP CSI-RS resource table

Sets the periodicity $T_{\text{CSI-RS}}$ (in slots) transmitted by the higher-layer parameter
CSI-ResourcePeriodicityAndOffset.

Thus, this parameter defines how often the CSI-RS is transmitted.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
CSIRs:ZP:SET<gr0>:RES<user0>:RBNumber on page 501
```

Start RB ← Periodic ZP CSI-RS resource table

If the number of RB the CSI-RS spans ("No. RBs") is smaller than the available number of RB (i.e. the whole width of the BWP), set the first RB (*startingRB*) the CSI-RS allocates.

The value is set relative to the common resource block #0 on the common RB grid.

Only multiples of 4 are allowed.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
CSIRs:ZP:SET<gr0>:RES<user0>:SRBNumber on page 501
```

Row ← Periodic ZP CSI-RS resource table

The CSI-RS location in a slot is defined according to TS 38.211 as a function of the number of ports X , the "Density" and the "CDM-Type".

The possible combinations are listed in a table and the parameter "Row" indicates one of the combinations. It is not the consequent table row number in the CSI-RS resource table. The latter is defined with the suffix *RES<user0>* in the remote control command.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
CSIRs:ZP:SET<gr0>:RES<user0>:ROW on page 501
```

Density ← Periodic ZP CSI-RS resource table

Sets the value p that is the higher-layer parameter *density* in the
CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:  
CSIRs:ZP:SET<gr0>:RES<user0>:DENSity on page 502
```

CDM-Type ← Periodic ZP CSI-RS resource table

Indicates or sets value of the higher-layer parameter *cdm-Type* in the
CSI-RS-ResourceMapping.

The value is selected automatically according to TS 38.211 and depending on the selected "Row".

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:CDMType? on page 502

Bitmap ← Periodic ZP CSI-RS resource table

Sets the location of the CSI-RS in the frequency domain. The starting position and number of the resource blocks in which the CSI-RS is transmitted are defined by the higher-layer parameters *freqBand*.

This parameter is transmitted by the higher-layer parameters *frequencyDomainAllocation* as part of the CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:BITMap on page 503

Ports ← Periodic ZP CSI-RS resource table

Sets the number of ports *x* that is given by the higher-layer parameter *nrofPorts*.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:PORTs? on page 502

I0/I1 ← Periodic ZP CSI-RS resource table

Sets the parameters I_0 and I_1 and define the CSI-RS location relative to the start of as slot. Thus, the I_0 and I_1 give the location of the CSI-RS in time.

These parameters are transmitted by the higher-layer parameters *firstOFDMSymbolInTimeDomain* and *firstOFDMSymbolInTimeDomain2* as part of the CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:I0 on page 503
[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:ZP:SET<gr0>:RES<user0>:I1 on page 503

6.3.4.6 NZP CSI-RS Settings

Access:

- Select "User/BWP Settings > DL BWP Config > NZP CSI-RS".

The dialog comprises the non-zero-power (NZP) CSI-RS settings, as defined in TS 38.211.

5G New Radio A: Users/BWP Settings

General	Properties User 0	DL BWPs User 0 / Cell 0	DL BWP Config User 0 / Cell 0 / BWP 0	UL BWPs User 0 / Cell 0	UL BWP Config User 0 / Cell 0 / BWP 0																																				
User:	0	Carrier: Cell	0	BWP	0																																				
Periodic NZP CSI-RS State Resources 2 <table border="1"> <thead> <tr> <th></th> <th>Periodicity</th> <th>Slot Offset</th> <th>No. RBs</th> <th>Start RB</th> <th>Row</th> <th>Density</th> <th>CDM-Type</th> <th>Bitmap</th> <th>Ports</th> <th>Power (dB)</th> <th>Settings</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4 slots</td> <td>0</td> <td>273</td> <td>0</td> <td>1</td> <td>3</td> <td>No CDM</td> <td>1111</td> <td>1</td> <td>0.00</td> <td>Config...</td> </tr> <tr> <td>1</td> <td>20 slots</td> <td>10</td> <td>100</td> <td>50</td> <td>1</td> <td>3</td> <td>No CDM</td> <td>1010</td> <td>1</td> <td>0.00</td> <td>Config...</td> </tr> </tbody> </table>							Periodicity	Slot Offset	No. RBs	Start RB	Row	Density	CDM-Type	Bitmap	Ports	Power (dB)	Settings	0	4 slots	0	273	0	1	3	No CDM	1111	1	0.00	Config...	1	20 slots	10	100	50	1	3	No CDM	1010	1	0.00	Config...
	Periodicity	Slot Offset	No. RBs	Start RB	Row	Density	CDM-Type	Bitmap	Ports	Power (dB)	Settings																														
0	4 slots	0	273	0	1	3	No CDM	1111	1	0.00	Config...																														
1	20 slots	10	100	50	1	3	No CDM	1010	1	0.00	Config...																														

PDSCH
PDCCH
ZP CSI-RS
NZP CSI-RS
Rate Match

For description of the remote-control commands, see [Chapter 12.14.4, "ZP and NZP CSI-RS Commands"](#), on page 498.

State.....	107
Resources.....	107
Periodic NZP CSI-RS resource table.....	108
L Periodicity.....	108
L Offset.....	108
L No. RBs.....	108
L Start RB.....	108
L Row.....	108
L Density.....	109
L CDM-Type.....	109
L Bitmap.....	109
L Ports.....	109
L Power.....	109
L Settings.....	110
L Resource-Settings > General.....	110
L Scrambling ID.....	110
L IO/I1.....	110
L Resource-Settings > Antenna Port Mapping.....	111
L Mapping Coordinates.....	111
L Mapping table.....	111

State

Enables the NZP CSI-RS transmission.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:STATe on page 500

Resources

Sets the number of periodic CSI-RS resources.

There is one table row per resource.

See "[Periodic ZP CSI-RS resource table](#)" on page 104.

Remote command:

`[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:NRESources` on page 500

Periodic NZP CSI-RS resource table

Each periodic NZP CSI-RS is configured individually; there is one table row per resource, where the number of rows is defined by the parameter [Resources](#).

Periodicity ← Periodic NZP CSI-RS resource table

Sets the periodicity $T_{\text{CSI-RS}}$ (in slots) transmitted by the higher-layer parameter `CSI-ResourcePeriodicityAndOffset`.

Thus, this parameter defines how often the CSI-RS is transmitted.

Remote command:

`[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:PER` on page 500

Offset ← Periodic NZP CSI-RS resource table

Sets the slot offset T_{offset} transmitted by the higher-layer parameter `CSI-ResourcePeriodicityAndOffset`.

Remote command:

`[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:OFFSet` on page 500

No. RBs ← Periodic NZP CSI-RS resource table

Sets the periodicity $T_{\text{CSI-RS}}$ (in slots) transmitted by the higher-layer parameter `CSI-ResourcePeriodicityAndOffset`.

Thus, this parameter defines how often the CSI-RS is transmitted.

Remote command:

`[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:RBNumber` on page 501

Start RB ← Periodic NZP CSI-RS resource table

If the number of RB the CSI-RS spans ("No. RBs") is smaller than the available number of RB (i.e. the whole width of the BWP), set the first RB (`startingRB`) the CSI-RS allocates.

The value is set relative to the common resource block #0 on the common RB grid.

Only multiples of 4 are allowed.

Remote command:

`[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:SRBNumber` on page 501

Row ← Periodic NZP CSI-RS resource table

The CSI-RS location in a slot is defined according to [TS 38.211](#) as a function of the number of ports X , the "Density" and the "CDM-Type".

The possible combinations are listed in a table and the parameter "Row" indicates one of the combinations. It is not the consequent table row number in the CSI-RS resource table. The latter is defined with the suffix `RES<user0>` in the remote control command.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:ROW on page 501
```

Density ← Periodic NZP CSI-RS resource table

Sets the value `p` that is the higher-layer parameter `density` in the CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:DENSity on page 502
```

CDM-Type ← Periodic NZP CSI-RS resource table

Indicates or sets value of the higher-layer parameter `cdm-Type` in the CSI-RS-ResourceMapping.

The value is selected automatically according to TS 38.211 and depending on the selected "Row".

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:CDMType? on page 502
```

Bitmap ← Periodic NZP CSI-RS resource table

Sets the location of the CSI-RS in the frequency domain. The starting position and number of the resource blocks in which the CSI-RS is transmitted are defined by the higher-layer parameters `freqBand`.

This parameter is transmitted by the higher-layer parameters `frequencyDomainAllocation` as part of the CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:BITMap on page 503
```

Ports ← Periodic NZP CSI-RS resource table

Sets the number of ports `x` that is given by the higher-layer parameter `nrofPorts`.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:PORTs? on page 502
```

Power ← Periodic NZP CSI-RS resource table

Sets the power of the NZP resource relative to the PDSCH power.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:PWR on page 504
```

Settings ← Periodic NZP CSI-RS resource table

Opens the "Resource-Settings" dialog where you configure:

- Scrambling and I0/I1 values, see ["Resource-Settings > General"](#) on page 110.
- The antenna port mapping for the selected resource, see ["Resource-Settings > Antenna Port Mapping"](#) on page 111.

Resource-Settings > General ← Periodic NZP CSI-RS resource table

Access: "General > Users/BWPs > DL BWP Config > NZP CSI-RS" > "Resources = 1" and select "Settings > Config > General".

5G New Radio A (U0/C0/B0/RS0/R0)Resource-Settings	
General	Antenna Ports
SCrambling ID	0
I0	9
I1	11

Scrambling ID ← Resource-Settings > General ← Periodic NZP CSI-RS resource table

Sets the parameter n_{ID} that is defined by the higher-layer parameter `ScramblingID` and used for the generation of the pseudo-random reference-signal generator.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>:RES<user0>:SCID on page 503
```

I0/I1 ← Resource-Settings > General ← Periodic NZP CSI-RS resource table

Sets the parameters I_0 and I_1 and define the CSI-RS location relative to the start of as slot. Thus, the I_0 and I_1 give the location of the CSI-RS in time.

These parameters are transmitted by the higher-layer parameters `firstOFDMSymbolInTimeDomain` and `firstOFDMSymbolInTimeDomain2` as part of the CSI-RS-ResourceMapping or the CSI-RS-CellMobility messages.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>:RES<user0>:I0 on page 503
```

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>:RES<user0>:I1 on page 503
```

Resource-Settings > Antenna Port Mapping ← Periodic NZP CSI-RS resource table

Access: "General > Users/BWPs > DL BWP Config > NZP CSI-RS" > "Resources = 1" and select "Settings > Config > Antenna Ports".

	AP 3000 Real	Imag
BB A	1.000+j0.000	

For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Mapping Coordinates ← Resource-Settings > Antenna Port Mapping ← Periodic NZP CSI-RS resource table

Switches representation between the "Cartesian" (Real/Imag) and "Cylindrical" (Magn./Phase) coordinates.

Mapping table ← Resource-Settings > Antenna Port Mapping ← Periodic NZP CSI-RS resource table

The mapping table is a matrix with number of rows equal to the number of physical Tx antennas (basebands) and number of columns equal of the number of antenna ports (AP). The available antenna ports depend on the current configuration. The yellow matrix elements in the mapping table indicate the default antenna port to physical antenna (TX antenna/baseband) mapping.

The number of rows depends on the selected "System Configuration".

For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Remote command:

"Mapping Coordinates = Cartesian":

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL
```

on page 504

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:
IMAGinary
```

on page 504

"Mapping Coordinates = Cylindrical":

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:
```

MAGNitude on page 505

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CSIRs:NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe
```

on page 505

6.3.4.7 Rate Match Settings

Access:

- Select "User/BWP Settings > DL BWP Config > Rate Match".

The dialog comprises the PDSCH resources-mapping settings, required to configure the rate match patterns, as defined in [TS 38.214](#).

For description of the remote-control commands, see [Chapter 12.14.5, "Rate Match Commands"](#), on page 505.

State

Enables the configuration of rate match groups.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
```

RATM:STATe on page 506

Number of Groups

Sets the number of rate match pattern groups (`rateMatchPatternGroup`).

The value limits the available group ID, the groups that can be selected for PDSCH ("Scheduling > PDSCH > Config > General" > [Rate Match Pattern Group](#)) and the bit length of the DCI format 1_1 parameter "Rate Matching Indicator".

Each rate match pattern group contains a list of RB and slot indices that build a resource set of resources. These resources are not available for the PDSCH allocations, if one of the following is true:

- The "Rate Matching Indicator" field of the DCI format 1_1 used to schedule this PDSCH is set to value different than 0.

- A "Rate Match Group" is selected for a manually configured PDSCH.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:GRPNumber on page 506
```

Resources

Sets the number of rate match resources.

There is one table row per resource.

See "[Rate match resource table](#)" on page 113.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:NREsources on page 506
```

Rate match resource table

Each rate match resource is configured individually; there is one table row per resource, where the number of rows is defined by the parameter [Resources](#).

RB Pattern ← Rate match resource table

The resource block level bitmap is defined as a binary data from a data list, internally or externally generated.

The bitmap is 275 bits long. Longer patterns are truncated; shorter are zero-padded (i.e. the remaining bits are set to 0). If no data list is loaded, a pattern with all zeros is assumed.

A bit value of 1 in the RB level bitmaps indicates that the corresponding resource is not available for PDSCH.

To load a list:

- Select "Data List"
- In the standard "Select List" dialog, select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
- Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
- Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:RBDList on page 507
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:RBPatt on page 507
```

Slot ← Rate match resource table

Sets the number of slots and thus defines the "Slot Pattern" length.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:SLOT on page 507
```

Slot Pattern ← Rate match resource table

Set the slots to be used as a pattern.

The pattern length is the 14 or 28 depending on whether "Slot = 1 or 2".

A bit value of 1 in the symbol level bitmaps indicates that the corresponding resource is not available for PDSCH.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:SLTPatt on page 508
```

Periodicity ← Rate match resource table

Sets the time-domain pattern and defines the "Periodicity Pattern" length.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:PER on page 508
```

Periodicity Pattern ← Rate match resource table

Sets the periodicity in a pattern form, where the pattern length is set with the parameter "Periodicity".

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:PERPatt on page 508
```

Group ID ← Rate match resource table

Sets the group identifier for the selected rate match pattern, where the available values depend on the selected [Number of GroupsIdPDbNr5gUserDIBwpRateMatchRsPeriodicity](#).

Up to four rate match patterns can use the same "Group ID".

Remote command:

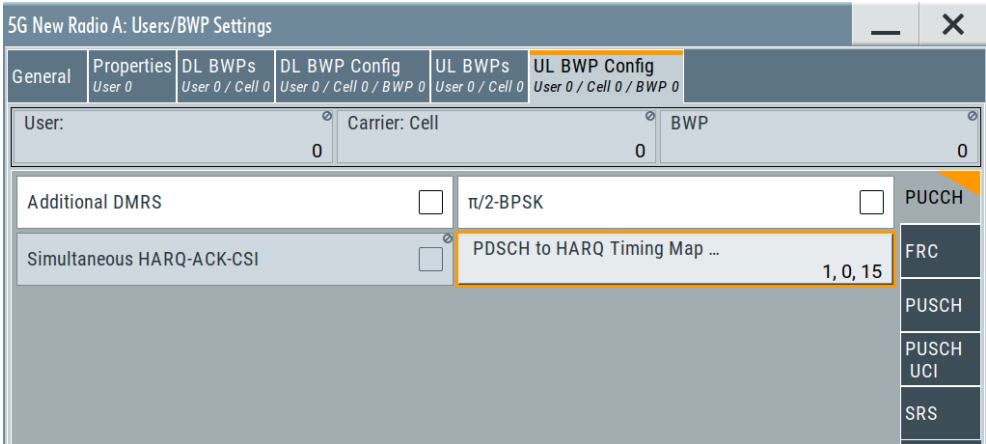
```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RATM:RS<gr0>:GRID on page 508
```

6.3.5 UL BWP Configuration Settings

Access:

1. Select "5G New Radio > General > Link Direction" > "Uplink".
2. Select "General > Users/BWPs" > "UL BWP Config".

3. Select "PUCCH".



The dialog comprises the settings for the UL bandwidth parts (BWP) configuration.

Settings:

- [User, Carrier, BWP Settings](#)..... 115
- [PUCCH Settings](#)..... 116
- [FRC Settings](#)..... 117
- [PUSCH Settings](#)..... 121
- [PUSCH UCI Settings](#)..... 132
- [SRS Settings](#)..... 134

6.3.5.1 User, Carrier, BWP Settings

- [User](#)..... 115
- [Cell](#)..... 115
- [BWP](#)..... 115

User

Selects the user to be configured.

Remote command:
via suffix at USER<ch>

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:
via suffix at CELL<ch>

BWP

Select the bandwidth parts (BWP) whose settings are displayed for configuration.

There are one or more BWPs, as set with the parameter "User/BWP Settings > UL BWPs" > [Number of DL/UL BWPs](#).

Remote command:
via suffix at BWP<dir0>

6.3.5.2 PUCCH Settings

Access:

- Select "User/BWP Settings > UL BWP Config > PUCCH".

Additional DMRS.....	116
$\pi/2$ - BPSK.....	116
Simultaneous HARQ-ACK-CSI.....	116
PDSCH to HARQ Timing Map.....	117
L Number of Entries.....	117
L Value of Indicator x.....	117

Additional DMRS

Global parameter that defines if additional DMRS is used for PUCCH format 3 and 4. According to TS 38.211, the value is required to select the DMRS positions for the PUCCH format 3 and 4.

The value is ignored, if other PUCCH Format is configured.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:ADMRs:STATe on page 509
```

$\pi/2$ - BPSK

If enabled, the $\pi/2$ - BPSK modulation order is used for PUCCH, instead of the default QPSK.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:BPSK:STATe on page 509
```

Simultaneous HARQ-ACK-CSI

Reserved for future use.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:HACK:STATe on page 510
```


PDSCH to HARQ Timing Map

Select the parameter name to access a dialog where you configure the PDSCH-to-HARQ-timing-indicator field values map, as defined in TS 38.213.

The PDSCH to HARQ timing map is transmitted by the higher-layer parameter `dl-DataToUL-ACK`. It is a sequence of up to 8 entries, every four bits long, where the number of entries is set with the parameter [Number of Entries](#).

The value of the individual timing indicators is defined by the parameter [Value of Indicator x](#). Observe the resulting sequence in the overview indication together with the parameter name "PDSCH to HARQ Timing Map".

Timing Map	
Number of Entries	3
Timing Values	
Value for Indicator 0	1
Value for Indicator 1	0
Value for Indicator 2	15

Number of Entries ← PDSCH to HARQ Timing Map

Sets the number of entries in the sequence of PDSCH to HARQ timing values.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:PDSHarq:NTMentry on page 510
```

Value of Indicator x ← PDSCH to HARQ Timing Map

Sets the individual timing values.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:PDSHarq:TMIValue<gr0> on page 510
```

6.3.5.3 FRC Settings

Access:

1. Select "User/BWP Settings > Properties" > **DSCH/USCH Channel Coding** > "On".

2. Select "User/BWP Settings > UL BWP Config > FRC".

The dialog allows you to select and enable fixed reference measurement channels (FRC), as defined in [TS 38.141](#).

The available FRCs depend on the selected BWP SCS ([SC Spacing/CP](#)) and selected number of RBs ([No. RBs](#)).

FRC State	118
FRC	118
Subcarrier Spacing	119
Allocated Resource Blocks	120
Modulation	120
Payload Size	120
RB Offset	120
Mapping Type	120
PTRS	120

FRC State

To enable the fixed reference measurement channels (FRC), set "User/BWP Settings > Properties" > [DSCH/USCH Channel Coding](#) > "On".

Remote command:

[\[:SOURCE<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:STATE](#) on page 511

FRC

The available FRCs depend on the selected BWP subcarrier spacing [SC Spacing/CP](#)) and selected number of resource blocks ([No. RBs](#)).

For each particular combination, you can select from the FRCs that have the same subcarrier spacing (SCS) as the BWP and the number of RBs allocated in the FRC is less than or equal to the "No. RB" of current BWP.

The FRCs are configured as defined in [TS 38.141](#). [FRCs major parameters \[TS 38.141\]](#) list the major difference between the FRC subsets; within one subset, the FRCs further differ in the SCS and the number of allocated RBs. For details, refer to [TS 38.141](#).

Table 6-2: FRCs major parameters [TS 38.141]

Test condition	Frequency	Subset	Modulation	Reference channels
Fixed reference channels for receiver sensitivity and in-channel selectivity	FR1	A1	QPSK	G-FR1-A1-1 to G-FR1-A1-9
	FR2	A1	QPSK	G-FR2-A1-1 to G-FR2-A1-5
Fixed reference channels for dynamic range	FR1	A2	16QAM	G-FR1-A2-1 to G-FR1-A2-6
Fixed reference channels for performance requirements	FR1	A3	QPSK	G-FR1-A3-8 to G-FR1-A3-14 G-FR1-A3-22 to G-FR1-A3-28 G-FR1-A3-31 and G-FR1-A3-32
		A4	16QAM	G-FR1-A4-8 to G-FR1-A4-14 G-FR1-A4-22 to G-FR1-A4-28
		A5	64QAM	G-FR1-A5-8 to G-FR1-A5-14
	FR2	A3	QPSK	G-FR2-A3-1 to G-FR2-A3-24
		A4	16QAM	G-FR2-A4-1 to G-FR2-A4-20
		A5	64QAM	G-FR2-A5-1 to G-FR2-A5-10

"TS 38.141: G-FR1"

Subset of FRCs defined for the FR1.

"TS 38.141: G-FR2"

Subset of FRCs defined for the FR2.

"Not Available" Indicates that there is no FRC defined for the current combination of "SC Spacing/CP" and "No. RB".

If FRC is selected, the following parameters are set automatically:

- DMRS for Mapping Type A parameters [Config Type](#), [Additional Position Index](#) and [Max Length](#).
- PUSCH allocations
- All FRC parameters in the "FRC" dialog.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:TYPE on page 511

Subcarrier Spacing

Indicates the SCS of the selected FRC. It is the same as the SCS of the selected BWP.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
SCS? on page 512

Allocated Resource Blocks

Indicates the number of used RBs of the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
ALRB? on page 513

Modulation

Indicates the modulation scheme used by the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
MODulation? on page 513

Payload Size

Indicates the payload size of the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
PASize? on page 513

RB Offset

Sets the RB offset for the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
RBOffset on page 513

Mapping Type

Sets the PUSCH mapping type for the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
MAPType on page 514

PTRS

Enables PTRS for the selected FRC.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
PTRS:STATe on page 514

6.3.5.4 PUSCH Settings

Access:

- Select "User/BWP Settings > UL BWP Config > PUSCH".

The dialog comprises the DMRS settings, divided per DMRS-mapping type and as defined in TS 38.211.

If FRC is used ("UL BWP Config > FRC > State > On"), the settings of the "DMRS for Mapping Type A" are configured automatically and cannot be changed.

Transform Precoding.....	122
Max Rank.....	122
TxConfig.....	122
Codebook Subset.....	122
Use PUSCH Scrambling ID.....	123
Data Scrambling ID.....	123
MCS Table.....	123
MCS Table Transform Precoding.....	123
Resource Allocation.....	123
Resource Block Group Size.....	124
Frequency Hopping.....	124
Max Code Block Groups Per Transport Block.....	125
Frequency Hopping Offsets.....	125
L Number of Offsets.....	125
L Offset Values.....	125
Minimum Scheduling Offset Available.....	126
Same Settings for Type A and Type B.....	126
Config Type.....	126
Additional Position Index.....	126
Max Length.....	127
NPusch ID.....	127

Scrambling ID 0/Scrambling ID 1.....	127
Time Domain Allocations.....	127
PTRS Config	127
L State.....	128
L RE-offset.....	128
L Power.....	129
L Max Number of Ports.....	129
L I_MCS_1/I_MCS_2/I_MCS_3.....	129
L N_RB_1/N_RB_2.....	129
PTRS Config (Transform Precoding)	130
L State.....	130
L Time Density.....	131
L Scrambling ID.....	131
L N_RB_x.....	131

Transform Precoding

Sets the higher layer parameter `transformPrecoder` that defines which access method is used, the optional DFT-s-OFDM or the CP-OFDM.

See also [Chapter 3.3, "Multiple Accesses Schemes"](#), on page 18.

"On" Enables the precoding operation and thus enables the DFT-s-OFDM.
See ["PTRS Config \(Transform Precoding\) ..."](#) on page 130.

"Off" Disables the DFT-s-OFDM precoding operation.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:TPSTate on page 518
```

Max Rank

Sets the higher layer parameter `maxRank` that defines the rank of the precoding matrix, as defined in [TS 38.212](#).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MRANK on page 519
```

TxConfig

Sets the higher layer parameter `txConfig`. It defines if codebook-based or non-codebook-based transmission is used and thus defines how and which precoding matrix is used, as defined in [TS 38.212](#).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:TXConfig on page 519
```

Codebook Subset

If codebook-based transmission ("TxConfig > Codebook") is used, this parameter sets the higher layer parameter `codebookSubset`, as defined in [TS 38.212](#).

"Fully-and-partial-and-non-coherent"

```
codebookSubset = fullyAndPartialAndNonCoherent
```

"Partial-non-coherent"

codebookSubset = partialAndNonCoherent

"Non-coherent" codebookSubset= nonCoherent

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:CBSubset on page 519

Use PUSCH Scrambling ID

Defines the value of the variable n_{ID} used for the initialization of the generator of the PUSCH scrambling sequence.

"Off" $n_{ID} = N_{ID}^{cell}$ (i.e. the physical layer cell identity)

"On" n_{ID} is the values set with the parameter [Data Scrambling ID](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:SCRambling:STAtE on page 521

Data Scrambling ID

If [Use PUSCH Scrambling ID](#) > "On", sets the identifier

dataScramblingIdentityPDSCH used to initialize data scrambling (c_{init}) for PUSCH.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DSID on page 521

MCS Table

Sets the MCS table and thus together with the parameter ["MCS Table Transform Precoding"](#) on page 123 defines the used modulation scheme.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MCSTable on page 520

MCS Table Transform Precoding

Together with the selected "MCS Table", this parameter defines the used modulation scheme.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MTTPrecoding on page 520

Resource Allocation

Sets the PUSCH resource allocation scheme and defines the allocation in the frequency domain.

"Type 0", "Type 1"

Selects the downlink resource allocation scheme, according to [TS 38.214](#).

"Dynamic Switch"

- If **PDSCH Scheduling** > "Auto/DCI":
UE uses downlink resource allocation type 0 or type 1, as defined by the DCI field "Frequency domain resource assignment".
- If **PDSCH Scheduling** > "Manual":
UE uses downlink resource allocation type 0 or type 1, as set with the parameter **Resource Allocation**.

This parameter defines the **PDSCH** allocation in the frequency domain globally and if you configure the allocations manually.

To configure the PDSCH based on the DCI:

- Set "Node > Scheduling > PDSCH Scheduling = Auto/DCI"
- Enable a DCI format 1_1 ("Scheduling > CORESET > Payload > DCI Format = 1_1") with "Config > Frequency Domain Resource Assignment = 262 143"
Set "Create PDSCH > On"
- Observe the allocation information for PDSCH ("Scheduling > PDSCH > Info > Content > frequency domain allocation")

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RESalloc on page 493
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:RESalloc on page 520
```

Resource Block Group Size

For **Resource Allocation** = "Type 0/Dynamic Switch", the resource block assignment is defined in terms of resource block groups (RBG). An RBG is a set of consecutive virtual resource blocks and its size (*rbg-Size*) is defined as function of the BWP size and one of two possible configurations.

This parameter sets which of the two configurations defined in **TS 38.214** is used.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RBGSize on page 493
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PUSCh:RBGSize on page 520
```

Frequency Hopping

"Frequency Hopping" disables or enables inter- or intra-slot frequency hopping.

"Disabled"	Disable frequency hopping.
"Intra-Slot"	Enable intra slot frequency hopping. Both intra- and inter-subframe hopping are performed. The PUSCH position in terms of used resource blocks is changed each slot and each subframe.
"Inter-Slot"	Enable inter-slot frequency hopping. The PUSCH position in terms of used resource blocks is changed each subframe.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:FHOP on page 522
```


Max Code Block Groups Per Transport Block

Limits the number of code block groups per transport block.

In 5G NR a huge TB (transport block) is split into multiple code blocks (CB). Multiples CBs are grouped into one code block group (CBG). The number of code blocks grouped into the CBG can be limited by the "Max Code Block Groups Per Transport Block" setting.

Disabled Disabled the limitation of code block groups per transport block.

2, 4, 6, 8 Defines the max number of code block groups per TB.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MCBGroups on page 518

Frequency Hopping Offsets

Opens the "Frequency Hopping Offsets" dialog which displays the number of offsets and enables you to change the offset values.

Frequency Hopping Offsets	
Number of Offsets	4
Offset Values	
Offset 0	1
Offset 1	1
Offset 2	1
Offset 3	1

Number of Offsets ← Frequency Hopping Offsets

Displays the number of frequency hopping offsets.

The number of offsets is set automatically to 2 or 4 depending on the size of the active BWP, as follows:

- If the size of the active BWP is fewer than 50 PRBs, one of two higher layer configured offsets is indicated in the UL grant.
- If the size of the active BWP is equal to or greater than 50 PRBs, one of four higher layer configured offsets is indicated in the UL grant.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:FHOFFsets:NOFFsets on page 521

Offset Values ← Frequency Hopping Offsets

Sets the value of the available offsets.

The number of offsets is set automatically to 2 or 4 depending on the size of the active BWP. See [Number of Offsets](#) for more information.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:FHOFFsets:OFFSet<gr0> on page 522
```

Minimum Scheduling Offset Available

Option: R&S SMW-K148.

Enables/disables the configuration of the minimum applicable scheduling offset indicator for the DCI format 0_1.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:OI01 on page 498
```

Same Settings for Type A and Type B

Enables or disables the possibility to configure DMRS (demodulation reference signal) for mapping type A and B separately or identically. Per default, the same settings are applied for both DMRS mapping types.

Mapping type A and B define the DMRS position in the PUSCH, the starting symbol and length. The UE informs the BS about the mapping type supportability via the UE capability information message.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:BSAMe on page 516
```

Config Type

Sets the configuration type (type 1 or type 2). It thus defines the mapping of the demodulation reference signal (DMRS) to the physical resource elements in the frequency domain, as defined in [TS 38.211](#).

The configuration type is carried by the higher-layer parameter `dmrs-Type`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:CTYPE on page 516
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:CTYPE on page 516
```

Additional Position Index

Sets the parameter `dmrs-AdditionalPosition` that is required to select the positions of the DMRS symbols l , as defined in [TS 38.211](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:APIndex on page 517
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:APIndex on page 517
```

Max Length

Sets the parameter `maxLength` and defines whether single- or double-symbol DMRS is used.

If "Max Length = 1", only single-symbol DMRS is allowed.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:MLENgtH on page 517
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:MLENgtH on page 517
```

NPusch ID

Sets the PUSCH ID value used for DMRS sequence generation.

Enabled if "Transform Precoding > On".

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PUIID on page 517
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PUIID on page 517
```

Scrambling ID 0/Scrambling ID 1

Sets the higher-layer parameters `scramblingID0` and `scramblingID1` (N_{ID}^0, N_{ID}^1).

The values are used to calculate the initialization sequence of the pseudo-random sequence generator.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:SID0 on page 518
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:SID1 on page 518
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:SID0 on page 518
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:SID1 on page 518
```

Time Domain Allocations

Sets the number of time domain allocations used to calculate the bitwidth of the "Time Domain Resource Assignment" for the UL DCI format 0_1 as specified in TS 38.214.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PDSCh:TDANum on page 524
```

PTRS Config ...

Enabled if [Transform Precoding](#).

Comprises the settings of the phase-tracking reference signals (PTRS) for P_xSCH, as defined in TS 38.214.

5G New Radio A: PTRS Settings - Mapping Type A (U0/C0/B0)	
State	0
RE-offset	00
Power	00
Max Number of Ports	1
Threshold Time Density	
I_MCS_1	0
I_MCS_2	0
I_MCS_3	0
Threshold Frequency Density	
N_RB_0	1
N_RB_1	276

The phase tracking reference signal (PTRS) is a UE-specific reference signal that is used to compensate for the phase noise of the oscillator. Phase-tracking reference signals can be transmitted only in the resource blocks used for the P_xSCH and if the transmission is enabled.

If the PTRS "State" is on, you can define its "Power" relative to the P_xSCH and its location in the resource grid.

State ← PTRS Config ...

If [DSCH/USCH Channel Coding](#) > "On", enables the transmission of phase-tracking reference signals.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:STATe on page 538
```

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:STATe on page 538
```

RE-offset ← PTRS Config ...

Sets the parameter `resourceElementOffset` $k_{\text{ref}}^{\text{RE}}$ required to define the precoding and mapping to the physical resources.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:REOF on page 538
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:REOF on page 538
```

Power ← PTRS Config ...

Sets the parameter `ptrs-Power` and thus defines the PUSCH to PTRS power ratio per layer per resource element.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:POWer on page 539
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:POWer on page 539
```

Max Number of Ports ← PTRS Config ...

Sets the maximum number of configured PTRS ports, given by the higher-level parameter `maxNrofPorts`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:PORT on page 539
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:PORT on page 539
```

I_MCS_1/I_MCS_2/I_MCS_3 ← PTRS Config ...

Sets the threshold values `ptrs-MCSl` with $l = \{1, 2, 3\}$ transmitted by the higher-layer parameter `timeDensity` in `PTRS-DownlinkConfig`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:MCS1 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:MCS2 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:MCS3 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:MCS1 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:MCS2 on page 540
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:MCS3 on page 540
```

N_RB_1/N_RB_2 ← PTRS Config ...

Sets the threshold values `NRBl` with $l = \{0, 1\}$ transmitted by the higher-layer parameter `frequencyDensity` in `PTRS-DownlinkConfig`.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:RB0 on page 540

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:RB1 on page 540

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:RB0 on page 540

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:RB1 on page 540

PTRS Config (Transform Precoding) ...

Enabled if [Transform Precoding](#) > "On" and [Link Direction](#) > "Uplink".

Comprises the settings of the phase-tracking reference signals (PTRS) for PUSCH incl. transform precoding (TP), as defined in [TS 38.214](#).

5G New Radio A: PTRS ...ing Type A (U0/C0/B0)	
State	☒
Time Density	1
Scrambling ID	N_{ID}^{Cell}
Sample Density	
N_RB_0	1
N_RB_1	276
N_RB_2	276
N_RB_3	276
N_RB_4	276

State ← PTRS Config (Transform Precoding) ...

Simulates the transmission of the higher-layer parameter
transformPrecoderEnabled.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:STaTe on page 522
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:TP:STaTe on page 522
```

Time Density ← PTRS Config (Transform Precoding) ...

Per default, an UE is configured with time density $L_{\text{PTRS}} = 1$.

Set the value of this parameter to 2 to simulated an UE configured by the higher-layer parameter `timeDensityTransformPrecoding`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:TMDensity on page 523
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:TP:TMDensity on page 523
```

Scrambling ID ← PTRS Config (Transform Precoding) ...

Sets whether the PTRS Scrambling ID value used for PTRS sequence generation is configured by the **NPusch ID** (higher layer) or by the cell ID.

N_ID^Cell Sets the cell ID as the scrambling ID for PTRS sequence generation.
N_ID^PUSCH Sets the **NPusch ID** as the scrambling ID for PTRS sequence generation.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:SCID on page 523
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:TP:SCID on page 523
```

N_RB_x ← PTRS Config (Transform Precoding) ...

Sets the higher-layer parameter `sampleDensity` that indicates the sample density thresholds $N_{\text{RB},i}$.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:RB0 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:RB1 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:RB2 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:RB3 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:TP:RB4 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:TP:RB0 on page 524
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:TP:RB1 on page 524
```

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
 PUSCh:DMTB:PTRS:TP:RB2 on page 524
 [:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
 PUSCh:DMTB:PTRS:TP:RB3 on page 524
 [:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
 PUSCh:DMTB:PTRS:TP:RB4 on page 524

6.3.5.5 PUSCH UCI Settings

Access:

- Select "User/BWP Settings > UL BWP Config > PUSCH UCI".

5G New Radio A: Users/BWP Settings				
General		Properties User 0	UL BWPs User 0 / Cell 0	UL BWP Config User 0 / Cell 0 / BWP 0
User:	0	Carrier: Cell	0	BWP
State	I	Mode	UCI+UL-SCH	
Scaling Alpha	1.0			
HARQ ACK				
I_HARQ_offset,0	0	I_HARQ_offset,1	0	
I_HARQ_offset,2	0			
CSI				
I_CSI1_offset,0	0	I_CSI1_offset,1	0	
I_CSI2_offset,0	0	I_CSI2_offset,1	0	

Here you can define the PUSCH uplink control information (UCI) parameters, such as the settings of the uplink shared channel (UL-SCH), HARQ control information, and the channel state information (CSI).

State.....	132
Mode.....	132
Scaling Alpha.....	133
I_CSI1_Offset,x, I_CSI2_Offset,x.....	133
I_HARQ_Offset,x.....	133

State

Enables the transmission and the configuration of the uplink control information (UCI).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:STATE on page 525

Mode

Defines the information transmitted on the PUSCH.

"UCI+UL-SCH" Control information and data are multiplexed into the PUSCH.

"UCI only" Only uplink control information is transmitted on PUSCH.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:MODE on page 525

Scaling Alpha

Sets the higher-layer parameter `scaling`. It defines the value of the parameter α required for the calculation of the number of coded modulation symbols per layer for HARQ-ACK and CSI transmissions.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:ALPHA on page 525

I_CSI1_Offset,x, I_CSI2_Offset,x

According to TS 38.213, the number of resources for multiplexing the CSI information in a PUSCH is defined by the CSI part 1 and CSI part 2 information offsets $\beta_{\text{offset}}^{\text{CSI-1}}$ and $\beta_{\text{offset}}^{\text{CSI-2}}$.

The information offsets are defined by the indexes $I_{\text{offset},x}^{\text{CSI-1}}$ and $I_{\text{offset},x}^{\text{CSI-2}}$, where :

- $x = 0, 1$ and
- $I_{\text{offset},0}^{\text{CSI-1}}$ and $I_{\text{offset},0}^{\text{CSI-2}}$ is used if up to 11 CSI bits are multiplexed
- $I_{\text{offset},1}^{\text{CSI-1}}$ and $I_{\text{offset},2}^{\text{CSI-2}}$ is used for more than 11 CSI bits

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF10 on page 526

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF11 on page 526

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF20 on page 526

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF21 on page 526

I_HARQ_Offset,x

According to TS 38.213, the number of resources for multiplexing the HARQ-ACK information in a PUSCH is defined by the information offsets $\beta_{\text{offset}}^{\text{HARQ-ACK}}$.

The information offsets are defined by the indexes $I_{\text{offset},x}^{\text{HARQ-ACK}}$, where :

- $x = 0, 1, 2$ and
- $I_{\text{offset},0}^{\text{HARQ-ACK}}$ is used if up to 2 HARQ-ACK information bits are multiplexed
- $I_{\text{offset},1}^{\text{HARQ-ACK}}$ is used for multiplexing of 2 to 11 HARQ-ACK information bits
- $I_{\text{offset},2}^{\text{HARQ-ACK}}$ is used if more than 11 HARQ-ACK information bits are multiplexed

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
HARQ:OFF0 on page 526

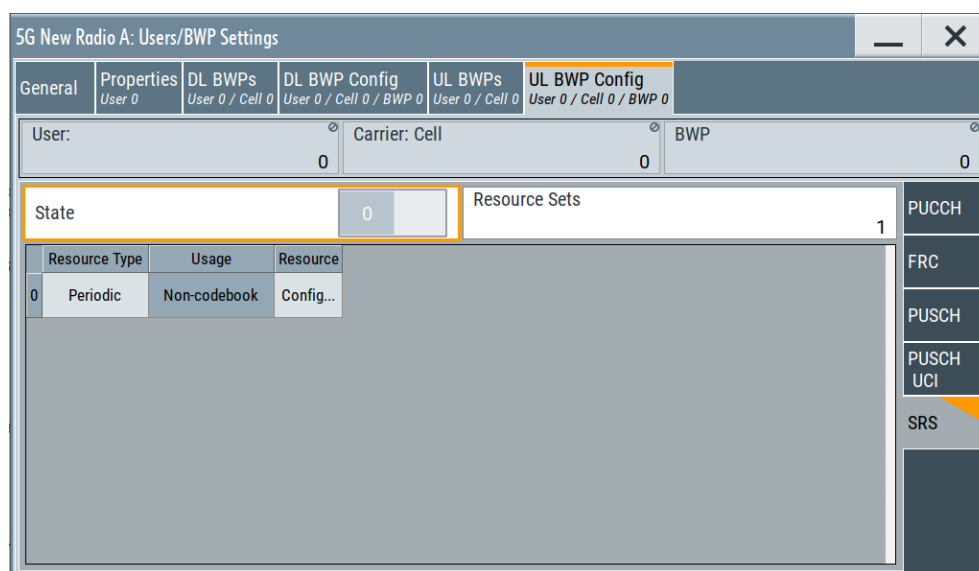
[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
HARQ:OFF1 on page 526

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
HARQ:OFF2 on page 526

6.3.5.6 SRS Settings

Access:

1. Select "User/BWP Settings > UL BWP Config > SRS".



2. Select "User/BWP Settings > UL BWP Config > SRS > Resource Set = 1".
3. Select "Resource > Config".

5G New Radio A (U0/C0/B0/R0) SRS Resource Set Settings																	
Resources																	
1																	
	Periodicity	Offset	Start Pos.	No. Sym.	Freq. Pos.	Freq. Shift	B SRS	C SRS	B Hop	Rep. Factor	Trans. Comb	Comb Offset	Sequence Settings	No. Ports	PTRS Port Idx.	Power (dB)	Antenna Ports
0	10 slots	1	4	1	0	0	0	0	0	1	2	0	Config...	1	0	0.00	Config...

4. To observe the SRS allocations on the time plan, proceed as follows:
 - a) Select "5G NR > General > Link Direction > Uplink".
 - b) Select "Scheduling > PUSCH > State > Off".

c) Select "General > Time Plan".

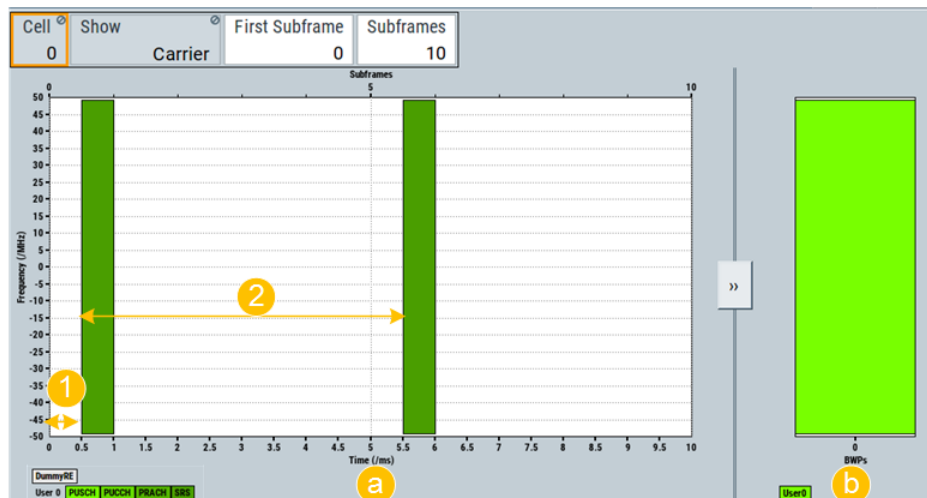


Figure 6-5: SRS representation on the Time Plan

a = SRS (PUSCH transmission is disabled)

b = Bandwidth part (273 RBs)

1 = Offset = 1 slot

2 = Periodicity = 10 slots

The sounding reference signal (SRS) is an UL reference signal transmitted by the UE. The BS uses the received SRS to estimate the UL channel quality for the particular user.

The SRS structure is defined in [TS 38.211](#), [TS 38.214](#) and [TS 38.331](#).

SRS structure

The SRS 5G NR structure is similar to the SRS structure used in LTE. In 5G NR, SRS is transmitted within the BWP, based on a flexible scheduling and using only portions of the overall channel bandwidth. Among other, the SRS supports the frequency hopping and transmission comb techniques known from LTE.

In the **time domain**, the SRS resource is defined as:

- 1, 2 or 4 consecutive OFDM symbols (**No. Sym.** $N_{\text{sym}}^{\text{SRS}}$)
- A starting position **Start Pos.** l_0 (i.e. the starting OFDM symbol), calculated as follows:

$$l_0 = N_{\text{sym}}^{\text{slot}} - 1 - l_{\text{offset}}$$

Where $l_{\text{offset}} = \{0 \text{ to } 5\}$ is an offset relative to the end of a slot.

In the **frequency domain**, its **starting position** is defined by the parameter k_0 and the density indication is given by the parameter **frequency shift**.

The SRS can be mapped to 1, 2 or 4 antenna ports (**No. Ports** $N_{\text{ap}}^{\text{SRS}}$) and its transmit **Power** is controlled, too.

Settings

State.....	136
Resource Sets.....	136
SRS resource sets table.....	137
L Resource Type.....	137
L Usage.....	137
L Resource > Config.....	137
SRS Resource Set Settings.....	137
L Resources.....	137
L Periodicity.....	137
L Offset.....	138
L Start Pos.....	138
L No. Sym.....	138
L Freq. Pos.....	138
L Freq. Shift.....	138
L B SRS.....	138
L C SRS.....	139
L B Hop.....	139
L Rep. Factor.....	139
L Trans. Comb.....	139
L Comb Offset.....	139
L Sequence Settings > Config.....	139
L Cyclic Shift.....	140
L Sequence ID.....	140
L Group or Sequence Hopping.....	140
L No. Ports.....	140
L PTRS Port Idx.....	140
L Power.....	141
L Antenna Ports > Config.....	141
L Mapping Coordinates.....	141
L Mapping table.....	141

State

Enables the SRS transmission.

Use this function to suppress the SRS indication on the "Time Plan".

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
STATE on page 528

Resource Sets

Sets the number of SRS sets and thus defines the number of table rows in SRS resource set table.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:NRSets on page 528

SRS resource sets table

The SRS resource sets are defined in table form, one resource set per table row, where the number of rows depends on the selected number of "Resource Sets".

Resource Type ← SRS resource sets table

Indicates that periodic SRS transmission is configured.

Periodic SRS means that the SRS occurs at regular time interval. "Aperiodic" and "Semi-Persistent" SRS will be supported in a future firmware version.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RSType on page 528
```

Usage ← SRS resource sets table

Indicates whether a codebook based or a non-codebook based transmission is used.

The value is set automatically and resembles the transmission method selected for PUSCH, see "UL BWP Config > PUSCH" > [TxConfig](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:USAGe on page 529
```

Resource > Config ← SRS resource sets table

Opens a dialog where you configure the SRS resources for the selected SRS resource set.

See "[SRS Resource Set Settings](#)" on page 137.

SRS Resource Set Settings

Access: "User/BWP Settings > UL BWP Config > SRS > Resource Set = 1" and "Resource > Config".

Resources ← SRS Resource Set Settings

Sets the number of SRS resources in the SRS resource set.

Each SRS resource is configured in an individual row in the SRS resource table.

The maximum number of SRS resources depends on whether [TxConfig](#) = "Codebook" or not.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:NRESources on page 529
```

Periodicity ← SRS Resource Set Settings

If [Usage](#) = "Periodic", sets the SRS repetition factor T_{SRS} . The periodicity is a time interval defined as number of slots that indicates how often (i.e. after how many slots) the SRS is transmitted.

As smaller the periodicity value as frequent is the SRS transmission. To enable the SRS for example in each slot, set "Periodicity = 1 slot".

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:PER on page 529
```

Offset ← SRS Resource Set Settings

If **Usage** = "Periodic" and **Periodicity** $\geq$ "2 slots", sets time position of first SRS allocation within an SRS periodicity, given as an offset in number of slots (T_{offset}) from the start of the frame.

Logically, the maximum offset value is calculated as SRS **Periodicity** - 1.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:OFFSet on page 529
```

Start Pos. ← SRS Resource Set Settings

Sets the starting position of the SRS allocation l_0 within a slot. The value gives the OFDM symbol number counted backwards from the end of a slot, see "SRS structure" on page 135.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:SPOS on page 530
```

No. Sym. ← SRS Resource Set Settings

Sets the number of consecutive OFDM symbols ($N_{\text{symb}}^{\text{SRS}}$) the SRS resource spans.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:SYMNumber on page 530
```

Freq. Pos. ← SRS Resource Set Settings

Sets the parameter k_0 that defines the starting position of the SRS allocation in the frequency domain.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:FPOS on page 530
```

Freq. Shift ← SRS Resource Set Settings

The frequency shift n_{shift} influence the SRS transmission density in the frequency domain.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:FQShift on page 531
```

B SRS ← SRS Resource Set Settings

Sets the filed b-SRS contained in the higher-layer parameter `freqHopping` and used to define the length of the SRS sequence, see TS 38.211, Table 6.4.1.4.3-1.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:BSRS on page 531
```

C SRS ← SRS Resource Set Settings

Sets the filed c-SRS contained in the higher-layer parameter `freqHopping` and used to define the length of the SRS sequence, see TS 38.211, Table 6.4.1.4.3-1.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:CSRS on page 531
```

B Hop ← SRS Resource Set Settings

Sets the parameter b_{Hop} that defines the frequency hopping of the SRS.

Set "B Hop" > "B SRS" to disable frequency hopping ("Rep. Factor" = 1).

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:BHOP on page 531
```

Rep. Factor ← SRS Resource Set Settings

If **B Hop** < **B SRS**, defines how many times the SRS symbols are repeated.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:REFactor on page 532
```

Trans. Comb ← SRS Resource Set Settings

Transmission comb (k_{TC}) is a method for interleaving SRS symbols by using alternating subcarriers (only the even or odd subcarriers).

The value of k_{TC} defines the maximum number of cyclic shifts $n_{\text{SRS}}^{\text{CS}}$ (**Cyclic Shift**).

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:TRTComb on page 532
```

Comb Offset ← SRS Resource Set Settings

Sets the parameter transmission comb offset.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:COFFset on page 532
```

Sequence Settings > Config ← SRS Resource Set Settings

Access: "User/BWP Settings > UL BWP Config > SRS > Resource Set = 1", "Resource > Config" and select "Sequence > Config".

5G New Radio A (U0/C0/B0/RS0/R0) SRS Sequence Settings	
Cyclic Shift	1
Sequence ID	0
Group or Sequence Hopping	Neither

Cyclic Shift ← Sequence Settings > Config ← SRS Resource Set Settings

Sets the number of cyclic shifts $n_{\text{SRS}}^{\text{CS}}$, required for the SRS sequence generation according to TS 38.211.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:SEQ:CYCShift on page 532

Sequence ID ← Sequence Settings > Config ← SRS Resource Set Settings

Sets the higher-layer parameter `sequenceId` ($n_{\text{ID}}^{\text{SRS}}$), required for the SRS sequence generation according to TS 38.211.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:SEQ:ID on page 533

Group or Sequence Hopping ← Sequence Settings > Config ← SRS Resource Set Settings

Sets the higher-layer parameter `groupOrSequenceHopping` that defines the sequence group, required for the SRS sequence generation according to TS 38.211.

In this firmware version, group and sequence hopping are not supported.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:SEQ:HOPping on page 533

No. Ports ← SRS Resource Set Settings

If `TxConfig` = "Codebook", sets how many antenna ports (AP) are used for every SRS transmission. The same number of antenna ports is used for all SRS resources.

If "Non-Codebook" transmission is used, the value of the parameter "No. Ports" is set automatically.

Remote command:

[:SOURCE<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:NAPort on page 533

PTRS Port Idx ← SRS Resource Set Settings

Sets the PTRS antenna port index. The maximum number of configured PTRS ports is set with the parameter [Max Number of Ports](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:PTRS on page 534

Power ← SRS Resource Set Settings

Sets the SRS power.

The value is set relative to the PUSCH power.

Remote command:

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:POWer on page 534

Antenna Ports > Config ← SRS Resource Set Settings

Access: "User/BWP Settings > UL BWP Config > SRS > Resource Set = 1", "Resource > Config" and select "Antenna Ports > Config".

	AP 1000	
	Real	Imag
BB A	1.000+j0.000	

For details on the antenna ports-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Mapping Coordinates ← Antenna Ports > Config ← SRS Resource Set Settings

Switches representation between the "Cartesian" (Real/Imag) and "Cylindrical" (Magn./Phase) coordinates.

Mapping table ← Antenna Ports > Config ← SRS Resource Set Settings

Defines the mapping of the antenna ports (AP) to the physical antennas.

Set the number of antenna ports (AP) with the parameter [No. Ports](#).

For details on the antenna ports-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Remote command:

"Mapping Coordinates = Cartesian":

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL on page 534

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary on page 535

on page 535

"Mapping Coordinates = Cylindrical":

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude

on page 536

[:SOURce<hw>] :BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe

on page 536

6.4 Scheduling Settings

Access:

- Select "Baseband > 5G NR > Scheduling".

Cell	Subframe	Content	No. Alloc	SC Spacing / CP	Slot	Map Type	No. Sym.	Sym. Offset	No. RBs	RB Offset	Settings	Power / dB	State	Repetition
0	0	SS/PBCH		30 kHz NCP	0(0)		4	4	20	-	Config...	-	On	
		SS/PBCH		30 kHz NCP	0(0)		4	8	20	-	Config...	-	On	
		User 0, BWP 0	2	30 kHz NCP					273		Config...			
		CORESET	Copy To...	30 kHz NCP	0(0)		1	0	270	0	Config...	0.00	On	Slot
		PDSCH	Copy To...	30 kHz NCP	0(0)	A	13	1	273	0	Config...	0.00	On	Slot
		CORESET		30 kHz NCP	1(1)		1	0	270	0	Info...	0.00		of SF 0...
		PDSCH		30 kHz NCP	1(1)	A	13	1	273	0	Info...	0.00		of SF 0...

This dialog displays an overview of distribution of the configured allocations in the time domain.

Because the slot is the basis time unit in 5G NR and the basis granularity in the numerologies, the **5G NR scheduling is performed on a per slot basis**. In comparison, the LTE scheduling is subframe-based. However, the scheduling dialog still shows the configuration of a complete subframe, as the subframe (besides the frame) is the common time boundary between the different numerologies.

Scheduling table: Understanding the displayed information

The allocation table lists all BWPs of all users configured for the corresponding link direction. Some of the allocations, in the BWPs or in the common group, are automatically configured. You can add additional allocations in the user-specific groups.

Allocations belonging to the same user and BWP are grouped in "**User x BWP x**" groups. Select the group name to unfold the PDSCH/CORESET or PUSCH/PUCCH allocations. You find the **non-user-specific** allocations in the dedicated "**Common**" group.

The allocations can be divided into two types: configurable allocations and read-only allocations.

- *Configurable allocations*

You can configure these allocations in the first 100 subframes. The configurable allocations are always the first allocations in each BWP per user group.

To append or remove allocations of this type, set the number of allocations ([No. of Allocations](#)) for the corresponding group.

Once configured, these allocations are repeated as defined in the [Repetition/Repetition Type](#) field.

- *Read-only allocations*

These allocations are configured automatically, based on: scheduling mode, DCI, repetition of an allocation configured in previous/same subframe, ongoing allocations, aggregated PDSCH, or because they are configured elsewhere, like for example SS/PBCH, SRS, CSI-RS, dummy RE.

You can observe the allocations in all available subframes, where the number of subframes depends on the ARB sequence length.

The icon  at the beginning of a table row, indicates that this allocation is set as [Burst Mode Ref Alloc Identifier](#) for the "Burst" power mode.

To offer a better overview of the 5G NR frame structure in configurations including several slots, i.e. complicated TDD settings, the [Slot](#) column displays the slot number in the frame in parentheses next to the slot number in the subframe.

Allocating channels in the time and frequency domains

The following settings define the allocation position:

- [SC Spacing/CP](#) (defines the available resources)
- Time domain: [Slot](#), [No. Sym.](#) and [Sym. Offset](#)
- Frequency domain: [No. RB](#) and [RB Offset](#)
- [Repetition/Repetition Type](#)

The allocation table shows information on the selected channel or signal. Additionally, for each "User x BWP x" summary information is also displayed, if this information affects the channel allocation within the BWP, e.g. [SC Spacing/CP](#) or [No. RB](#).

If allocations are overlapping, a conflict is indicated in the most left column of the allocation table.

Settings:

Cell	144
Subframe	144
Next/Prev	144
Expand/Collapse	144
Conflict	144
Content	145
No. of Allocations	145
Copy To	145
Subframe	146
Slot	146

Apply.....	146
SC Spacing/CP.....	146
Slot.....	146
Mapping Type.....	147
Format.....	147
No. Sym.....	147
Sym. Offset.....	148
No. RB.....	148
RB Offset.....	149
Transform Precoding.....	149
Settings.....	149
L Config.....	149
L Info.....	150
Power.....	150
State.....	151
Repetition/Repetition Type.....	151
Repetition Settings.....	151
L Repetition Type.....	151
L Period.....	152
L Duration.....	152

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

Subframe

Sets the subframe to be configured.

The maximum number of available subframes N_{SF} is calculated as follows:

$$N_{SF} = 10 * \text{"ARB Sequence Length"} - 1$$

Remote command:

via suffix at `SUBF<st0>`

Next/Prev

Navigates through the subframes.

Remote command:

n.a.

Expand/Collapse

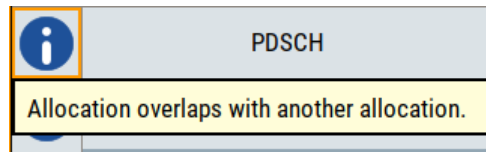
Shows/hides the group of settings.

Remote command:

n.a.

Conflict

A conflict is indicated if two allocations with the same priority overlap.



Observe also the [Time Plan](#).

Remote command:

`[:SOURCE<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CONFLICT?` on page 543

Content

Sets or indicates the allocated channel or signal.

- Configurable allocations
 - DL: CORESET, PDSCH, CSI-RS or LTE-CRS
 If [PDSCH Scheduling](#) = "Auto/DCI", the "Content" = "CORESET".
 (PDSCH allocations are configured automatically)
 If "Users/BWP > DL BWP Config > ZP/NZP CSI-RS > State = On", CSI-RS allocations are configured automatically.
 If "Node > LTE-CRS Coexistence" > [State](#) = "On", LTE-CRS allocations are configured automatically.
 If "Node > PRS" > ["State"](#) on page 66 = "On", PRS allocations are configured automatically.
 - UL: PUSCH, PUCCH, PRACH
- Read-only allocations
 Same as for the configurable allocations and additionally: Dummy REs, SS/PBCH, SRS

Remote command:

`[:SOURCE<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CONTent` on page 543

No. of Allocations

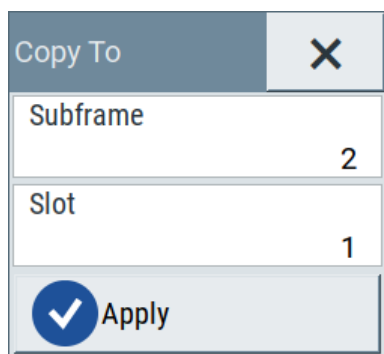
In the "User x BWP x" groups, sets the number of configurable allocations per "User x BWP x" group.

Remote command:

No. of Allocations: `[:SOURCE<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:
USER<dir0>:BWPart<gr0>:NALLoc` on page 544

Copy To...

Opens the "Copy To" dialog which enables you to copy the settings to another sub-frame and slot.



A dialog box titled "Copy To" with a close button (X) in the top right corner. It contains two input fields: "Subframe" with the value "2" and "Slot" with the value "1". At the bottom is an "Apply" button with a checkmark icon.

Remote command:
n.a.

Subframe

Sets the target subframe to copy the settings to.

Remote command:

`[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:COPYto:SUBF` on page 544

Slot

Sets the target slot to copy the settings to.

Remote command:

Copy To Slot: `[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:COPYto:SLOT` on page 544

Apply

Starts the copying process.

Remote command:

Copy To Apply: `[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:COPYto:APPLY` on page 544

SC Spacing/CP

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

The provided values depend on the channel type.

The SCS of the selected BWP is also displayed, because the channel allocation in the frequency domain depends on this value.

Remote command:

PRACH: `[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:SCSPacing` on page 613

Slot

Sets the start slot in the subframe for the selected allocation. The available slots depend on the channel-specific [SC Spacing/CP](#) as follows:

Slot	SCS / CP (as selected for the specific channel)
0	15 kHz NCP
0 to 1	30 kHz NCP
0 to 3	60 kHz NCP 60 kHz ECP
0 to 7	120 kHz NCP
0 to 15	240 kHz NCP

Remote command:

`[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:SLOT` on page 545

Mapping Type

Defines to which symbols of the PDSCH/PUSCH allocation the demodulation reference signals (DMRS) are mapped.

Selection of the PDSCH-mapping type depends on the "Additional Position Index" in the [DL BWP Config](#) dialog. If the "Additional Position Index" ≤ 1 a selection of the mapping type B is possible.

The PUSCH-mapping type is in case of "FRC" read-only. Otherwise a selection between mapping type "A" and "B" is always allowed.

"A" Location relative to the start of the slot.

"B" Location relative to the start of the PDSCH resources.

Remote command:

`[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:MAPType` on page 545

Format

In uplink, selects the PUCCH format.

3GPP defines several PUCCH formats. The PUCCH format affects several PUCCH characteristics, like the mapping to physical resource blocks.

You can select a different PUCCH format for each PUCCH allocation. Depending on the format, you can access different enhanced settings for the PUCCH.

Remote command:

`[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:FMT` on page 545

No. Sym.

Indicates the time duration of the allocation inside the slot.

The available values depend on the CP and the [Mapping Type](#), see [Table 6-3](#).

Table 6-3: No. Sym. (L)

Mapping Type	Normal cyclic prefix	Extended cyclic prefix
Mapping type A	3, 14	3, 12
Mapping type B	2, 4, 7	2, 4, 6

The parameters "No. Sym." and "Sym. Offset" are interdependent; their sum must not exceed the maximum of 14 or 12 symbols, for normal and extended CP respectively.

For SRS allocations, the value is set with "Users/BWP > UL BWP Config > SRS > SRS Resource Table > Resource > Config" > [No. Sym.](#).

Note:

If intra slot frequency hopping is enabled, the "No. Sym." for the PUSCH is limited to:

- Mapping type A: minimum 8
- Mapping type B: minimum 2

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:SYMNumber on page 546
```

Sym. Offset

Sets the allocation's start (OFDM symbol) within the slot.

The available values depend on the channel-specific [SC Spacing/CP](#) and the [Mapping Type](#), see [Table 6-4](#).

Table 6-4: Sym. Offset

Mapping Type	Normal cyclic prefix	Extended cyclic prefix
Mapping type A	0, 1, 2, 3	0, 1, 2, 3
Mapping type B	0, 12	0, 10

For SRS allocations, the value is set with "Users/BWP > UL BWP Config > SRS > SRS Resource Table > Resource > Config" > [Offset](#).

If the value "Sym. Offset" is read-only or not, depends on:

- Number of symbols
- Content type (PDSCH / PUSCH / PRACH / ...)
- Mapping type
- DMRS Type A position
- Cyclic prefix / numerology

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:SYMoffset on page 546
```

No. RB

Sets the bandwidth (frequency size) of selected allocation in terms of resource blocks (RB).

The number of resource blocks generally depends on the SCS of the corresponding BWP, set with the parameter "Users/BWP > DL/UL BWPs" > [SC Spacing/CP](#). Observe the number of *total* available RBs in the selected "User x, BWP x".

The number of *RB per channel* also depends on the channel type as follows:

- CORESET allocations span always a multiple of 6 resource blocks. Thus, only values that are multiple of 6 are allowed for these allocations.
- The number of resource blocks that are available for PUSCH depends on whether the transform precoding is enabled or not (that is if DFT-s-OFDM is applied), see ["Transform Precoding"](#) on page 149.
- The number of resource blocks of the PRACH allocation are set automatically, depending on the selected [SC Spacing/CP](#).
- The number of resource blocks of the PUCCH allocation is limited when [Transform Precoding](#) is enabled. In this case setting the "No. of RB" to 7, 11 or 13 is prohibited.

Symbol "-" indicates that the CORESET or PxSCH allocations are defined as bitmaps:

- "Scheduling > CORESET > Config > General" > [Frequency Domain Resources](#)
- "Scheduling > PxSCH > Config > General" > [Resource Allocation](#) = "Type 0"

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:RBNumber on page 546
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:RBNumber? on page 547
```

RB Offset

Adds a frequency offset and sets the start resource block of the selected allocation.

The value range depends on the selected channel type and the parameters [SC Spacing/CP](#) and [No. RB](#).

Symbol "-" indicates that the CORESET or PxSCH allocations are defined as bitmaps:

- "Scheduling > CORESET > Config > General" > [Frequency Domain Resources](#)
- "Scheduling > PxSCH > Config > General" > [Resource Allocation](#) = "Type 0"

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:RBOffset on page 547
```

Transform Precoding

In UL, you can define which access method is used, the optional DFT-s-OFDM or the CP-OFDM.

See also [Chapter 3.3, "Multiple Accesses Schemes"](#), on page 18.

"On" Enables the precoding operation and thus enables the DFT-s-OFDM.

"Off" Disables the precoding operation and thus enables the CP-OFDM.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:TPState on page 546
```

Settings

Opens dialogs with additional setting or information.

Config ← Settings

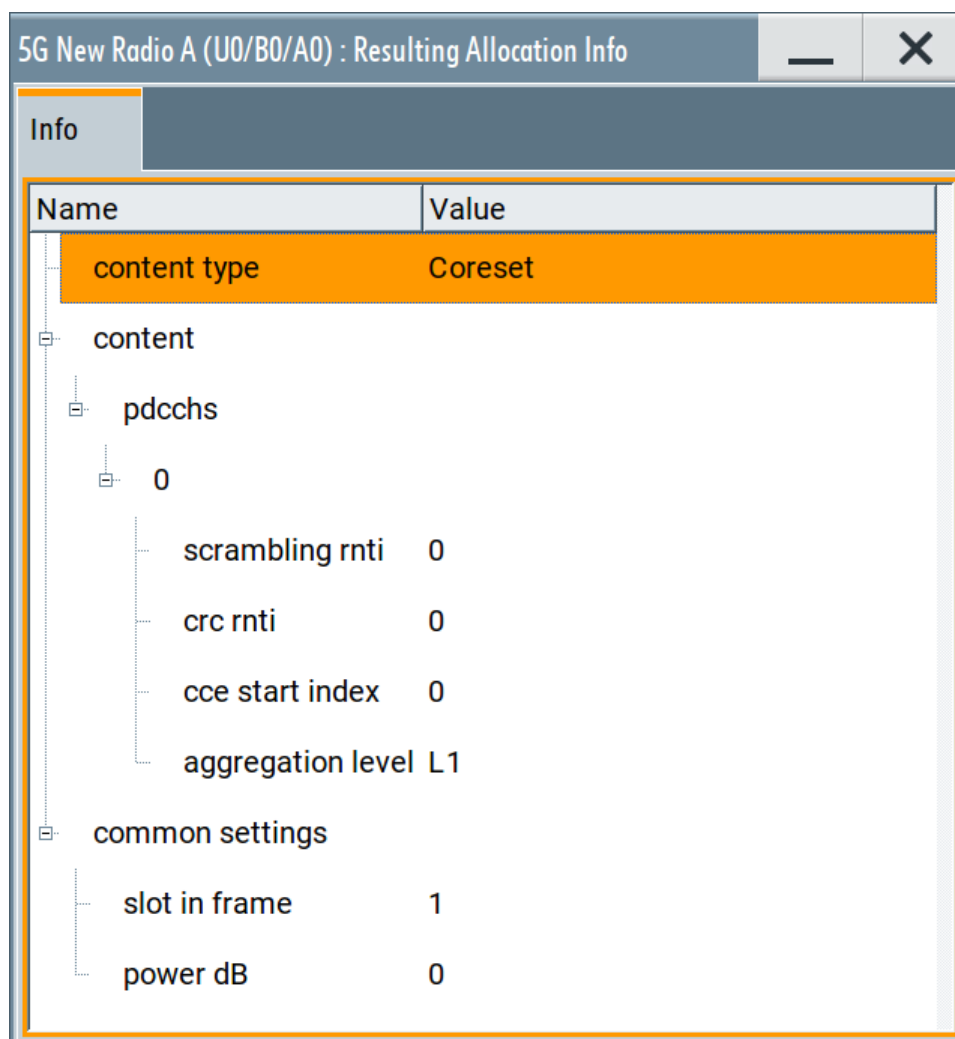
Opens the dialogs for configuration of the corresponding settings.

See:

- [Chapter 6.2.6, "SS/PBCH Settings"](#), on page 58
- [Chapter 6.2.8, "Dummy REs Settings"](#), on page 70
- [Chapter 6.3.3, "DL/UL BWPs Settings"](#), on page 82
- [Chapter 6.5, "PDSCH/PUSCH Settings"](#), on page 153
- [Chapter 6.6, "CORESET Settings"](#), on page 173
- [Chapter 6.7, "PUCCH Settings"](#), on page 199

Info ← Settings

Opens the "Resulting Allocation Info" dialog with details on the automatically allocated and repeated resources, like, for example, PDSCH created from DCIs or repeated PDSCH or CORESET.



Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:RESulting:ALLoc<user0>:INFO? on page 549
```

Power

Sets the power for the selected allocation relative to the power of the other allocations.

Allocations with "Power = 0 dB" use the same power level.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:POWer on page 548
```

State

Sets the allocation to active or inactive state.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:STATe on page 548
```

Repetition/Repetition Type

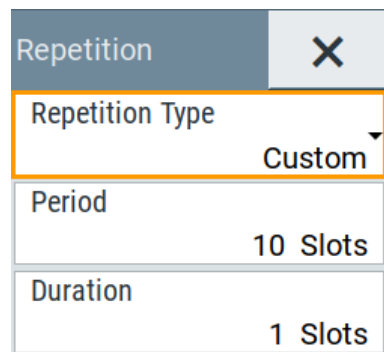
- Configurable allocations
Displays if and how often the allocation is repeated.
Select the field to open the [Repetition Settings](#) dialog where you can reconfigure the repetition.
- Read-only allocations
Indicates the read-only reason, e.g. ongoing allocation, from SF#, etc.
Select this indication to access the setting that causes the configuration.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:REPetitions on page 548
```

Repetition Settings

Access: "Baseband > 5G NR > Scheduling > Repetition".



Repetition	
Repetition Type	Custom
Period	10 Slots
Duration	1 Slots

Repetition Type ← Repetition Settings

Sets if and how the allocation is repeated, e.g. per slot, per subframe, on a per frame basis or at a user-defined period.

"Off" The allocation is transmitted once.

"Slot", "Subframe", "Frame"

Available for "Content = PDSCH/PUSCH/PUCCH/CORESET".
The allocation is transmitted every slot, subframe, or frame.

"Custom"

User-defined repetition pattern, set as [Duration](#) and [Period](#).
Use the "Time Plan" to observe the current scheduling.

Example:



Figure 6-6: Repetition Type = Custom: Representation on the Time Plan

1 = [Duration](#) = "2 Slots"

2 = [Period](#) = "5 Slots"

If "Quick Setting" configuration with "Duplexing = TDD" is applied, the values set here resemble the slot configuration set in the "Quick Setting" > [Frame Format](#) dialog.

Period ← Repetition Settings

Sets after how many slots the group of configurable allocation and its repetitions is repeated, see [User-defined repetition](#).

The maximum repartition period is calculated as follows:

$\text{RepPeriod}_{\text{max}} = \# \text{SlotsPerFrame} * \text{"SequenceLength"}$, where

- $\# \text{SlotsPerFrame}$: is the number of available slots within a frame and depends on the used subcarrier spacing
- "SequenceLength": is the ARB sequence length as set with the parameter "Output/Power > Output" > [Sequence Length](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PERiod on page 549
```

Duration ← Repetition Settings

Sets in how many consecutive slots within a frame the allocation is repeated.

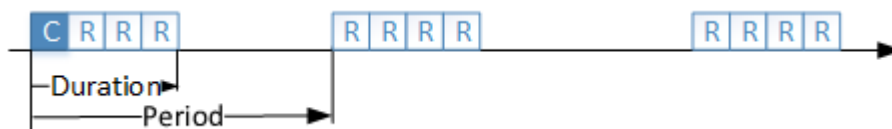


Figure 6-7: User-defined repetition

C = Configurable allocation

R = Repetition

Duration = Number of consecutive slots in that the allocation is transmitted

Period = Sets after how many slots the group of configurable allocation and its repetitions is repeated

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:DURation on page 548

6.5 PDSCH/PUSCH Settings

Access:

1. PDSCH settings:

- Select "5G New Radio > General > Link Direction > Downlink".
- Select "5G New Radio > Scheduling".
- Select "User x BWP x > Content > PDSCH".
- Select "PDSCH > Settings > Config".

5G New Radio A (U0/B0/A1) PDSCH Settings	
General	TxScheme DMRS PTRS Manual Antenna Ports Info
PDSCH Type	DCI Format 1_1
Number of Codewords	2
Scheduled by CORESET 0	☐
Rate Match Pattern Group	None
Resource Allocation	Type 1
Burst Mode Ref Alloc Identifier	
Transport Block 2	
Modulation	QPSK
Number of Physical Bits	204 120
Transport Block 1	
Modulation	QPSK
Number of Physical Bits	136 080
HARQ Process Number	0

2. PUSCH settings:

- Select "5G New Radio > General > Link Direction > Uplink".
- Select "5G New Radio > Scheduling".
- Select "User x BWP x > Content > PUSCH".

d) Select "PUSCH > Settings > Config".

5G New Radio A (U0/B0/A0) PUSCH Settings	
General	TxScheme DMRS PTRS <i>Manual</i> Antenna Ports Info
PUSCH Type	DCI Format 0_1
Resource Allocation	Type 1
	Burst Mode Ref Alloc Identifier: 1
Frequency Hopping	☐
	Index to Frequency Hopping Offset: 0
Modulation	QPSK
	Number of Physical Bits: 88 452
HARQ Process Number	0

This dialog comprises the settings of the physical downlink shared channel (PDSCH) or the physical uplink shared channel (PUSCH).

The PDSCH carries the general user data and is therefore the most prominent channel in a radio frame; it occupies the most resources.

Settings:

• General Settings	154
• TxScheme Settings	158
• DMRS Settings	160
• Channel Coding Settings	163
• UCI Settings	165
• PTRS Settings	167
• PTRS Settings with Enabled Transform Precoding	169
• Antenna Ports	171
• Info	173

6.5.1 General Settings

Access:

1. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".
2. Select "General".

5G New Radio A (U0/B0/A1) PDSCH Settings	
General	TxScheme DMRS PTRS Manual Antenna Ports Info
PDSCH Type	DCI Format 1_1
Scheduled by CORESET 0	☐
Resource Allocation	Type 1
	Burst Mode Ref Alloc Identifier
Transport Block 2	
Modulation	QPSK
	Number of Physical Bits
	204 120
Transport Block 1	
Modulation	QPSK
	Number of Physical Bits
	136 080
HARQ Process Number	0

Settings:

PDSCH Type/PUSCH Type	155
Number of Codewords	155
Scheduled by CORESET 0	156
Rate Match Pattern Group	156
Resource Allocation	156
Burst Mode Ref Alloc Identifier	156
Precoding Granularity	156
Frequency Hopping	157
Index to Frequency Hopping Offset	157
Resource Block Group Bitmap	157
Modulation	157
Phys. Bits	158
HARQ Process Number	158

PDSCH Type/PUSCH Type

Defines the PDSCH/PUSCH type by selecting the DCI format by that the PDSCH/PUSCH content is defined.

The available settings depend on the current configuration. To select, for example, "PDSCH Type = DCI Format 1_0", select "Users/BWP > DL BWP Config > PDSCH > Additional Position Index = 2" and "Scheduling > PDSCH > Map Type = A".

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:TYPE on page 555
```

Number of Codewords

For PDSCH, sets if one or two codewords are used.

The combination of number of codewords and [Number of Layers](#) determines the layer mapping for the selected precoding scheme.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SchEd:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:NCW on page 555
```

Scheduled by CORESET 0

For PDSCH allocations, defines if the PDSCH settings are scheduled by CORESET 0 or not.

You can enable several PDSCH allocations, also a combination of PDSCH scheduled by CORESET 0 and such that are not. To enable the CORESET 0 itself, set the parameter **CORESET ID** = "0".

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SchEd:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:SBCZero:STaTe on page 555
```

Rate Match Pattern Group

For PDSCH allocations, selects one of the rate match pattern groups, configured in the "Users/BWP Settings > DL BWP Config > Rate Match" dialog.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SchEd:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:PaTGrp on page 556
```

Resource Allocation

If "Users/BWPs > DL BWP Config > PDSCH > Resource Allocation = Dynamic Switch", sets the resource allocation type 0 or type 1.

This parameter allows you to schedule PDSCH type 0 allocation if manual scheduling is used (**PDSCH Scheduling** > "Manual").

For PDSCH, the resource allocation for type 0 allocation is set with the parameter **Resource Block Group Bitmap**.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SchEd:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:RESaLloc on page 556
```

Burst Mode Ref Alloc Identifier

If **Power Mode** > "Burst", sets whether the bandwidth of the current allocation is used as reference for the "Burst" power mode.

The icon  in the **Scheduling Settings** table indicates which allocation is set as burst reference.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SchEd:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:BMAid on page 554
```

Precoding Granularity

For PDSCH allocations, the precoding granularity can be adjusted. Sets the precoding granularity if "User/BWP Settings > DL BWP Config > PDSCH > General Settings > Precoding" is enabled.

"N2" Precoding granularity is set to N2.

- "N4" Precoding granularity is set to N4.
This setting is not available if following values are set at "Users/BWPs > DL BWP Config > PDSCH > General Settings":
- "VRB-to-PRB Interleaver" equals 2 or
 - "Resource Block Group Size" equals Config1 and BWP size ≤ 36 RBs
- "Wideband" Precoding granularity is set to wideband.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PDSCh:PRECG on page 554
```

Frequency Hopping

For PUSCH allocations, enable or disable the frequency hopping, configured in the "Users/BWP Settings > UL BWP Config > Frequency Hopping" dialog.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PUSCh:FHOP:STATe on page 562
```

Index to Frequency Hopping Offset

For PUSCH allocations, selects one of the frequency hopping offset index according to the entries, configured in the "Users/BWP Settings > UL BWP Config > Frequency Hopping Offsets" dialog.

"0, 1" If there are only 2 frequency hopping offsets configured.

"0, 1, 2, 3" If there are only 4 frequency hopping offsets configured.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PUSCh:FHOI on page 561
```

Resource Block Group Bitmap

For [Resource Allocation](#) > "Type 0", sets the PxSCH resource block groups allocation as bit pattern.

The bitmap is a 19-bits long pattern where value of 1 indicates that the resource element group is used for PxSCH.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PDSCh|PUSCh:RESalloc:PATtern on page 556
```

Modulation

Selects the modulation scheme.

- PDSCH: QPSK, 16QAM, 64QAM, 256QAM
- PUSCH: QPSK, 16QAM, 64QAM, 256QAM, and if [Transform Precoding](#) > "Off" also pi/2-BPSK.

Note:

Preconditions for 256QAM:

- "Users/BWP" > "DL/UL BWP Config" > "PDSCH" > "MCS Table" equals "256QAM"
- "Users/BWP" > "DL/UL BWP Config" > "PUSCH" > "MCS Table" equals "256QAM"

Preconditions for BPSK :

- BPSK is not available for PxSCH
- $\pi/2$ -BPSK:

Preconditions for $\pi/2$ -BPSK:

- $\pi/2$ -BPSK: "Users/BWP" > "DL/UL BWP Config" > "PUSCH" > "Transform Precoding" equals "Enabled"

See also [Table 3-1](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :MOD on page 557
```

Phys. Bits

Indicates the size of the selected allocation in bits.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PHYSbits? on page 557
```

HARQ Process Number

Sets the HARQ process number for the relevant DCI.

The value can be set between 0 and 15.

Note: Only visible when the "HPN Mode" is enabled in the "Node Settings > Feedback" dialog.

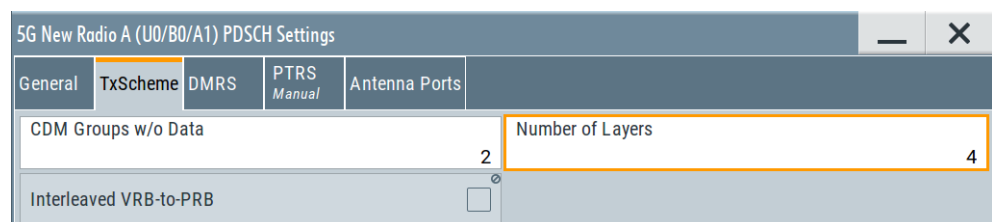
Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:HPRNumber on page 561
```

6.5.2 TxScheme Settings

Access:

1. Select "5G New Radio > General > Link Direction" > **"Downlink"**.
2. Select "Scheduling > User x BWP x > Content > PDSCH > Settings > Config".
3. Select "TxScheme".



4. Select "5G New Radio > General > Link Direction" > **"Uplink"**.
5. Select "Scheduling > User x BWP x > Content > PUSCH > Settings > Config".
6. Select "General > PUSCH Type = DCI Format 0_1".

7. Select "TxScheme".

5G New Radio A (U0/B0/A0) PUSCH Settings	
General	TxScheme
DMRS	PTRS Auto
Channel Coding	Antenna Ports
CDM Groups w/o Data	Number of Layers
SRS Resource Indicator	

Settings:

CDM Groups w/o Data.....	159
Number of Layers.....	159
TPMI.....	159
SRS Resource Indicator.....	160
Interleaved VRB-to-PRB.....	160

CDM Groups w/o Data

Selects the number of CDM groups that are reserved and contain no data. They are therefore not used by the PDSCH/PUSCH for data transmission. In the resource grid, the resource elements for CDM (between PDSCH/PUSCH DMRS resource elements) remain empty.

The value is required to select the number of DMRS ports and hence the number of antenna ports. For details, see [TS 38.212](#).

If "User/BWPs > UL BWP Config > PUSCH" > [Transform Precoding](#) = "On", this parameter is set automatically.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PDSch|PUSCh:TXScheme:CDMData on page 560
```

Number of Layers

Sets the number of precoding layers.

The combination of number of codewords and number of layers determines the layer mapping. Each layer is transmitted on a separate antenna port. The minimum number of layers corresponds to the selected [Number of Codewords](#).

If "User/BWPs > UL BWP Config > PUSCH" > [TxConfig](#) = "Codebook", this parameter is set automatically.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PDSch|PUSCh:TXScheme:NLAYers on page 560
```

TPMI

Access: "User/BWPs > UL BWP Config > PUSCH" > [TxConfig](#) = "Codebook".

Sets the TPMI index, required to select the precoding matrix, as defined in [TS 38.211](#).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPpart<gr0>:ALLoc<user0>:PUSCh:TXScheme:TPMidx on page 562
```

SRS Resource Indicator

Access: "User/BWPs > UL BWP Config > SRS > Resource > Config" > [Resources](#) ≥ 1.

Selects the SRS resource to be used. SRS resources are defined in the SRS resource table and the resource indicator refers to a table row number.

See "[SRS Resource Set Settings](#)" on page 137.

If only one SRS resource is defined, the "SRS Resource Indicator = 0".

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:  
BWPart<gr0>:ALLoc<user0>:PUSCh:TXSCHEME:SRI on page 563
```

Interleaved VRB-to-PRB

If "User/BWP Settings > DL BWP Config > PDSCH" > [VRB-to-PRB Interleaver](#) = "2 or 4", the VRB-to-PRB interleaving is enabled for all PDSCH allocation.

With this parameter, you can disable the VRB-to-PRB interleaving for the particular PDSCH.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:  
BWPart<gr0>:ALLoc<user0>:PDSCh:TXSCHEME:INTervp on page 562
```

6.5.3 DMRS Settings

Access:

1. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".
2. Select "DMRS".

A	Freq	1.000 000 000 000 GHz	RF Off	Int Ref	Mod Off	PEP	-30.00 dBm	Level	-30.00 dBm
B	Freq	1.000 000 000 000 GHz	RF Off	Int Ref	Mod Off	PEP	-30.00 dBm	Level	-30.00 dBm

5G New Radio A (U0/B0/A0) PUSCH Settings	
General	TxScheme
DMRS	PTRS Manual
Antenna Ports	Info
Sequence Generation	
N_ID^Cell	N_SCID
N_ID^RS	Group or Sequence Hopping
Length	Slot Symbols
Power	
DMRS Antenna Port Mapping	
DMRS Antenna Ports ...	

Settings:

Sequence Generation.....	161
N_SCID.....	161
N_ID^RS.....	162
Group or Sequence Hopping.....	162
Length.....	162
Slot Symbols.....	162
Power.....	162
DMRS Antenna Ports	163

Sequence Generation

The initialization sequence of the pseudo-random sequence generator is generated based among others depending on a parameter called scrambling ID ($N_{ID}^{n\_SCID}$).

This parameter defines how the scrambling ID is derived:

"N_ID^Cell" Scrambling ID (i.e. $N_{ID}^{n\_SCID}$) = cell ID (i.e. N_{ID}^{Cell})

"N_ID^DMRS" Scrambling ID (i.e. $N_{ID}^{n\_SCID}$) = DMRS scrambling ID (i.e. N_{ID}^{DMRS})

See also ["About PDSCH and DMRS sequence generation"](#) on page 88.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLOc<user0>:PDSCh|PUSCh:DMRS:SEQGen on page 558
```

N_SCID

Sets which variable, N_{ID}^0 or N_{ID}^1 , is used by the generation of the initialization sequence of the pseudo-random sequence generator. The value of the parameters N_{ID}^0 or N_{ID}^1 is set per DMRS type with the parameters "User/BWP > DL BWP > PDSCH" > 95.

See also ["About PDSCH and DMRS sequence generation"](#) on page 88.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:NSID on page 558
```

N_ID^{DMRS}

Sets whether the variable n_{ID}^{CELL} or n_{ID}^{PUSCH} is used by the generation of the DMRS sequence.

Enabled if "User/BWP > PUSCH Config > PUSCH > Transform Precoding > On".

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:DMR:NIDSel on page 557
```

Group or Sequence Hopping

Sets the higher-layer parameter `groupOrSequenceHopping` that defines the sequence group for the DMRS sequence generation according to [TS 38.211](#).

Enabled if "User/BWP > PUSCH Config > PUSCH > Transform Precoding > On".

Neither Disables the group and sequence hopping for the DMRS sequence generation.

Group Hopping Enables the group hopping for the DMRS sequence generation.

Sequence Hopping Enables the sequence hopping for the DMRS sequence generation.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:SEQHopping on page 558
```

Length

Defines whether single- or double-symbol DMRS is used.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:LENGTH on page 559
```

Slot Symbols

Indicates the number of DMRS slot symbols. The value is set automatically, depending on the selected "Length".

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:SLTSymbols? on page 559
```

Power

Sets the power of the PDSCH/PUSCH, relative to the power of the other channels.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:POWER on page 559
```

DMRS Antenna Ports ...

Sets the antenna ports.

The number of allocated antenna ports must be equal to the number of layers and must not be equal to the number of mapped antenna ports.

Note: When the codebook is used, the antenna ports in "Antenna Port" tab are numbered consecutively from 1000 to 1000 + number of mapped antenna ports. When the codebook is not used, the antenna ports configured for DMRS + 1000 are used.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSch[:DMRS]:APSelect<s2us0> on page 487
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh[:DMRS]:APSelect<s2us0> on page 561
```

6.5.4 Channel Coding Settings

Access:

1. Select "5G New Radio > General > Users/BWPs > Properties > DSCH/USCH Channel Coding > On".
2. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".
3. Select "Channel Coding".

The dialog comprises the settings for the LDPC channel coding for PDSCH and PUSCH.

5G New Radio A (U0/B0/A1)PDSCH Settings	
General	TxScheme
Channel Coding	
Antenna Ports	
Transport Block 1	
I_MCS	0
Target Code Rate	0.117
Number of Physical Bits	36 960
Transport Block Size	21 528
Redundancy Version Index	0
Transport Block 2	
I_MCS	10
Target Code Rate	0.332
Number of Physical Bits	110 880
Transport Block Size	24
Redundancy Version Index	0

Channel coding parameters determine the code rate of the PDSCH/PUSCH, which is the ratio between transmitted bits and maximum bits in a subframe (or 1 ms transport block). Because the number of bits in a subframe is variable, the target code rate has to be derived from the modulation order in combination with an index I_{MCS} .

You can select the modulation order for the PDSCH/PUSCH (one of several tables, one for each modulation type) by setting the corresponding index value "I_MCS". The target code rates for modulation order and index are defined in [TS 38.214](#).

In addition to the modulation order and I_{MCS} , the number of transmitted bits depends on the "Redundancy Version Index". Depending on the redundancy version index, the PDSCH/PUSCH contains a different number of parity bits for error detection: Index 0 adds 1 sequence of parity bits, index 1 adds two sequences of parity bits etc.

Settings:

I_MCS	164
Target Code Rate	165
Phys. Bits	165
Transport Block Size	165
Redundancy Version Index	165

I_MCS

Sets the modulation and coding scheme index.

The available values depend on the selected [Modulation](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PDSCh|PUSCh:CCODing:IMCS
on page 568
```

Target Code Rate

Indicates the target code rate, set automatically depending on the selected modulation and coding scheme ("I_MSC").

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PDSCh|PUSCh:CCODing:TCRate
on page 568
```

Phys. Bits

Indicates the size of the selected allocation in bits.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PHYSbits? on page 557
```

Transport Block Size

Indicates the resulting transport block size (TBS), calculated for the selected modulation and coding scheme ("I_MSC").

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PDSCh|PUSCh:CCODing:TBSize?
on page 568
```

Redundancy Version Index

Sets the redundancy version index.

Depending on the redundancy version index, the PDSCH/PUSCH contains a different number of parity bits for error detection: Index 0 adds 1 sequence of parity bits, index 1 adds two sequences of parity bits etc.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>[ :CW<s2us0> ] :PDSCh|PUSCh:CCODing:RVIndex
on page 569
```

6.5.5 UCI Settings

Access:

1. Select "Users/BWPs > Properties > USCH Channel Coding > On".
2. Select "Users/BWPs > UL BWP Config > PUSCH UCI > State > On".
3. Select "Scheduling > User x BWP x > Content > PUSCH > Settings > Config".

4. Select "UCI".

5G New Radio A (U0/B0/A0)PUSCH Settings		—	×		
General	TxScheme	DMRS	Channel Coding	UCI	Antenna Ports
Number of ACK Bits		ACK Pattern		0...	
Number of CSI 1 Bits		CSI 1 Pattern		0...	
Number of CSI 2 Bits		CSI 2 Pattern		0...	

Settings:

Number of ACK Bits.....	166
ACK Pattern.....	166
Number of CSI x Bits.....	166
CSI x Pattern.....	167

Number of ACK Bits

Sets the number of ACK bits and defines the length of the "ACK Pattern" field.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:ACK:BITS on page 569
```

ACK Pattern

Sets the ACK bits in pattern form, where the pattern length is set with the parameter "Number of ACK Bits".

A "1" indicates an ACK, a "0" - a NACK.

The pattern is read out once.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:ACK:PATtern on page 569
```

Number of CSI x Bits

Sets the number of CSI 1/CSI 2 bits and defines the length of the "CSI Pattern" fields.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI1:BITS on page 569
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI2:BITS on page 569
```

CSI x Pattern

Sets the CSI bits in pattern form, where the pattern length is set with the parameter "Number of CSI x Bits".

A "1" indicates an ACK, a "0" - a NACK.

The pattern is read out once.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI1:PATtern on page 569
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI2:PATtern on page 569
```

6.5.6 PTRS Settings

Access:

1. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".
2. Select "PTRS".

5G New Radio A (U0/B0/A1) PDSCH Settings

General TxScheme DMRS **PTRS Manual** Antenna Ports Info

Mode: Manual

State: ☒ On

PTRS Downlink Settings

Time Density (L_PTRS): Every OFDM Symbol

Frequency Density (K_PTRS): Every 2nd RB

RE-offset: 00

EPRE Ratio: 0

The dialog comprises the settings of the phase-tracking reference signal (PTRS). The phase tracking reference signal (PTRS) is a UE-specific reference signal that is used to compensate for the phase noise of the oscillator. Phase-tracking reference signals can be transmitted only in the resource blocks used for the PxSCH and if the transmission is enabled.

If the PTRS "State" is on, you can define its "Power" relative to the PxSCH and its location in the resource grid.

Settings:

Mode.....	168
PTRS-DMRS Association	168
State.....	168
Time Density (L_PTRS).....	168
Frequency Density (K_PTRS).....	168
RE-offset.....	169

EPRE Ratio.....	169
Power.....	169
Max Number of Ports.....	169

Mode

Sets how the PTRS configuration is defined:

- "Auto" If [DSCH/USCH Channel Coding](#) > "On" and "PTRS" > [State](#) > "On", the PTRS configuration is derived from the current PDSCH DMRS settings.
- "Manual" You configure PTRS manually, with the settings provided in the "PxSCH Settings > PTRS" dialog.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:MODE on page 563
```

PTRS-DMRS Association

If "Scheduling > User x BWP x > Content = PUSCH", indicates the PTRS-DMRS association.

The association between UL PTRS ports and DMRS ports is signaled by PTRS-DMRS association field in DCI format 0_1.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:PTDMrs on page 563
```

State

Enables the transmission of phase-tracking reference signals.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:STATe on page 564
```

Time Density (L_PTRS)

Sets the higher-layer parameter `timeDensity`.

The "L_PTRS" defines distance between the PTRS in terms of OFDM symbols (transmission every 1, 2 or 4 OFDM symbols). If the subcarrier used by the PTRS also contains a DMRS, the distance can be larger.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:TMDen on page 564
```

Frequency Density (K_PTRS)

Sets the higher-layer parameter `frequencyDensity`.

The "K_PTRS" and "RE-offset" define the location of the PTRS in the frequency domain. K_{PTRS} defines the distances between the PTRS in terms of subcarrier. You can also define an additional frequency offset for the PTRS relative to the first subcarrier.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:PTRS:FRQDen on page 564
```

RE-offset

Sets the parameter `resourceElementOffset` $k_{\text{ref}}^{\text{RE}}$ required to define the precoding and mapping to the physical resources.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:REOF on page 564
```

EPRE Ratio

If "Scheduling > User x BWP x > Content = PDSCH", sets the higher layer parameter `epre-Ratio`. It is needed to define the ratio of PTRS EPRE to PDSCH EPRE per layer per RE for PTRS port.

The abbreviation EPRE stands for energy per resource element.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:PTRS:EPRE on page 565
```

Power

If "Scheduling > User x BWP x > Content = PUSCH", sets the parameter `ptrs-Power` and thus defines the PUSCH to PTRS power ratio per layer per resource element.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:POWer on page 565
```

Max Number of Ports

If "Scheduling > User x BWP x > Content = PUSCH", sets the maximum number of configured PTRS ports, given by the higher-level parameter `maxNrofPorts`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:PORT on page 565
```

6.5.7 PTRS Settings with Enabled Transform Precoding

Access:

1. Select "Users/BWPs > Properties > USCH Channel Coding > On".
2. Select "General > Users/BWPs > UL BWP Config > PUSCH > Transform Precoding > On"
3. Select "Scheduling > User x BWP x > Content > PUSCH > Settings > Config".

4. Select "PTRS".

5G New Radio A (U0/B0/A0) PUSCH Settings

General TxScheme DMRS **PTRS Manual** Channel Coding Antenna Ports Info

Mode Manual

State ☒

PTRS Transform Precoding Settings

Time Density (L_PTRS)	1	PTRS Scrambling ID	Cell ID
Number of PTRS Groups	2	Samples Per PTRS Group	2

The dialog comprises the settings of the phase-tracking reference signal (PTRS) if transform precoding is enabled.

Settings:

Mode.....	170
State.....	170
Time Density (L_PTRS).....	170
Number of PTRS Groups.....	171
PTRS Scrambling ID.....	171
Samples Per PTRS Group.....	171

Mode

Sets how the PTRS configuration is defined:

- "Auto" If [DSCH/USCH Channel Coding](#) > "On" and "PRTS (Transform Pre-coding)" > [State](#) > "On", the PTRS configuration is derived from the current PUSCH DMRS settings.
- "Manual" You configure PTRS manually, with the settings provided in the "PUSCH Settings > PTRS" dialog.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:MODE on page 566
```

State

Enables the transmission of phase-tracking reference signals.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:STAtE on page 566
```

Time Density (L_PTRS)

Sets the higher-layer parameter `timeDensity`.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:TMDensity on page 566
```

Number of PTRS Groups

Sets the number of PTRS groups according to TS 38.214, required to define the PTRS group pattern.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:NGRPs on page 567
```

PTRS Scrambling ID

Sets whether the PTRS Scrambling ID value used for PTRS sequence generation is configured by the NPusch ID (higher layer) or by the cell ID.

Cell ID Sets the cell ID as the scrambling ID for PTRS sequence generation. This is the value by default.

N_ID^PUSCH Sets the NPusch ID as the scrambling ID for PTRS sequence generation.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:SCID on page 567
```

Samples Per PTRS Group

Sets the number of samples per PTRS group according to TS 38.214, required to define the PTRS group pattern.

Remote command:

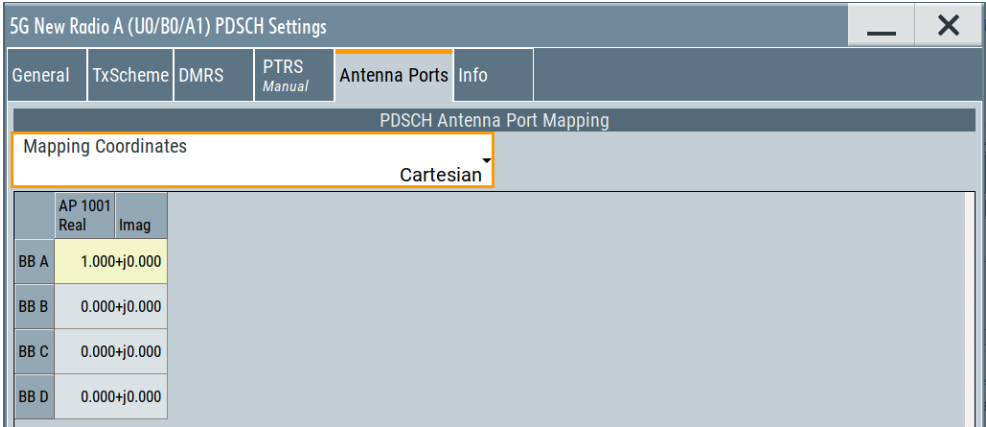
```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:SPPG on page 567
```

6.5.8 Antenna Ports

Access:

1. If necessary, enable MIMO scenario.
 - a) For example, select "System Config > Fading/Baseband Config > Mode = Advanced".
 - b) Select a 2x4x4 configuration with "BB Source Config = Coupled per Entity".
 - c) Confirm with "Apply".
2. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".

3. Select "Antenna Ports".



With the provided settings, you can map the antenna ports arbitrarily to the base-band outputs. The available antenna ports depend on the current configuration. For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

Settings:

Mapping Coordinates	172
Mapping Table	172

Mapping Coordinates

Switches representation between the "Cartesian" (Real/Imag) and "Cylindrical" (Magn./Phase) coordinates.

Mapping Table

Defines the mapping of the antenna ports (AP) to the physical antennas. The available antenna ports depend on the current configuration. For details on the antenna port-mapping concept, see [Chapter 3.10, "Antenna Port Mapping"](#), on page 26.

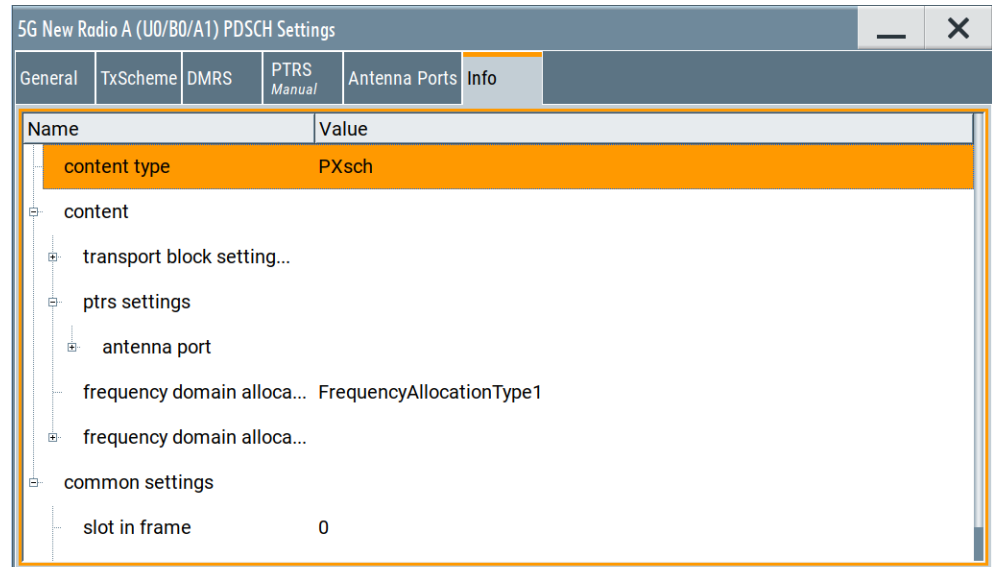
Remote command:

```
"Mapping Coordinates = Cartesian":
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:REAL
on page 570
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:IMAGinary
on page 570
"Mapping Coordinates = Cylindrical":
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:MAGNitude
on page 571
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:PHASe
on page 571
```


6.5.9 Info

Access:

1. Select "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config".
2. Select "Info".



The dialog displays details on the PDSCH/PUSCH configuration.

Info

The dialog displays details on the configuration.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:INFO? on page 550
```

6.6 CORESET Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "5G New Radio > Scheduling".
3. Select "User x BWP x > Content > CORESET".
4. Select "CORESET > Settings > Config".

CORESET

The CORESET settings are defined per user and per BWP. The CORESET size in the frequency domain is given by number of resource blocks $N_{RB}^{CORESET}$ is spans; in the time - it can occupy 1, 2 or 3 symbols.

A CCE consists of 6 resource-element groups (REGs). The mapping between the CEE and the REGs is unique per CORESET. It can be interleaved or non-interleaved and is described by the so called REG bundles with different sizes (L).

Settings:

- [General Settings](#)..... 174
- [Payload Settings](#)..... 178
- [Info](#)..... 199

6.6.1 General Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "5G New Radio > Scheduling".
3. Select "User x BWP x > Content > CORESET".
4. Select "CORESET > Settings > Config" > "General".

5G New Radio A (U0/B0/A0) CORESET Settings		
General		
Precoder Granularity	REG Bundle	CORESET ID
		1
Use DMRS scrambling ID	☐	ID
		0
Use Bitmap for Resources in Frequency Domain	☐	Frequency Domain Resources
		1 1111 11...
Interleaving		
State	0	Bundle Size
		6
Shift Index	0	Size
		2
Search Space		
Aggregation Level	Max. Candidates	
0	1	1
1	2	4

This dialog comprises the settings of the Control Resource Set (CORESET). Each CORESET is assigned to a specific user and comprises of a set of one or more PDCCH channels.

The PDCCH channel carries the downlink control information.

Precoder Granularity.....	175
CORESET ID.....	175
Use DMRS Scrambling ID.....	175
ID.....	176
Use Bitmap for Resources in Frequency Domain.....	176
Frequency Domain Resources.....	176
Interleaving State.....	176
Bundle Size.....	176
Shift Index.....	177
Size.....	177
Search Space.....	177
L Aggregation Level.....	178
L Max Candidates.....	178

Precoder Granularity

Sets the value of the higher-layer parameter `precoderGranularity`, as defined in TS 38.211.

"REG Bundle" The same precoding is used within a REG bundle; corresponds to `precoderGranularity = sameAsREG-bundle`.

"All Contiguous RBs" The same precoding is used across all REG within the set of contiguous resource blocks in the CORESET; corresponds to `precoderGranularity = allContiguousRBs`.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:PREGran on page 579
```

CORESET ID

Sets the CORESET ID.

Set "CORESET ID = 0" to simulate CORESET 0 (`controlResourceSetZero`). If CORESET 0 is used, the reference point changes and is according to TS 38.211 the subcarrier 0 of the lowest-numbered resource block in the CORESET.

For "CORESET ID ≥ 1", the reference point is subcarrier 0 in common resource block 0.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:ID on page 579
```

Use DMRS Scrambling ID

Defines the parameter used to calculate the PUCCH scrambling sequence:

- If disabled, the [Cell ID](#) is used.
- If enabled, the demodulation reference signal DMRS [ID](#) is used.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DMRS:SCRam:STATe on page 580
```

ID

For [Use DMRS Scrambling ID](#) > "On", sets the value of the higher-level parameter PDCCH-DMRS-Scrambling-ID, according to [TS 38.211](#).

This DMRS scrambling ID is used to calculate the PDCCH scrambling sequence instead of [Cell ID](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DMRS:SCRam:ID on page 580
```

Use Bitmap for Resources in Frequency Domain

If enabled, the CORESET frequency allocation is set as a bitmap, defined with the parameter [Frequency Domain Resources](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:RESalloc:STATe on page 580
```

Frequency Domain Resources

Sets the value of the higher-level parameter `frequencyDomainResources` according to [TS 38.331](#) and thus defines the CORESET frequency allocation.

The frequency domain resources is a 45 bits long pattern, where value of 1 indicates a resource element group that is used for the CORESET.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:RESalloc:BITMap on page 581
```

Interleaving State

If enabled, the CCE-to-REG mapping is interleaved.

This parameter corresponds to the higher-level parameter CORESET-CCE-REG-mapping-type ([TS 38.211](#)).

See ["CORESET"](#) on page 174.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:STATe on page 581
```

Bundle Size

For [Interleaving State](#) > "On", sets the higher-level parameter bundle size L (CORESET-REG-bundle-size).

The value is used to calculate the CCE-to-REG mapping, according to [TS 38.211](#).

See also ["CORESET"](#) on page 174.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:BUNSize on page 581
```

Shift Index

For **Interleaving State** > "On", sets the higher-level parameter shift index n_{shift} (CORESET-shift-index).

The value is used to calculate the CCE-to-REG mapping, according to TS 38.211.

See also "CORESET" on page 174.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:SHIDx on page 582
```

Size

For **Interleaving State** > "On", sets higher-level parameter interleaver size R (CORESET-interleaver-size).

The value is used to calculate the CCE-to-REG mapping, according to TS 38.211.

See also "CORESET" on page 174.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:SIZE on page 582
```

Search Space

The term search space describes a set of CCEs that a UE monitors. The UE can decode only the control information on a PDCCH/CORESET that is transmitted over CCEs within the search space this UE monitors.

A physical downlink control channel PDCCH consists of one or more control-channel elements (CCEs), where their number is defined by the "Aggregation level".

The following parameters influence the way the search space is defined:

- If **Restrict to Search Space** > "On", you define the search space by selecting the **aggregation level** and the **number of a particular candidate**. The available candidates are defined as a combination aggregation level and maximum number of candidates per aggregation level.

See:

- "Scheduling > CORESET > Payload" > [Aggregation Level](#)
- "Scheduling > CORESET > Payload" > [Candidate](#)
- "Scheduling > CORESET > General" > [Aggregation Level](#) and [Max Candidates](#)

The **CCE start index** [CCE Index](#) is selected automatically so that the CCE is within the search space.

- If **Restrict to Search Space** > "Off", you define the search space manually, by setting the CCE start index, see [CCE Index](#).

Example:

Select:

- [Restrict to Search Space](#) > "On".
- For "Scheduling > CORESET > General" > [Aggregation Level](#) = "1", select [Max Candidates](#) = "2".
- Select "Scheduling > CORESET > Payload" > [Aggregation Level](#) = "1" and [Candidate](#) = "1"

Observe the CCE index ("Scheduling > CORESET > Payload" > [CCE Index](#)). The value is set automatically.

Aggregation Level ← Search Space

Displays the possible aggregation levels, as defined in [TS 38.213](#).

For each aggregation level, you can set the maximum number of candidates that are monitored, see [Max Candidates](#).

"Aggregation level"	Number of CCEs
1	1
2	2
4	4
8	8
16	16

For more information, see ["Search Space"](#) on page 177.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:AGGLeve1?
on page 582
```

Max Candidates ← Search Space

Sets the maximum number of candidates allowed for the selected aggregation level, as specified in [TS 38.213](#).

For more information, see ["Search Space"](#) on page 177.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate
on page 583
```

6.6.2 Payload Settings

Access:

1. Select "5G New Radio > General > Link Direction > Downlink".
2. Select "5G New Radio > Scheduling".

3. Select "User x BWP x > Content > CORESET".
4. Select "CORESET > Settings > Config" > "Payload".

5G New Radio A (U0/B0/A0) CORESET Settings

General **Payload** Info

Unused CCEs: Dummy CCEs: Dummy CCE Data Source: PN9

Active UL BWP: TCI Present in DCI: ☒

Number of DCIs: 3

	Usage	RNTI	DCI Format	Search Space	Aggregation Level	CCE Index	Content	Create PDSCH
0	C-RNTI	0	0_0	USS	1	0	Config...	
1	SI-RNTI	0	1_0	Type3 CSS	1	0	Config...	
2	C-RNTI	0	Custom	USS	1	0	Config...	

Unused CCEs.....	180
Dummy CCEs Data Source.....	180
Active UL BWP.....	180
TCI Present In DCI.....	181
Number of DCIs.....	181
DCI Table.....	181
L Usage.....	181
L RNTI.....	181
L DCI Format.....	181
L Search Space.....	182
L Aggregation Level.....	183
L Candidate.....	183
L CCE Index.....	183
L Content.....	184
L Create PDSCH.....	184
DCI content configuration.....	184
L Bit Data > Pattern.....	184
L DCI Format 0_0.....	184
L DCI Format 0_1.....	186
L DCI Format 1_0.....	188
L DCI Format 1_1.....	190
L DCI Format 2_0.....	193
L DCI Format 2_1.....	194
L DCI Format 2_2.....	194
L DCI Format 2_3.....	195
L DCI Format 2_4.....	195
L DCI Format 2_6.....	196
L Custom.....	197
L Channel Coding.....	197
L Data Source.....	197
L Initialization.....	198
L Pattern Length.....	198

Unused CCEs

Defines if unused CORESET resources (CCEs) are used for data transmission or not.

"No Data"	No data is transmitted in the unused CCEs.
"Dummy CCEs"	Unused CCEs are filled in with dummy data.
"Allow PDSCH"	PDSCH transmission is allowed in the unused CCEs.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCCes:STATe on page 583
```

Dummy CCEs Data Source

Selects the data source for the dummy CCEs.

The following standard data sources are available:

- "All 0, All 1"
An internally generated sequence containing 0 data or 1 data.
- "PNxx"
An internally generated pseudo-random noise sequence.
- "Pattern"
An internally generated sequence according to a bit pattern.
Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.
 - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
 - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
 - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCCes:DATA on page 583
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCCes:DLISt on page 584
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCCes:PATtern on page 584
```

Active UL BWP

If more than one UL BWPs are configured ("Users/BWP Settings > UL BWPs" > [Number of UL BWPs](#) ≥ 2), this parameter sets the index of the UL BWP to be used by the calculation of the bit size of the DCI formats.

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:AULBwp on page 585

TCI Present In DCI

Sets the higher-layer parameter `tci-PresentInDCI` according to TS 38.212.

"On" [Transmission configuration indication](#) (TCI) field in DCI format 1_1 is 3 bits long.

"Off" Transmission configuration indication field in DCI format 1_1 is not transmitted; field is disabled in the DCI format 1_1.

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:TCI on page 585

Number of DCIs

Sets the number of DCIs and thus defines the number of rows in the DCI table.

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:NDCI on page 586

DCI Table

Comprises the DCI settings. There is one row per DCI. The number of rows depends on the selected [Number of DCIs](#).

Usage ← DCI Table

Sets the RNTI type to scramble the CRC, see [Table 6-6](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:USAGe on page 586

RNTI ← DCI Table

Displays the current applicable RNTI of the associated user.

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:RNTI on page 587

DCI Format ← DCI Table

Sets the DCI format.

The downlink control information (DCI) is a message used to control the physical layer resource allocations. It carries scheduling information and power control commands.

The DCI formats available in a particular situation depend on the selected [Usage](#) and [Search Space](#). For an overview of the available DCI formats, see [Table 6-5](#). Additionally, the "Custom" format with user-defined content is available.

To configure the parameters per DCI format, select "Content > Config".

Table 6-5: DCI formats overview [TS 38.212]

DCI format	Usage
0_0	Scheduling of PUSCH in one UL cell See "DCI Format 0_0" on page 184.
0_1	See "DCI Format 0_1" on page 186.
1_0	Scheduling of PDSCH in one DL cell (allocation type 1) See "DCI Format 1_0" on page 188.
1_1	Scheduling of PDSCH in one DL cell See "DCI Format 1_1" on page 190.
2_0	Notifying a group of UEs of the slot format See "DCI Format 2_0" on page 193.
2_1	Notifying a group of UEs of the PRBs and OFDM symbols where UE can assume that no transmission is intended for the UE See "DCI Format 2_1" on page 194.
2_2	Transmission of TPC commands for PUCCH and PUSCH See "DCI Format 2_2" on page 194.
2_3	Transmission of a group of TPC commands for SRS transmissions by one or more UEs See "DCI Format 2_3" on page 195.
2_4	Option: R&S SMW-K148. Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE. See "DCI Format 2_4" on page 195.
2_6	Option: R&S SMW-K148. Notifying the power saving information outside DRX Active Time for one or more UEs. See "DCI Format 2_6" on page 196.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:FMT on page 587
```

Search Space ← DCI Table

Defines the search space for the selected DCI.

The search space defines the set of PDCCH candidates that a UE has to monitor. Search spaces can be common search space (CSS) and UE-specific search space (USS), where the non-common DCIs are mapped to the USS. The UE can decode only the control information that is transmitted within one or more search spaces this UE monitors.

TS 38.213 defines the search spaces listed in "Search Space" on page 182.

Table 6-6: Search space sets

Search space	Designation	Parameter	CRC scrambled with
CSS (Common search space)	Type0-PDCCH Type0A-PDCCH	"Type0 CSS"	SI-RNTI RA-RNTI, TC-RNTI
	Type1-PDCCH	"Type1 CSS"	P-RNTI
	Type2-PDCCH	"Type2 CSS"	C-RNTI, CS-RNTI, P-RNTI, MCS-C-RNTI, SP-CSI-RNTI, INT-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, RPC-SRS-RNTI
	Type3-PDCCH	"Type3 CSS"	INT-RNTI, SFI-RNTI, TPC-PUSCH/PUCCH/SRS-RNTI, C-RNTI, CS-RNTI, MCS-C-RNTI, P-RNTI, RA-RNTI, TC-RNTI, SP-CSI-RNTI, SI-RNTI, CI-RNTI, PS-RNTI
UE-specific search space	USS	"USS"	C-RNTI, CS-RNTI, MCS-C-RNTI, SP-CSI-RNTI

The available search spaces depend on the selected [Usage](#).

Inside the user BWPs, the common search space types Type0A, Type1 and Type2 are supported.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SSP on page 585
```

Aggregation Level ← DCI Table

Sets the aggregation level for the selected DCI.

A physical downlink control channel PDCCH consists of one or more control-channel elements (CCEs), where their number is defined by the "Aggregation level".

This and several other parameters influence the way the search space is defined. For details, see ["Search Space"](#) on page 177.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:AGGLevel on page 588
```

Candidate ← DCI Table

Selects one of the candidates configured for the selected [Aggregation Level](#), where the number of candidates per aggregation level is set by the parameter "CORESET > General" > [Max Candidates](#).

This and several other parameters influence the way the search space is defined. For details, see ["Search Space"](#) on page 177.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CANDidate on page 588
```

CCE Index ← DCI Table

Sets or displays the CCE start index and thus the position of the first CCE of the PDCCH.

This and several other parameters influence the way the search space is defined. For details, see ["Search Space"](#) on page 177.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:INDeX on page 588
```

Content ← DCI Table

Access a dialog for configuring the parameters per DCI format, see ["DCI content configuration"](#) on page 184.

Create PDSCH ← DCI Table

If enabled, the content and scheduling of the PDSCH is created automatically, as configured with the DCI format 1_0 and 1_1 parameters.

If [PDSCH Scheduling](#) = "Auto/DCI", the "Create PDSCH" = "On".

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CPDSch on page 589
```

DCI content configuration

Comprises the parameters of the selected DCI format.

The fields defined in the DCI format are mapped to the information bits according to [TS 38.212](#). The resulting [Bit Data > Pattern](#) is displayed.

The following parameters have an impact on the DCI bit data length and the DCI fields:

- Number of RB [No. RBs](#) of the first UL BWP
- Number of RB of the DL BWP, in that the DCI is configured
- [SUL](#) indicator of the selected cell
- DCI [Search Space](#)

Bit Data > Pattern ← DCI content configuration

Displays the resulting bit data as selected with the DCI format parameters.

Mapping of the information bits is according to [TS 38.212](#).

Padding bits are added in certain cases, that is zeros are append to the DCI format until the payload size is equal to a specified size.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:HBTS? on page 589
```

DCI Format 0_0 ← DCI content configuration

The DCI format 0_0 is used for scheduling of PUSCH in one UL cell.

5G New Radio A: DCI Settings (DCI 0)	
Bit Data	
Pattern	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
DCI Fields	
Frequency Domain Resource Assignment	Time Domain Resource Assignment
0	0
Frequency Hopping Flag	Modulation and Coding Scheme (TB1)
☐	0
New Data Indicator (TB1)	Redundancy Version (TB1)
☐	0
HARQ Process Number	TPC Command for Scheduled PUSCH
0	0

DCI format 0_0 is scrambled by C-RNTI or CS-RNTI and carries the following information:

DCI field	Remote command:	Remark
Frequency domain resource assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRDRes on page 589	
Time domain resource assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TIDRes on page 590	
Frequency hopping flag	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRHFlag on page 590	
Modulation and coding scheme (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS on page 590 [:SOURce<hw>] :BB:NR5G:SCHed: CELL<ch0>:SUBF<st0>:USER<dir0>: BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>: TB2:MCS on page 590	
New data indicator (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI on page 591 [:SOURce<hw>] :BB:NR5G:SCHed: CELL<ch0>:SUBF<st0>:USER<dir0>: BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>: TB2:NDI on page 591	
Redundancy version (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:RV on page 591 [:SOURce<hw>] :BB:NR5G:SCHed: CELL<ch0>:SUBF<st0>:USER<dir0>: BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>: TB2:RV on page 591	

DCI field	Remote command:	Remark
HARQ process number	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:HAPRoc on page 592	
TPC command for scheduling PUSCH	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TPUSch on page 592	
UL/SUL indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:USInd on page 596	If "Node > System Information > SUL = On"

DCI Format 0_1 ← DCI content configuration

The DCI format 0_1 is used for scheduling of PUSCH in one UL cell.

5G New Radio A: DCI Settings (DCI 0)	
Bit Data	
Pattern	00 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
DCI Fields	
Frequency Domain Resource Assignment	Time Domain Resource Assignment
0	0
Modulation and Coding Scheme (TB1)	New Data Indicator (TB1)
0	☐
Redundancy Version (TB1)	HARQ Process Number
0	0
(1st) Downlink Assignment Index	2nd Downlink Assignment Index
0	0
TPC Command for Scheduled PUSCH	Antenna Ports
0	0
SRS Request	CSI Request
0	0
CBG Transmission Information (CBGTI)	PTRS-DMRS Association
0	0

DCI format 0_1 is scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI, TC-RNTI or SP-CSI-RNTI and carries the following information:

DCI field	Remote command:	Remark
UL/SUL indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:USInd on page 596	If "Node > System Information > SUL = On"
Carrier indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:CAInd on page 592	If cross car- rier
Bandwidth part indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:BWInd on page 598	

DCI field	Remote command:	Remark
Frequency domain resource assignment	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRDRes on page 589	
Time domain resource assignment	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TIDRes on page 590	
Frequency hopping flag	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRHFflag on page 590	
Modulation and coding scheme (TB1)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS on page 590	
New data indicator (TB1)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI on page 591	
Redundancy version (TB1)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:RV on page 591	
HARQ process number	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HAPRoc on page 592	
(1st) downlink assignment index	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DAI1 on page 593	Dependent on "Node > Carrier > PDSCH HARQ ACK Codebook"
(2nd) downlink assignment index	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DAI2 on page 593	Dependent on "Node > Carrier > PDSCH HARQ ACK Codebook"
TPC Command for Scheduling PUSCH	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TPUSch on page 592	
PUCCH Resource Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PUCResind on page 596	

DCI field	Remote command:	Remark
PDSCH-to-HARQ Feedback Timing Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PDSHarq on page 597	
SRS resource indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SRSResind on page 593	
Precoding information and number of layers	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PRECinfo on page 594	
Antenna ports	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ANTPorts on page 594	
SRS request	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SRSRequest on page 594	
CSI Request	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CSIRequest on page 594	
Code block group transmission information	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGTi on page 599	
PTRS-DMRS association	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PTDMrs on page 595	If "User/ BWPs > UL BWP Config > PUSCH > Max Rank ≥2"
Beta_offset indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BOINd on page 595	
CBG Transmission Information (CBGTI)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGTi on page 599	
Minimum Applicable Scheduling Offset Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:MOFFs on page 600	If "User/ BWPs > UL BWP Config > PUSCH" > Minimum Scheduling Offset Available > "On"

DCI Format 1_0 ← DCI content configuration

The DCI format 1_0 is used for scheduling of PDSCH in one DL cell.

5G New Radio A: DCI Settings (DCI 2)	
Bit Data	
Pattern	1000 0000 0000 0000 0000 0000 0000 0000 0000 0000
DCI Fields	
Frequency Domain Resource Assignment	0
Time Domain Resource Assignment	0
VRB-to-PRB Mapping	☐ 0
Modulation and Coding Scheme (TB1)	0
New Data Indicator (TB1)	☐ 0
Redundancy Version (TB1)	0
HARQ Process Number	0
(1st) Downlink Assignment Index	0
TPC command for Scheduled PUCCH	0
PUCCH Resource Indicator	0
PDSCH-to-HARQ Feedback Timing Indicator	0

DCI format 1_0 is scrambled by C-RNTI, CS-RNTI, RA-RNTI or SI-RNTI and carries the following information:

DCI field	Remote command:	Remark
Frequency Domain Resource Assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRDRes on page 589	
Time Domain Resource Assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TIDRes on page 590	
VRB-to-PRB Mapping	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:VTPRb on page 593	
Modulation and Coding Scheme (TB1)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS on page 590	
New Data Indicator (TB1)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI on page 591	If "Usage = C-RNTI"
Redundancy Version (TB1)	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:RV on page 591	
HARQ Process Number	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HAPRoc on page 592	If "Usage = C-RNTI"
(1st) Downlink Assignment Index	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DAI1 on page 593	If "Usage = C-RNTI"

DCI field	Remote command:	Remark
TPC Command for Scheduling PUCCH	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TPUCch on page 596	If "Usage = C-RNTI"
PUCCH Resource Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PUCResind on page 596	If "Usage = C-RNTI"
PDSCH-to-HARQ Feedback Timing Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PDSHarq on page 597	If "Usage = C-RNTI"
Short Message Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SMINd on page 597	If "Usage = P-RNTI"
System Information Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SIINd on page 597	If "Usage = SI-RNTI"
TB Scaling	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TBSCaling on page 591	
Padding Bits, Reserved Bits	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:RESVed on page 597	If "Usage = SI-RNTI"

DCI Format 1_1 ← DCI content configuration

The DCI format 1_1 is used for scheduling of PDSCH in one DL cell.

5G New Radio A: DCI Settings (DCI 3)	
DCI Fields	
BWP Indicator	Frequency Domain Resource Assignment
0	0
Time Domain Resource Assignment	VRB-to-PRB Mapping
0	☐
PRB Bundling Size Indicator	Rate Matching Indicator
☐	0
ZP CSI-RS Trigger	Modulation and Coding Scheme (TB1)
0	0
New Data Indicator (TB1)	Redundancy Version (TB1)
☐	0
Modulation and Coding Scheme (TB2)	New Data Indicator (TB2)
0	☐
Redundancy Version (TB2)	HARQ Process Number
0	0
(1st) Downlink Assignment Index	TPC command for Scheduled PUCCH
0	0
PUCCH Resource Indicator	PDSCH-to-HARQ Feedback Timing Indicator
0	0
Antenna Ports	Transmission Configuration Indication
0	0
SRS Request	CBG Transmission Information (CBGTI)
0	0
CBG Flushing out Information (CBGFI)	DMRS Sequence Initialization
☐	☐

The DCI resource allocator for DCI1_1 C-RNTI - CA is needed for cross-carrier scheduling.

DCI format 1_1 is scrambled by C-RNTI or CS-RNTI and carries the following information:

DCI field	Remote command:	Remark
Carrier Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:CAINd on page 592	If cross-carrier
Bandwidth Part Indicator	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:BWInd on page 598	
Frequency Domain Resource Assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:FRDRes on page 589	
Time Domain Resource Assignment	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TIDRes on page 590	
VRB-to-PRB Mapping	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:VTPRb on page 593	

DCI field	Remote command:	Remark
PRB Bundling Size Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:PRBBundling on page 598	
Rate Matching Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:RMIND on page 598	
ZP CSI-RS Trigger	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:ZCRTrigg on page 599	
Modulation and Coding Scheme (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS on page 590 [:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB2:MCS on page 590	
New data Indicator (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI on page 591 [:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB2:NDI on page 591	
Redundancy Version (TB1/TB2)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB1:RV on page 591 [:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:TB2:RV on page 591	
HARQ Process Number	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:HAPRoc on page 592	
(1st) Downlink Assignment Index	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:DAI1 on page 593	Dependent on "Node > Carrier > PDSCH HARQ ACK Codebook" and "Node > Carrier > Number of Carriers"

DCI field	Remote command:	Remark
TPC Command for Scheduling PUCCH	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TPUCCh on page 596	
PUCCH Resource Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PUCResind on page 596	
PDSCH-to-HARQ Feedback Timing Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PDSHarq on page 597	
Antenna Ports	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ANTPorts on page 594	
Transmission Configuration Indication	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TCI on page 599	Enabled if TCI Present In DCI > "On"
SRS Request	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SRSRequest on page 594	
CBG Transmission Information (CBGTI)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGTi on page 599	
CBG Flushing Out Information (CBGFI)	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGFi on page 599	
DMRS Sequence Initialization	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DMSQinit on page 595	
Minimum Applicable Scheduling Offset Indicator	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:MOFFs on page 600	If "User/ BWPs > UL BWP Config > PDSCH" > Minimum Scheduling Offset Avail- able > "On"

DCI Format 2_0 ← DCI content configuration

The DCI format 2_0 is used for notifying a group of UEs of the slot format.

5G New Radio A: DCI Settings (DCI 0)

Bit Data

Pattern: 0000 0000 0000

DCI Fields

Slot Format Indicator 1: 0

Padding Bits, Reserved Bits: 0...

DCI format 2_0 is scrambled by SFI-RNTI and carries the following information:

DCI field	Remote command:	Remark
Slot format indicator 1 etc.	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SI16 on page 601 etc.	Depends on "Users/BWP Set- tings > Proper- ties" > Number of SFIs in DCI 2_0
Padding bits, reserved bits	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:RESVed on page 597	

DCI Format 2_1 ← DCI content configuration

The DCI format 2_1 is used for notifying a group of UEs of the PRBs and OFDM symbols where UE can assume that no transmission is intended for the UE.

5G New Radio A: DCI Settings (DCI 0)

Bit Data

Pattern: 00 0000 0000 0000

DCI Fields

Pre-emption Indicator 1: 0

DCI format 2_1 is scrambled by INT-RNTI and carries the following information:

DCI field	Remote command:	Remark
Pre-emption indication 1 etc.	[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE9 on page 601 etc.	Depends on "Users/BWP Settings > Properties" > Number of Pre-emption Indications in DCI 2_1

DCI Format 2_2 ← DCI content configuration

The DCI format 2_2 is used for transmission of TPC commands for PUCCH and PUSCH.

DCI format 2_2 is scrambled by TPC-PUSCH-RNTI or TPC-PUCCH-RNTI and carries the following information:

DCI field	Remote command:	Remark
Closed loop indicator 1 etc.	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CL22 on page 602 etc.	Enabled if "Users/BWP Settings > DL BWP Config > Uplink " > SRS-TPC-PDCCH-Group Type > "On"
TPC command 1 etc.	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TP22 on page 604 etc.	Depends on "Users/BWP Settings > DL BWP Config > Uplink " > Number of Blocks

DCI Format 2_3 ← DCI content configuration

The DCI format 2_3 is used for transmission of a group of TPC commands for SRS transmissions by one or more UEs.

DCI format 2_3 is scrambled by TPC-SRS-RNTI and carries the following information:

DCI field	Remote command:	Remark
SRS request 1	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR11 on page 585	
TPC command number 1	[:SOURce<hw>] :BB:NR5G:SCHeD:CELL<ch0>: SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TP1 on page 603	

DCI Format 2_4 ← DCI content configuration

Option: R&S SMW-K148.

The DCI format 2_4 is used for notifying the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE.

5G New Radio A: DCI Settings (DCI 0)

Bit Data	
Pattern	0000 0000 0000
DCI Fields	
Cancellation Indication 1	0...
Cancellation Indication 2	0...
Cancellation Indication 3	0...
Padding Bits, Reserved Bits	0...

DCI format 2_4 is scrambled by CI-RNTI and carries the following information:

DCI field	Remote command:	Remark
Cancellation indication 1 to Cancellation indication 16	[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI1 on page 604 to [:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI16 on page 604	The number of fields depends on the value set in "Users/BWPs > DL BWP Config > Control > Number of Cancellation Indications"
Padding bits, reserved bits	[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:RESVed on page 597	Depends on "Users/BWPs > DL BWP Config > Control > Cancellation Indication Length" and "Number of Cancellation Indications".

DCI Format 2_6 ← DCI content configuration

Option: R&S SMW-K148.

The DCI format 2_6 is used for notifying the power saving information outside DRX Active Time for one or more UEs.

5G New Radio A: DCI Settings (DCI 0)

Bit Data	
Pattern	1001 0011 0111
DCI Fields	
Wakeup Indication 1	☒ SCell Dormancy Indication 1 4
Wakeup Indication 2	☒ SCell Dormancy Indication 2 0
Wakeup Indication 3	☒ SCell Dormancy Indication 3 2
Padding Bits, Reserved Bits	1111...

DCI format 2_6 is scrambled by PS-RNTI and carries the following information:

DCI field	Remote command:	Remark
Wakeup indication 1 to Wakeup indication 10	<code>[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPpart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:WA1 on page 606</code> to <code>[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPpart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:WA10 on page 606</code>	The number of fields depends on "Users/ BWPs > DL BWP Config > Control > Number of Dormancy Indications".
SCell dormancy indication 1 to SCell dormancy indication 10	<code>[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPpart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:DI1 on page 605</code> to <code>[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPpart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:DI10 on page 605</code>	Depends on "Users/ BWPs > DL BWP Config > Control > Number of SCell Groups".
Padding bits, reserved bits	<code>[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> : SUBF<st0>:USER<dir0>:BWPpart<gr0> : ALLoc<user0>:CS:DCI<s2us0>:RESVed on page 597</code>	Depends on "Users/ BWPs > DL BWP Config > Control > Number of Dormancy Indications" and "Number of SCell Groups".

Custom ← DCI content configuration

This setting is a DCI without predefined DCI fields. The DCI content is user-definable.

5G New Radio A: DCI Settings (DCI 0)

Channel Coding ☒

Data Source: PN9 Initialization 1...

Pattern Length: 84

Channel Coding ← Custom ← DCI content configuration

Enables channel coding.

If **PDSCH Scheduling** = "Auto/DCI", the "Channel Coding" = "On".

Remote command:

`[:SOURCE<hw>] :BB:NR5G:SCHEd:CELL<ch0> :SUBF<st0>:USER<dir0> :
BWPpart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:STAtE on page 607`

Data Source ← Custom ← DCI content configuration

Selects the data source for the custom DCI.

The following standard data sources are available:

- "All 0, All 1"
An internally generated sequence containing 0 data or 1 data.

- "PNxx"
An internally generated pseudo-random noise sequence.
- "Pattern"
An internally generated sequence according to a bit pattern.
Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.
 - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
 - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
 - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DATA on page 607

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DLISt on page 607

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PATtern on page 608

Initialization ← Custom ← DCI content configuration

Sets an initialization value for the second m-sequence in the PN sequence of the custom DCI.

Enabled if "Data Source > PNxx".

Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:INITpattern on page 608

Pattern Length ← Custom ← DCI content configuration

If [Channel Coding](#) > "On", sets the number of DCI bits, i.e. the number of bits in the "Pattern" field.

If [Channel Coding](#) > "Off", the number of DCI bits is calculated based on the selected [Aggregation Level](#) for the corresponding DCI.

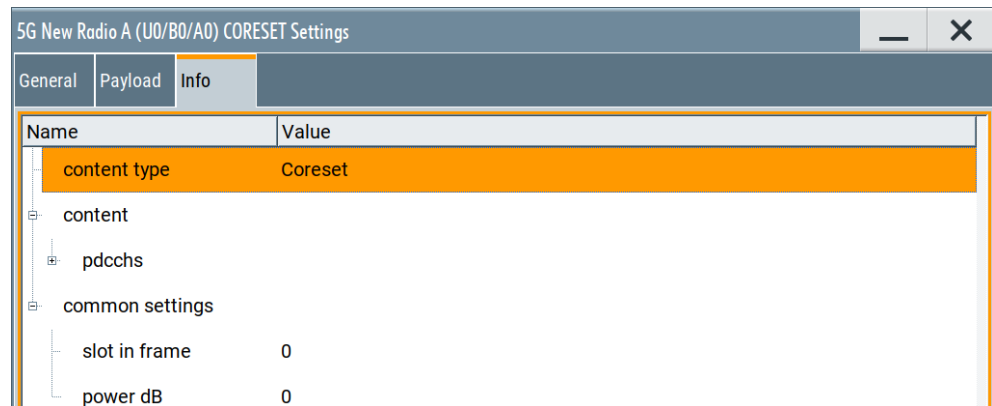
Remote command:

[:SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:BITLength on page 607

6.6.3 Info

Access:

1. Select "Scheduling > User x BWP x > Content > CORESET > Settings > Config".
2. Select "Info".



The dialog displays details on the CORESET configuration.

Info

The dialog displays details on the configuration.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:INFO? on page 550
```

6.7 PUCCH Settings

Access:

1. Select "5G New Radio > General > Link Direction > Uplink".
2. Select "5G New Radio > Scheduling".
3. Select "User x BWP x > Content > PUCCH".
4. For the PUCCH allocation, select "User x BWP x > Format = e.g. F0".
5. Select "PUCCH > Settings > Config".

This dialog comprises the settings of the physical uplink common channel (PUCCH).

PUCCH and PUCCH formats

The PUCCH supports 5 different formats (F0 to F4), each of them spanning different number of OFDM symbols. PUCCH can be transmitted on a constant frequency or

optionally use frequency hopping, where the latter is signaled by a higher-level parameter. If frequency hopping is enabled, the PUCCH in formats F1, F3 and F4 spans the half of the OFDM symbols available in the constant frequency case.

Settings:

• General Settings	200
• Payload Settings	202
• Info	204

6.7.1 General Settings

Access:

1. Select "Scheduling > User x BWP x > Content > PUCCH > Settings > Config".
2. Select "General".

The screenshot shows the '5G New Radio A (U0/B0/A0) PUCCH Settings' dialog box with the 'General' tab selected. The 'Burst Mode Ref Alloc Identifier' is set to 'I'. The 'Group Hopping' is set to 'Neither'. The 'Hopping ID' is set to '0'. The 'Intra Slot Frequency Hopping' checkbox is unchecked. The 'Second Hop PRB' is set to '0'. The 'Format Specific' section is expanded, showing 'Initial Cyclic Shift' set to '0'.

Setting	Value
Burst Mode Ref Alloc Identifier	I
Group Hopping	Neither
Hopping ID	0
Intra Slot Frequency Hopping	☐
Second Hop PRB	0
Format Specific	
Initial Cyclic Shift	0

Settings:

Burst Mode Ref Alloc Identifier	201
Group Hopping	201
Hopping ID	201
Intra Slot Frequency Hopping	201
Second Hop PRB	201
Initial Cyclic Shift	202

Time Domain OCC Index.....	202
OCC Length.....	202
OCC Index.....	202

Burst Mode Ref Alloc Identifier

If **Power Mode** > "Burst", sets whether the bandwidth of the current allocation is used as reference for the "Burst" power mode.

The icon  in the **Scheduling Settings** table indicates which allocation is set as burst reference.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:BMAid on page 554
```

Group Hopping

Available for PUCCH formats 0 and 1.

Sets the higher-layer parameter `pucch-GroupHopping`, as defined in [TS 38.211](#).

You turn group and sequence hopping for the PUCCH demodulation reference signal on and off as follows:

"Neither"	Disables group and sequence hopping
"Enable"	Enables group hopping
"Disable"	Enables sequence hopping

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:GRPHopping on page 609
```

Hopping ID

Sets the parameter hopping ID (n_{ID}) used to select the frequency hopping sequence number and to initialize the pseudo-random sequence generator. In the practice, the value is transmitted by the higher-layer parameter `hoppingId` [[TS 38.211](#)].

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:HOPid on page 609
```

Intra Slot Frequency Hopping

Enables PUCCH demodulation reference signal hopping within a slot.

If intra-slot hopping is enabled, you can define the physical resource block offset for the second hop ("Second Hop PRB").

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:ISFHopping on page 610
```

Second Hop PRB

Sets the physical resource block (PRB) of the second hop.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:SHOPping on page 610
```

Initial Cyclic Shift

For PUCCH formats F0 and F1, sets the initial cyclic shift.

As defined in [TS 38.211](#), the value is required to calculate the cyclic shift for the hopping sequence and thus define the frequency positions of the different hops.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:FS:CYCShift on page 610
```

Time Domain OCC Index

For PUCCH format F1, sets the orthogonal sequence index $\imath$ ($\imath = 0$ to 6). As defined in [TS 38.211](#), the value is required to select the orthogonal sequence, used for the block-wise spreading.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:FS:TDOCC on page 611
```

OCC Length

For PUCCH format F4, sets the value of the parameter $N_{SF}^{PUCCH,4}$ and thus defines which of the orthogonal sequences $w_n(m)$ defined in [TS 38.211](#) is used.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:FS:OCCLength on page 611
```

OCC Index

For PUCCH format F4, sets the orthogonal sequence index n ($n = 0$ to 4). As defined in [TS 38.211](#), the value is required to select the orthogonal sequence, used for the block-wise spreading.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:FS:OCCindex on page 611
```

6.7.2 Payload Settings

Access:

1. Select "Scheduling > User x BWP x > Content > PUCCH > Settings > Config".
2. Select "Payload".

Settings:

Positive SR Count.....	203
Number of ACK Bits.....	203
ACK Pattern.....	203
Number of UCI Bits.....	203
UCI Pattern.....	204

Positive SR Count

Sets the number of positive scheduling requests (SR). The value is used to define the mapping of the HARQ-ACK and CSI bits. For details, see [TS 38.213](#).

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:PL:SRCount on page 611
```

Number of ACK Bits

Sets the number of ACK bits and defines the length of the "ACK Pattern" field.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:BITS on page 612
```

ACK Pattern

Sets the ACK bits in pattern form, where the pattern length is set with the parameter "Number of ACK Bits".

A "1" indicates an ACK, a "0" - a NACK.

The pattern is read out once.

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:PATtern on page 612
```

Number of UCI Bits

Sets the number of UCI bits and defines the length of the "UCI Pattern" field.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:BITS on page 612
```

UCI Pattern

Sets the UCI bit sequence according to [TS 38.212](#). The sequence is set in pattern form, where the pattern length is set with the parameter "Number of UCI Bits".

A "1" indicates an ACK, a "0" - a NACK.

The pattern is read out once.

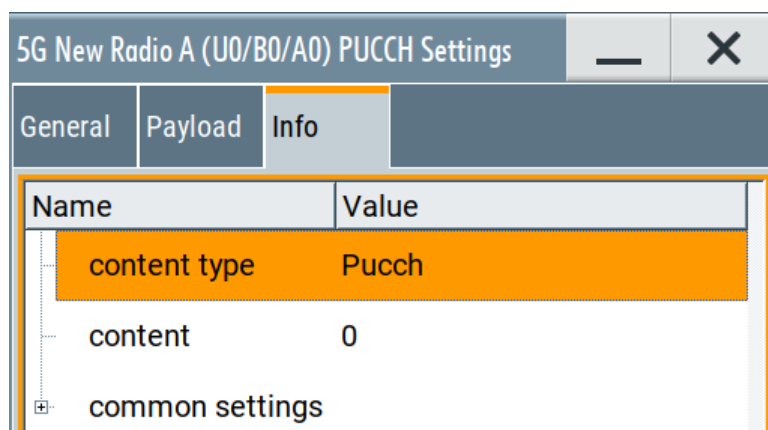
Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:PATtern on page 612
```

6.7.3 Info

Access:

1. Select "Scheduling > User x BWP x > Content > PUCCH > Settings > Config".
2. Select "Info".



The dialog displays details on the PUCCH configuration.

Info

The dialog displays details on the configuration.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:INFO? on page 550
```


6.8 PRACH Settings

Access:

1. Select "5G New Radio > General > Link Direction > Uplink".
2. Select "5G New Radio > Scheduling".
3. Select "User x BWP x > Content > PRACH".
4. Select "PRACH > Settings > Config".

5G New Radio A (U0/B0/A0) PRACH Settings	
General Info	
Format	A1
Restricted Set	Unrestricted
Logical Root Sequence	0
Zero Correlation Zone	0
Preamble Index	0
Time Offset	0.00 μs
Burst Mode Ref Alloc Identifier	1

This dialog comprises the settings of the physical random access channel (PRACH).

According to TS 38.211, the 64 preambles ([Preamble Index](#)) defined in each time-frequency PRACH occasion are numbered starting from the first cyclic shift of a logical root sequence. Then following the logical root sequence index, starting with the index set by the parameter [Logical Root Sequence](#).

Settings:

Format	205
Restricted Set	206
Logical Root Sequence	206
Zero Correlation Zone	206
Preamble Index	206
Time Offset	206
Burst Mode Ref Alloc Identifier	206
Info	207

Format

Selects the PRACH format.

The available formats depend on the [SC Spacing/CP](#) as follows:

- SCS = {1.25 kHz; 5 KHz}: "Format" = 0, 1, 2, 3
- SCS = {15 kHz; 30 kHz; 60 kHz; 120 kHz}: "Format" = A1, A2, A3, B1, B2, B3, B4, C0, C2

Remote command:

```
[ :SOURce<hw> ] :BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:FORMat on page 614
```

Restricted Set

Sets the higher-layer parameter `restrictedSetConfig` that defines the type of restricted sets (unrestricted, restricted type A, restricted type B).

Supported restricted sets depend on the PRACH [Format](#) as follows:

- "Format" = 0, 1, 2, 3: "Restricted Type A, Restricted Type B"
- "Format" = A1, A2, A3, B1, B2, B3, B4, C0, C2: "Unrestricted"

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:RSET on page 614
```

Logical Root Sequence

Sets the higher-layer parameter `prach-RootSequenceIndex` that defines the starting logical root sequence index and thus the 64 PRACH preambles.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:RSEquence on page 614
```

Zero Correlation Zone

Sets the parameter `zeroCorrelationZoneConfig` required to select the N_{cs} value that in turn is used for the calculation of the cyclic shift ([TS 38.211](#)).

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:ZCZone on page 615
```

Preamble Index

Sets the PRACH preamble index and thus defines which one of the 64 PRACH preambles is used.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:PRIndex on page 615
```

Time Offset

Sets the timing offset base value for PRACH, required for the PRACH performance requirement tests according to [TS 38.141-1](#).

The supported value range allows you to test PRACH detection also with in case of delay or misalignment greater than the values defined in the specification.

Remote command:

```
[ :SOURCE<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:TOFFset on page 615
```

Burst Mode Ref Alloc Identifier

If [Power Mode](#) > "Burst", sets whether the bandwidth of the current allocation is used as reference for the "Burst" power mode.

The icon  in the [Scheduling Settings](#) table indicates which allocation is set as burst reference.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:  
BWPart<gr0>:ALLoc<user0>:PRACH:BMAid on page 613
```

Info

The dialog displays details on the configuration.

Remote command:

```
[ :SOURce<hw>] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:  
BWPart<gr0>:ALLoc<user0>:INFO? on page 550
```

7 Signal Control and Signal Characteristics

This section lists settings provided for improving the signal and spectrum characteristics of the generated signal, defining the signal power and the signal generation start.

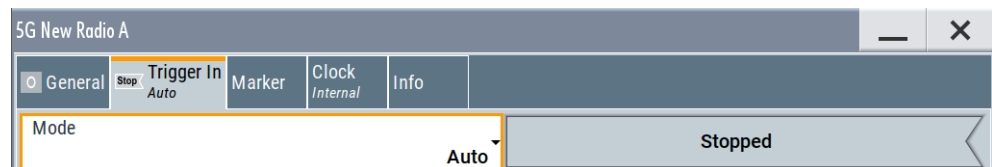
It covers the following topics:

• Trigger Settings	208
• Marker Settings	214
• TDD UL/DL Marker Mode	216
• Clock Settings	219
• Local and Global Connector Settings	220
• Output Settings	220
• Time Domain Windowing Settings	224
• Adjusting the Signal Power	226
• Crest Factor Reduction Settings	232

7.1 Trigger Settings

Access:

- Select "5G New Radio > Trigger In".



This tab provides access to the settings necessary to select and configure the trigger, like trigger source and mode, and to arm or trigger an internal trigger manually. The current signal generation status is displayed in the header of the tab together with information on the enabled trigger mode. As in the "Marker" and "Clock" tabs, this tab provides also access to the settings of the related connectors.



This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.



Routing and enabling a trigger

The provided trigger signals are not dedicated to a particular connector. Trigger signals can be mapped to one or more USER x or T/M connectors.

Use the [Local and Global Connector Settings](#) to configure the signal mapping, the polarity, the trigger threshold and the input impedance of the input connectors.

To route and enable a trigger signal, perform the following *general steps*:

- Define the signal source and the effect of a trigger event.
Select the "Trigger In > Mode" and "Trigger In > Source".
- Define the connector where the selected signal is provided.
Use the "Global Connectors" settings.

Settings:

Trigger Settings Common to All Basebands	209
Trigger Mode	209
Signal Duration Unit	210
Trigger Signal Duration	210
Running/Stopped	210
Arm	210
Execute Trigger	210
Trigger Source	211
Sync. Output to External Trigger/Sync. Output to Trigger	211
External / Trigger Inhibit	212
(External) Delay Unit	212
(Specified) External Delay/(Specified) Trigger Delay	213
Actual Trigger Delay/Actual External Delay	213

Trigger Settings Common to All Basebands

To enable simultaneous signal generation in all basebands, the R&S SMW couples the trigger settings in the available basebands in any instrument's configuration involving signal routing with signal addition. For example, in MIMO configuration, routing and summing of basebands or of streams.

The icon  indicates that common trigger settings are applied.

You can access and configure the common trigger source and trigger mode settings in any of the basebands. An arm or a restart trigger event applies to all basebands, too. You can still apply different delay to each of the triggers individually.

Trigger Mode

Selects trigger mode, i.e. determines the effect of a trigger event on the signal generation.

For more information, refer to chapter "Basics" in the R&S SMW user manual.

- "Auto"
The signal is generated continuously.
- "Retrigger"
The signal is generated continuously. A trigger event (internal or external) causes a restart.
- "Armed Auto"

The signal is generated only when a trigger event occurs. Then the signal is generated continuously.

An "Arm" stops the signal generation. A subsequent trigger event (internal or external) causes a restart.

- "Armed Retrigger"

The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart.

An "Arm" stops signal generation. A subsequent trigger event (internal or external) causes a restart.

- "Single"

The signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified at "Signal Duration".

Every subsequent trigger event (internal or external) causes a restart.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G\[:TRIGger\]:SEquence](#) on page 625

Signal Duration Unit

Defines the unit for describing the length of the signal sequence to be output in the "Single" trigger mode.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:SLUNit](#) on page 630

Trigger Signal Duration

Enters the length of the signal sequence to be output in the "Single" trigger mode.

Use this parameter to output part of the signal deliberately, an exact sequence of the signal, or a defined number of repetitions of the signal.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:SLENgth](#) on page 630

Running/Stopped

With enabled modulation, displays the status of signal generation for all trigger modes.

- "Running"

The signal is generated; a trigger was (internally or externally) initiated in triggered mode.

- "Stopped"

The signal is not generated and the instrument waits for a trigger event.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:RMODE?](#) on page 629

Arm

Stops the signal generation until subsequent trigger event occurs.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:ARM:EXECute](#) on page 629

Execute Trigger

For internal trigger source, executes trigger manually.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:EXECute](#) on page 629

Trigger Source

The following sources of the trigger signal are available:

- "Internal"
The trigger event is executed manually by the "Execute Trigger".
- "Internal (Baseband A/B)"
The trigger event is provided by the trigger signal from the other basebands.
If common trigger settings are applied, this trigger source is disabled.
- "External Global Trigger"
The trigger event is the active edge of an external trigger signal provided and configured at the USER x connectors.
- "External Local Trigger"
The trigger event is the active edge of an external trigger signal provided and configured at the local T/M/C connector.
With coupled trigger settings, the signal has to be provided at the T/M/C1/2/3 connectors.
- "External Local Clock"
The trigger event is the active edge of an external local clock signal provided and configured at the local T/M/C connector.
With coupled trigger settings, the signal has to be provided at the T/M/C1 connector.
- "Baseband Sync In"
Option: R&S SMW-B9
In master-slave mode, slave instruments are triggered by the active edge of the synchronization signal.

"External Local Clock/Trigger" require R&S SMW-B10.

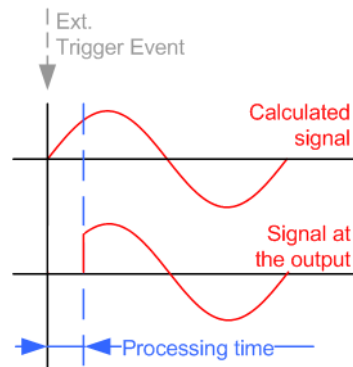
Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:SOURce](#) on page 625

Sync. Output to External Trigger/Sync. Output to Trigger

Enables signal output synchronous to the trigger event.

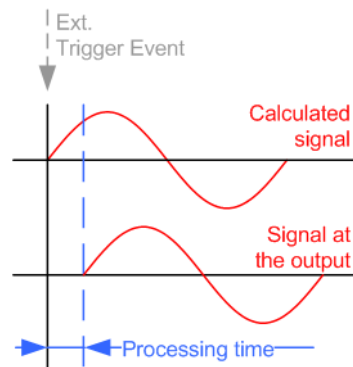
- "On"
Corresponds to the default state of this parameter.
The signal calculation starts simultaneously with the trigger event. Because of the processing time of the instrument, the first samples are cut off and no signal is output. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.



- "Off"

The signal output begins after elapsing of the processing time. Signal output starts with sample 0. The complete signal is output.

This mode is recommended for triggering of short signal sequences. Short sequences are sequences with signal duration comparable with the processing time of the instrument.



In master-slave mode, this setting ensures that once achieved, synchronization is not lost if the baseband signal sampling rate changes.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:EXtErnal:SYNChronize:OUTPut`
on page 626

External / Trigger Inhibit

Applies for external trigger signal or trigger signal from the other path.

Sets the duration with that any following trigger event is suppressed. In "Retrigger" mode, for example, a new trigger event does not cause a restart of the signal generation until the specified inhibit duration does not expire.

For more information, see chapter "Basics" in the R&S SMW user manual.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger[:EXtErnal]:INHibit` on page 627

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OBASeband:INHibit` on page 628

(External) Delay Unit

Determine whatever the trigger delay is expressed in samples or directly defined as a time period (seconds).

To specify the delay, use the parameter [\(Specified\) External Delay/\(Specified\) Trigger Delay](#).

The parameter [Actual Trigger Delay/Actual External Delay](#) displays the delay converted in time.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:DElay:UNIT](#) on page 626

(Specified) External Delay/(Specified) Trigger Delay

The name of the parameter and the units the delay is expressed in, changes depending on the parameter [\(External\) Delay Unit](#).

Delays the trigger event of the signal from:

- The external trigger source
- The other path
- The other basebands (internal trigger), if common trigger settings are used.

Use this setting to:

- Synchronize the instrument with the device under test (DUT) or other external devices
- Postpone the signal generation start in the basebands compared to each other
- Compensate delays and align the signal generation start in multi-instrument setup

For more information, see chapter "Basics on ..." in the R&S SMW user manual.

For "(External) Delay Unit = Samples", the delay is relative to the sample rate of the first output of the respective baseband block.

The parameter displays the delay converted in time.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TRIGger\[:EXternal\]:DElay](#) on page 626

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:EXternal:TDElay](#) on page 627

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:OBASeband:DElay](#) on page 628

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:OBASeband:TDElay](#) on page 628

Actual Trigger Delay/Actual External Delay

Indicates the resulting trigger delay in "Time" unit.

Remote command:

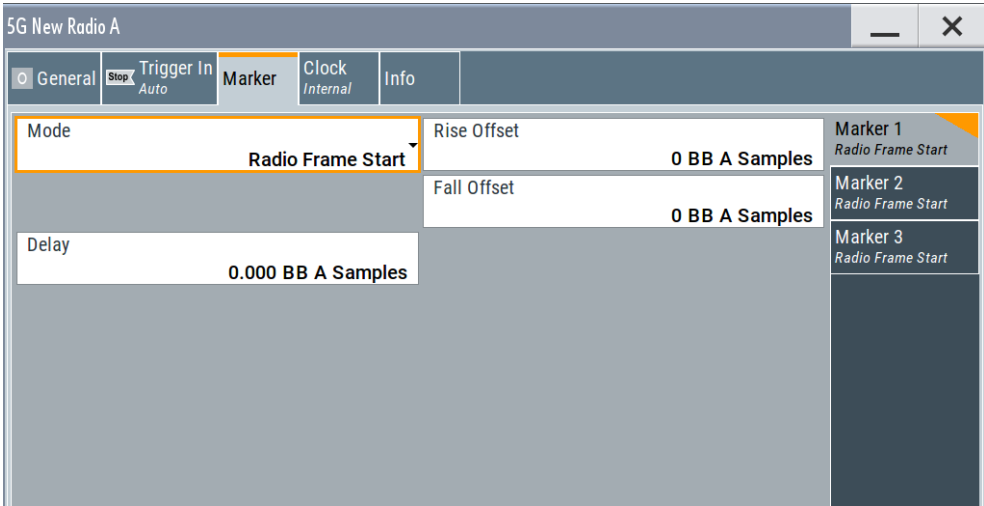
[\[:SOURce<hw>\]:BB:NR5G:TRIGger:EXternal:RDElay?](#) on page 627

[\[:SOURce<hw>\]:BB:NR5G:TRIGger:OBASeband:RDElay?](#) on page 628

7.2 Marker Settings

Access:

► Select "5G New Radio > Marker".



This tab provides access to the settings necessary to select and configure the marker output signal, like the marker mode or marker delay settings.

 This section focuses on the available settings.
For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

 **Routing and enabling a marker**
The provided marker signals are not dedicated to a particular connector. They can be mapped to one or more USER x or T/M connectors.
To route and enable a marker signal, perform the following *general steps*:

- Define the shape of the generated marker, i.e. select the "Marker > Mode".
- Define the connector where the selected signal is provided.
Use the [Local and Global Connector Settings](#).

Settings:

Marker Mode	214
Rise/Fall Offset	215
Marker x Delay	216

Marker Mode
Marker configuration for up to 3 markers. The settings are used to select the marker mode defining the shape and periodicity of the markers. The contents of the dialog change with the selected marker mode.

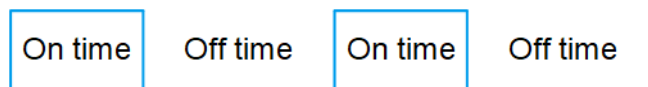
- "Subframe" A marker signal is generated at the start of each subframe.
- "Radio Frame Start" A marker signal is generated at the start of each radio frame.
- "Restart (ARB)" A marker signal is generated at the start of each ARB sequence.
- "User Period" A marker signal is generated at the beginning of every user-defined period, as set with the parameter "Period."

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:PERiod` on page 631

"On/Off Period"

A regular marker signal that is defined by an on/off ratio. A period lasts one on and off cycle.



Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:ONTime` on page 632

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:OFFTime` on page 632

"System Frame Number (SFN) Restart"

A marker signal is generated at the start of every SFN period.

"TDD UL/DL" A marker signal is generated at the start of every UL/DL pattern.

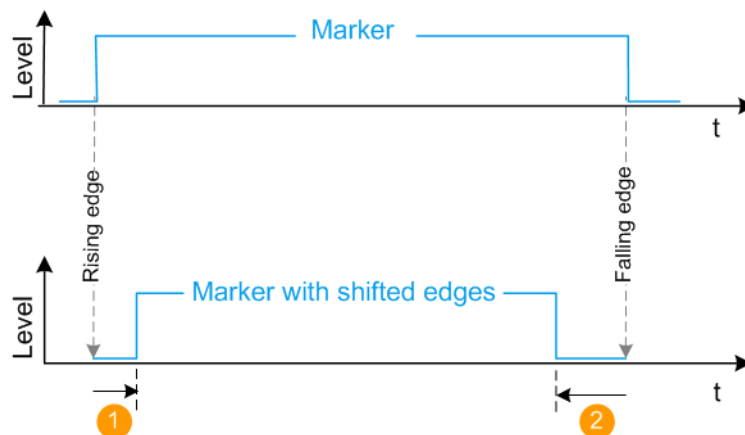
Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:MODE` on page 631

Rise/Fall Offset

Sets the value for the rise/fall offset.

The ramps of the marker signal are shifted by the specified number of samples. Positive values delay the rising ramp; negative values - shift it back.



1 = Positive rise offset

2 = Positive fall offset

Remote command:

[:SOURce<hw>] :BB:NR5G:TRIGger:OUTPut<ch>:ROFFset on page 631

[:SOURce<hw>] :BB:NR5G:TRIGger:OUTPut<ch>:FOFFset on page 631

Marker x Delay

Delays the marker signal at the marker output relative to the signal generation start.

Variation of the parameter "Marker x Delay" causes signal recalculation.

Remote command:

[:SOURce<hw>] :BB:NR5G:TRIGger:OUTPut<ch>:DELay on page 631

7.3 TDD UL/DL Marker Mode

Access:

- Select "5G New Radio > Marker > TDD UL/DL".

The screenshot shows the '5G New Radio A' dialog box with the 'Marker' tab selected. The 'TDD UL/DL' configuration is displayed. The 'Mode' is set to 'TDD UL/DL'. The 'Configuration Mode' is 'UL/DL Configuration'. The 'Duplexing' is 'TDD'. The 'Subcarrier Spacing' is '60 kHz'. The 'Use Extended Cyclic Prefix' checkbox is unchecked. The 'Slot Period' is '10 Slots'. The 'Number of DL Slots' is '9'. The 'Number of Special Slots' is '1'. The 'Number of UL Slots' is '0'. The 'Slot Format Index' is 'D'. The 'Special Slot Configuration' section shows a sequence of slots: D, D, D, D, D, D, D, D, D, S. The 'Marker 1' section shows 'TDD UL/DL'. The 'Marker 2' section shows 'Radio Frame Start'. The 'Marker 3' section shows 'Radio Frame Start'.

This dialog comprises the settings for the TDD UL/DL pattern in which you want to set a marker.

Settings:

Configuration Mode.....	217
Duplexing.....	217
Subcarrier Spacing.....	217
Use Extended Cyclic Prefix.....	217
Slot Period.....	217
Number of DL Slots.....	217
Number of Special Slots.....	218
Number of UL Slots.....	218
Slot Format Index.....	218

Number of DL Symbols.....	218
Number of Guarded Symbols.....	218
Number of UL Symbols.....	218

Configuration Mode

Displays the marker mode being configured. In this case, "UL/DL Configuration". This field is disabled and you cannot change the configuration mode.

Duplexing

Defines the duplexing mode for a UL/DL pattern containing a marker.

"TDD"	Sets TDD (time division duplex) as the duplexing mode for the UL/DL pattern.
"FDD"	Sets FDD (frequency division duplex) as the duplexing mode for the UL/DL pattern. FDD is set by default.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:DUPLexing` on page 632

Subcarrier Spacing

Defines the subcarrier spacing (SCS) value for a UL/DL pattern containing a marker.

The available values depend on the set [Deployment](#) value. See [Table 3-2](#).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SCSPacing` on page 634

Use Extended Cyclic Prefix

Enables/disables the extended cyclic prefix (ECP) for a UL/DL pattern containing a marker.

See [Chapter 3.2, "5G NR Numerology"](#), on page 18 for more information.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:ECPState` on page 632

Slot Period

Sets the duration of a UL/DL pattern containing a marker.

You can set this value to 5 or 10 slots.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SLENgth` on page 634

Number of DL Slots

Sets the number of DL slots in a UL/DL pattern containing a marker.

Enabled if "Link Direction > Downlink" and "Duplexing > TDD".

The value is calculated as follows:

"Number of DL Slots" = "Slot Period" - "Number of UL Slots" - "Special Slots".

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:NDLSlots` on page 633

Number of Special Slots

Displays the number of special slots in a UL/DL pattern containing a marker.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:NSSLots?` on page 633

Number of UL Slots

Sets the number of UL slots in a UL/DL pattern containing a marker.

Enabled if "Link Direction > Uplink".

The value is calculated as follows:

"Number of UL Slots" = "Slot Period" - "Number of DL Slots" - "Special Slots".

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:NULSlots` on page 633

Slot Format Index

Sets the special slot format index of the special slot included in a UL/DL pattern containing a marker according to [TS 38.213](#) and thus defines the slot structure.

See [Chapter 3.4, "Frame Structure, Slots and Slot Formats"](#), on page 19 for more information about the slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SSC:SLFMT` on page 635

Number of DL Symbols

Indicates the number of DL symbols in the special slot, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SSC:NDLSymbols?`
on page 634

Number of Guarded Symbols

Indicates the number of guarded symbols in the special slot, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SSC:NGSYmbols?`
on page 634

Number of UL Symbols

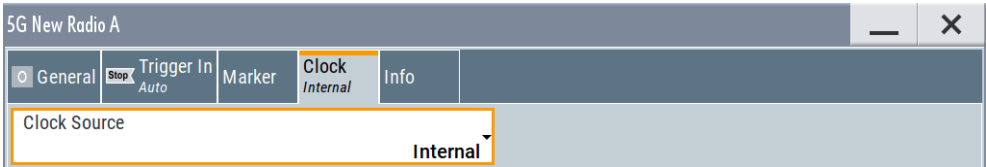
Indicates the number of UL symbols in the special slot, depending on the selected slot format index.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TRIGger:OUTPut<ch>:SSC:NULSymbols?`
on page 635

7.4 Clock Settings

- Access:
- ▶ Select "5G New Radio > Clock".



This tab provides access to the settings necessary to select and configure the clock signal, like the clock source and clock mode.

i This section focuses on the available settings.
For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

i **Defining the clock**
The provided clock signals are not dedicated to a particular connector. They can be mapped to one or more USER x and T/M/C connectors.
Use the [Local and Global Connector Settings](#) to configure the signal mapping, the polarity, the trigger threshold, and the input impedance of the input connectors.
To route and enable a trigger signal, perform the following *general steps*:

- Define the signal source, that is select the "Clock > Source".
- Define the connector where the selected signal is provided.
Use the [Local and Global Connector Settings](#).

Settings:

Clock Source	219
Clock Mode	220
Measured External Clock	220

Clock Source

- Selects the clock source.
- "Internal"
The instrument uses its internal clock reference.
 - "External Local Clock"
Option: R&S SMW-B10
The instrument expects an external clock reference at the local T/M/C connector.
- "External Local Clock" requires R&S SMW-B10.

Remote command:
[\[:SOURce<hw>\]:BB:NR5G:CLOCK:SOURce](#) on page 636

Clock Mode

Option: R&S SMW-B10

Sets the type of externally supplied clock.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:CLOCK:MODE` on page 636**Measured External Clock**

Provided for permanent monitoring of the enabled and externally supplied clock signal.

Remote command:

`CLOCK:INPut:FREQuency?`

7.5 Local and Global Connector Settings

Each of the "Trigger In", "Marker" and "Clock" dialogs and the "Trigger Marker Clock" dialog provides a quick access to the related connector settings.



See also chapter "Local and Global Connector Settings" in the user manual.

7.6 Output Settings

Access:

- ▶ Select "5G New Radio" > "Output/Power" > "Output".

Output	Sample Rate /Hz	Conflict	Sample Rate Variation	Playback Rate /Hz
BB A	122 880 000	☐		122 880 000
BB A	122 880 000	☒		122 880 000

This dialog comprises the settings required for configuring the output power.

Settings:

Sequence Length.....	221
Suppress Subcarrier on Output Center.....	221
Filter Mode.....	221
Load User Filter.....	222
Clipping Level.....	223
Clipping Mode.....	223
Sample Rate Mode.....	223
Output.....	223
Sample Rate.....	223
Conflict.....	224
Sample Rate Variation.....	224
Playback Rate.....	224

Sequence Length

Sets the sequence length of the signal in number of frames. The signal is calculated in advance and output in the arbitrary waveform generator.

Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:SEQLen on page 617

Suppress Subcarrier on Output Center

If enabled, the subcarriers that use the same frequency as the center frequency of the baseband output are not transmitted.

The suppressed subcarrier is not necessarily the center of a carrier (channel bandwidth), as it is if "Node > Carriers" > [Delta f to Output/MHz](#) ≠ 0 MHz is used to shift the center carrier relative to the output center. Not considered are center carrier shifts caused by baseband offsets applied by parameters like offsets in the "I/Q Stream Mapper" or "Baseband Offsets".

Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:SSOC:STATe on page 617

Filter Mode

Enables filtering and sets how the filter is applied:

"Channel BW"	Available if "Node > Feedback > Off". On the whole channel bandwidth.
"Per BWP"	Available if "Node > Feedback > Off". By filtering the individual BWPs separately.
"Off"	Disables filtering.
"Fast"	Applies fast filtering with reduced number of filter taps. Non-average power modes are supported. Supported in the following configuration: • "Node > Carriers > Number of Carriers = 1" and "Node > Carriers > Δf to Output = 0". • "Node > Carriers > Number of Carriers ≥ 2" and "System Configuration > BB Sources = Coupled". • "Node > Feedback = On"

"User" Available if "Node > Feedback > Off".
You can load your custom filter, see ["Load User Filter"](#) on page 222.

Each of these filters is designed for different application field and optimized for a particular performance.

Depending on the filter implementation, these filters require different calculation time:

- "Channel BW" and "Per BWP": high-quality filters, providing good EVM and ACP but requiring long calculation time
- "Fast": short calculation time combined with real-time processing, good EVM performance while ignoring the effects on ACP

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:OUTPut:FMODE](#) on page 617

Load User Filter

For [Filter Mode](#) > "User", it opens the standard dialog "Select List File User Filter" for loading a user-defined filter file.

User filters are used as offline filters. The following types are supported:

- Files with predefined file format and extensions *.vaf
For information, refer to the description "Introduction to "filtwiz" Filter Editor" on the Rohde & Schwarz web page.
- ASCII files with simple format and file extension *.dat
These files describe filters as a sequence of normalized filter coefficients. Each coefficient is defined as a pair of I and Q samples. The I and Q components alternate at each file line. The I and Q values vary between - 1 and + 1.
A user filter can contain up to 2560 coefficients.
The user filter must be real-valued. For both I and Q components of the coefficients, only real coefficients different than 0 are allowed.

Example: Script that generates user filter file

This MATLAB® script creates a user filter file for a 5G NR carrier with 10 MHz bandwidth. The sampling rate is 30.72 MHz.

```
subcarriersubspacing = 15e3;
f_s = 2*1024*subcarriersubspacing;
used_bw = 52*12*subcarriersubspacing; %52RBs*12 subcarriers per RB
trans_region = 0.02 * f_s/2; %controls steepness of filter slopes

%cutoff frequencies
f = [used_bw/2 used_bw/2+trans_region];
%ripples in dB
rp = 0.01; %passband
rs = 80; %stopband
dev = [(10^(rp/20)-1)/(10^(rp/20)+1) 10^(-rs/20)];
%estimate filter order
[n,fo,ao,w] = firpmord(f,[1 0],dev,f_s);
%generate filter coefficients
b = firpm(n,fo,ao,w);
fvtool(b); %displays filter response
%write filter out into .dat filter coefficient file
```

```

coeffs_out = zeros(2*length(b),1);
coeffs_out(1:2:end) = real(b);
coeffs_out(2:2:end) = imag(b);
dlmwrite(['smw_nr_user_filter_', num2str(n), 'coeffs_', 'bw', num2str(used_bw),
        'Hz_fs_', num2str(f_s), 'Hz.dat'], coeffs_out);

```

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:FMODE:USRFile](#) on page 617

Clipping Level

Sets the limit for clipping.

This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:OUTPut:CLeVel](#) on page 619

Clipping Mode

Selects the clipping method. The dialog displays a graphical illustration on how this two methods work.

- "Vector $|i + jq|$ "
The limit is related to the amplitude $|i + q|$. The I and Q components are mapped together, the angle is retained.
- "Scalar $|i|, |q|$ "
The limit is related to the absolute maximum of all the I and Q values $|i| + |q|$. The I and Q components are mapped separately, the angle changes.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:OUTPut:CMODE](#) on page 620

Sample Rate Mode

Sets how the sample rate is defined.

"FFT"	Sample rate is derived from the used FFT.
"Minimum"	Available if "Filter Mode" ≠ "Fast". Sample rate is set to the minimum possible value. This mode is set automatically in the following cases: • If more than two carriers are enabled • In uplink, if real-time feedback is enabled ("Node > Feedback" > "Closed Loop Feedback Mode" on page 397)

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:OUTPut:SAMRmode](#) on page 618

Output

Indicates the baseband (BB) output.

Sample Rate

Indicates the sample rate value, calculated according to the selected [Sample Rate Mode](#), configured signal contents and several other settings, such as the "Channel Bandwidth" or "Deployment".

Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:BBConf:ROW<ch0>:SRATe? on page 618

Conflict

If [Sample Rate Variation](#) is not enabled, indicates an existing conflict between the [Playback Rate](#) and [Sample Rate](#) values with the symbol ⚠.

Conflicts are caused by mismatch between the nominal sample rate, playback rate and sample rate values.

The playback rate is limited by the instrument capabilities. A conflict is indicated if the playback rate of the instrument is not enough for processing NR signals.

For example, if you configure a 400 MHz BW channel on an instrument which does not support this bandwidth value and you do not modify other parameters, e.g. the BWP value, the required playback rate for this configuration is > 490 MSps, which is higher than the value supported by the instrument, then a conflict is indicated.

An existing conflict is also indicated with the symbol ⚠ in the [Output/Power](#) field in the "General Settings" dialog.

Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:BBConf:ROW<ch0>:CONFLICT on page 618

[:SOURce<hw>] :BB:NR5G:OUTPut:BBConf:CONFLICT? on page 619

Sample Rate Variation

Activates sample rate variation and allows you to change the [Playback Rate](#) manually.

Enabling "Sample Rate Variation" is useful for chipset testing, where the chipset runs with a modified clock rate for test reasons.

Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:BBConf:ROW<ch0>:VARIation on page 619

Playback Rate

Indicates the playback **speed**.

By default, the "Playback Rate = Sample Rate" but the "Playback Rate" value is also limited by the instrument capabilities (installed options).

If there is a mismatch between the sample rate and playback rate values, a conflict is indicated.

Changing the "Playback Rate" does not do resampling. If you need a resampled signal, generate a waveform and resample it, for example, with software like R&S®ARB Tool-box.

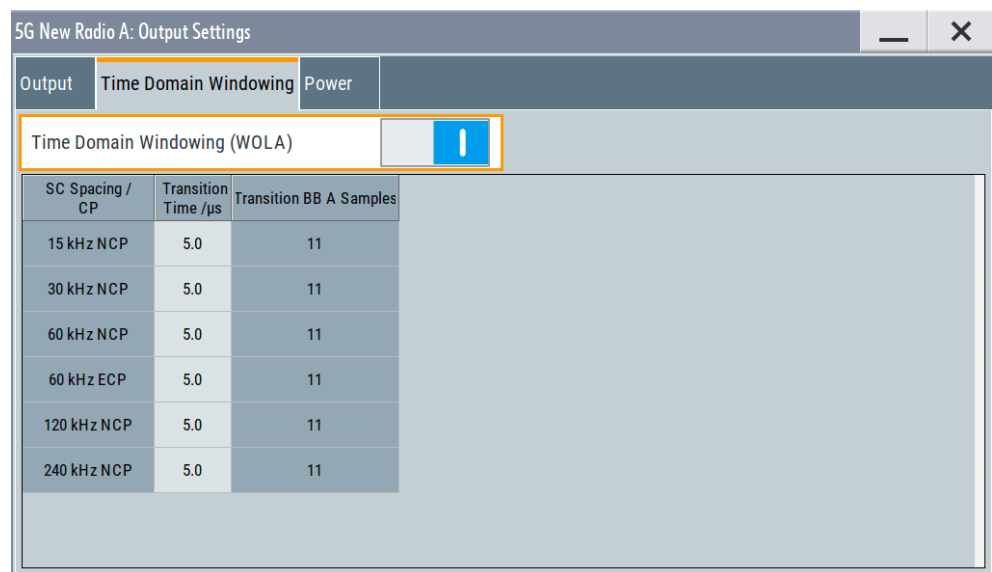
Remote command:

[:SOURce<hw>] :BB:NR5G:OUTPut:BBConf:ROW<ch0>:PBRate on page 619

7.7 Time Domain Windowing Settings

Access:

- Select "5G New Radio" > "Output/Power" > "Time Domain Windowing".



This dialog comprises the settings required for configuring the time domain windowing. You can set different transition time for each of the specified numerologies.

Settings:

Time Domain Windowing (WOLA).....	225
SC Spacing/CP.....	225
Transition Time.....	225
Transition BB A Samples.....	226

Time Domain Windowing (WOLA)

Activates/deactivates the time domain windowing.

Time domain windowing is a method that influences the spectral characteristics of the signal. The method removes the spikes caused by the OFDM; it does not replace oversampling and subsequent signal filtering.

The abbreviation WOLA stands for weighted-overlay-and-add.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TDWind:STATe` on page 620

SC Spacing/CP

Indicates all allowed combinations of the subcarrier spacing (SSC) and the cyclic prefix (CP), see [Table 3-2](#).

Transition Time

Sets the transition time when time domain windowing is active.

The transition time defines the overlap range of two OFDM symbols. You can define different transition times for each of the numerologies ([SC Spacing/CP](#)).

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:TDWind:S240K:TRTime` on page 620

etc.

Transition BB A Samples

Indicates the number of samples during the [Transition Time](#).

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:OUTPut:TDWind:S240K:TRTSamples?](#) on page 621
etc.

7.8 Adjusting the Signal Power

In the R&S SMW, you can adjust the power level of the generated signal in different ways.

This section explains the different power calculation modes and outlines the signal settings influencing the relations between the power levels of the channels and signals in the signal itself.

Overview of the power-related settings

The following settings influence the power level of the generated signal:

- Output level (P_{out}) of the instrument
To adjust the value, select "Status bar > Level".
- Selected power calculation method
To define it, select "General > Output/Power > Power > Power Mode"
- Selected relative signal and channel power values
 - "5G New Radio > General > Node > SS/PBCH" > ["PSS/SSS Power"](#) on page 64
 - "5G New Radio > General > Node > SS/PBCH" > ["PBCH Power"](#) on page 64
 - "5G New Radio > General > Node > Dummy REs" > ["Power"](#) on page 71
 - "Scheduling > User x BWP x > Content > PDSCH/PUSCH > Settings > Config" > ["Power"](#) on page 162

General principles

By selecting the power calculation method ("Power Mode"), you define the **power level at the first instrument's output**. The signal power level of the other outputs is calculated automatically according to the current power relations of all channels and signals.

Relative vs absolute power

All the relative channel and signal power values are set **relative** to each other.

Example:

If "PSS Power = 2 dB" and "SSS Power = -3 dB", then the power level of the SSS subcarriers is with 5 dB higher than the power level of the PSS subcarriers.

The **absolute power level** of one resource element depends on the selected "Power Mode" and on the configuration during the remaining subframes.

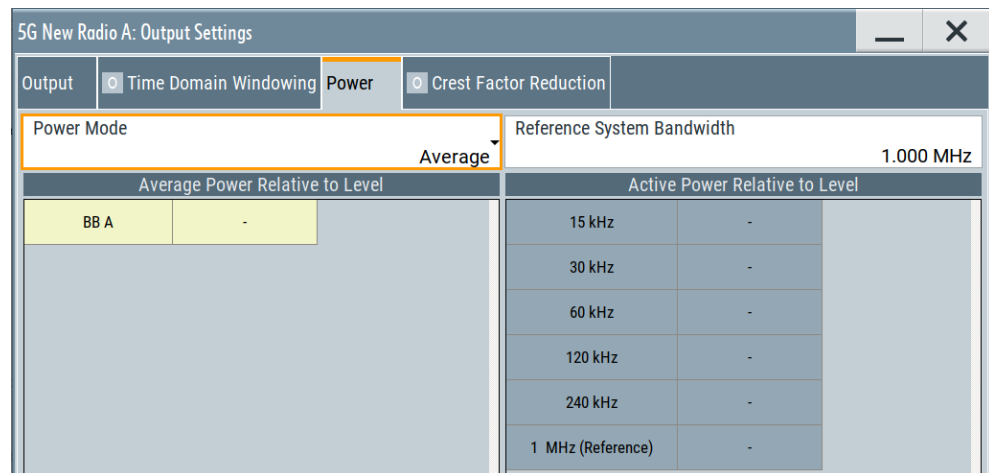
Power mode and the different power calculation methods

The value displayed in the "Status bar > Level" is the current RMS level at the output. The RMS and PEP values are calculated different, depending on the selected "5G New Radio" > "Output/Power" > "Power" > **Power Mode**.

7.8.1 Power Settings

Access:

- Select "5G New Radio" > "Output/Power" > "Power".



This dialog comprises the settings required for configuring the output power.

Settings:

Power Mode.....	227
Reference System Bandwidth.....	231
Carrier/Subframe/User/Bwp/Alloc.....	231
Average Power Relative To Level (per Baseband).....	231
L BB x.....	231
L Average Power.....	231
Active Power Relative To Level (per Bandwidth).....	232
L Numerology.....	232
L Active Power.....	232

Power Mode

Defines which method is used to calculate the signal power at the first instrument output. The signal power at the other outputs is calculated according to the current power relations of all channels and signals.

The different power modes are illustrated for the two signals, shown on [Figure 7-1](#).

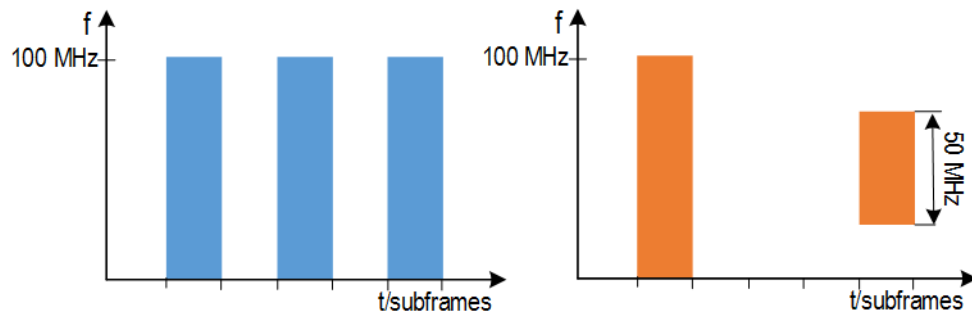


Figure 7-1: Example: time plans of 2 signals with different allocated subframes and channel bandwidth per allocation

left = Every second subframe is allocated; for all subframes, channel bandwidth $BW = 100$ MHz

right = 2 allocated subframes, channel bandwidth of the first allocation $BW_1 = 100$ MHz and of the second - $BW_2 = 50$ MHz

"Average"

The power level set with the parameter "Status Bar > Level" is the average **RMS power of the complete signal**.

The absolute power of a subframe depends on the configuration of the remaining signal. In fully allocated frames, the average RMS value applies for all subframes. If the frames are partly allocated, the absolute RMS power within an allocated subframe is greater than the displayed RMS value ("Status Bar > Level").

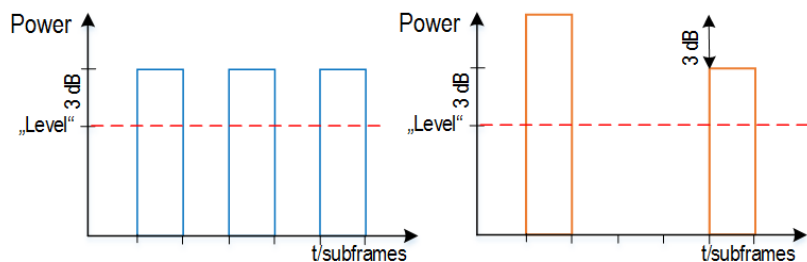


Figure 7-2: Signal power level for Power Mode = Average

Level = "Status Bar > Level"

Example:

If "Status Bar > Level" = -10 dBm, the RMS power measured with a power sensor in both cases is:

- $RMS_1 = RMS_2 = -10$ dBm

"Average Active Subframes"

The power level set with the parameter "Status Bar > Level" is the **average power in all allocated subframes**.

Thus, the absolute power of the allocated subframe depends only on the configuration of the remaining allocated signal.

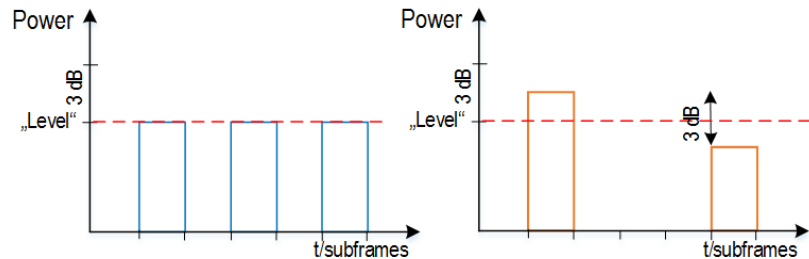


Figure 7-3: Signal power level for Power Mode = Average Active Subframes

Level = "Status Bar > Level"

Example:

If "Status Bar > Level" = -10 dBm, the RMS power measured with a power sensor in both cases is:

- $\text{RMS}_1 = -13 \text{ dBm}$
- $\text{RMS}_2 = -14.5 \text{ dBm}$

This mode is usefully if a specific SNR is required for a particular channel but this channel is not transmitted in every subframe.

"Constant PSD"

The power level set with the parameter "Status Bar > Level" is the **power of a fully allocated, fictitious signal with a specific bandwidth (Reference System Bandwidth)**. The power spectral density (PSD) of this fictitious signal is equal to the PSD of the current signal. In this mode, you configure a specific power spectral density per resource element rather than the RMS of the complete signal. The absolute power of a particular allocation is then calculated by multiplying the configured PSD with the bandwidth of the allocation.

Thus, for a given "Reference System Bandwidth", the PSD and the signal power for a particular bandwidth (SignalPower_{BW}) are calculated as follows:

- $\text{PSD} = \text{"Status Bar > Level"} / \text{"Reference System Bandwidth"}$
- $\text{SignalPower}_{\text{BW}} = \text{PSD} \cdot \text{BW}$, where BW is the channel bandwidth.

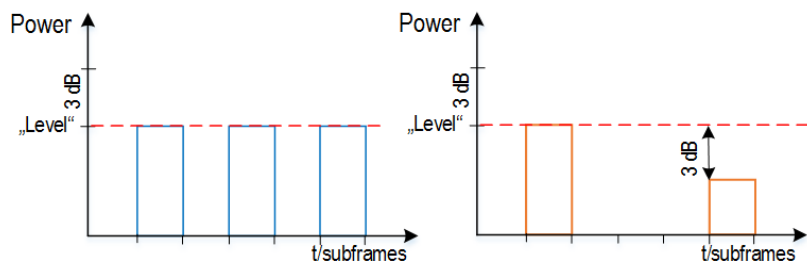
Example:

Figure 7-4: Signal power level for Power Mode = Constant PSD

Level = "Status Bar > Level"

For "Reference System Bandwidth" = 100 MHz, the signal power of a signal with 100 MHz bandwidth (BW = 100 MHz) is:

$$\text{SignalPower}_{100 \text{ MHz}} = (\text{"Status Bar > Level"} / 100 \text{ MHz}) \cdot 100 \text{ MHz} = \text{"Status Bar > Level"}$$

The signal power of a signal with 50 MHz bandwidth (BW = 50 MHz) is then:

$$\text{SignalPower}_{50 \text{ MHz}} = (\text{"Status Bar > Level"} / 100 \text{ MHz}) \cdot 50 \text{ MHz} = \text{"Status Bar > Level"} / 2 \text{ or}$$

$$\text{SignalPower}_{50 \text{ MHz}} = \text{"Status Bar > Level"} - 3 \text{ dB}$$

If "Status Bar > Level" = -10 dBm, the RMS power measured with a power sensor in both cases is:

- $\text{RMS}_1 = -13 \text{ dBm}$
- $\text{RMS}_2 = -16 \text{ dBm}$

This mode is useful if you need to configure an absolute SNR. To achieve an absolute SNR, set the "AWGN > System Bandwidth" value to be equal to the "5G New Radio > Output/Power > Power > Reference System Bandwidth".

"Burst"

For users configured on the baseband output, a reference allocation from the scheduling table has to be chosen. The software **computes the signal PSD bandwidth**, such that the **absolute power of the reference allocation** is equal to the "Level" value in the "Status Bar". For the case of multiple users configured on the same baseband output, each user signal has the same PSD level computed using the reference allocation. If AWGN is turned on, both UEs have the same SNR.

The "Burst" mode is a special case of the "Constant PSD" mode in the sense that it computes automatically a reference bandwidth based on the chosen allocation.

Thus, for a given "Reference System Bandwidth", the PSD and the signal power for a particular bandwidth ($\text{SignalPower}_{\text{BW}}$) are calculated as follows:

- $\text{PSD} = \text{"Status Bar > Level"} / \text{"Reference System Bandwidth"}$
- $\text{SignalPower}_{\text{BW}} = \text{PSD} \cdot \text{BW}$, where BW is the channel bandwidth.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:POWer:MODE` on page 621

Reference System Bandwidth

In "Power Mode > Constant PSD", sets the system bandwidth used as reference for the calculation of the output power.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:POWer:RSBW` on page 622

Carrier/Subframe/User/Bwp/Alloc

If **Power Mode** > "Burst", displays the identifier of the allocation set as burst reference.

If you select "Carrier/Subframe/User/Bwp/Alloc", the **Scheduling Settings** open. The allocation showing the icon  is used as burst reference.

The system sets by default the bandwidth of the first allocation in the "Scheduling Settings" as the burst reference.

The power value of the burst reference allocation is displayed in the last row of the **Active Power Relative To Level (per Bandwidth)** table.

Average Power Relative To Level (per Baseband)

The table displays the average power relative to the level of all baseband outputs associated to the current block.

BB x ← Average Power Relative To Level (per Baseband)

Displays the baseband (BB) output.

Average Power ← Average Power Relative To Level (per Baseband)

Displays the average power relative to the level of the corresponding baseband output associated to the current block.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:POWer:BBConf:ROW<ch0>:AVRL?`

on page 621

Active Power Relative To Level (per Bandwidth)

The table displays the power of an active signal of a certain bandwidth relative to the level.

Numerology ← Active Power Relative To Level (per Bandwidth)

Displays the bandwidth value according to the numerology associated to the current block.

Active Power ← Active Power Relative To Level (per Bandwidth)

Displays the power of an active signal of a certain bandwidth relative to the level.

If **Power Mode** > "Burst" or "Constant PSD", the power value of the reference bandwidth set by **Burst Mode Ref Alloc Identifier** or **Reference System Bandwidth** is shown in the last row.

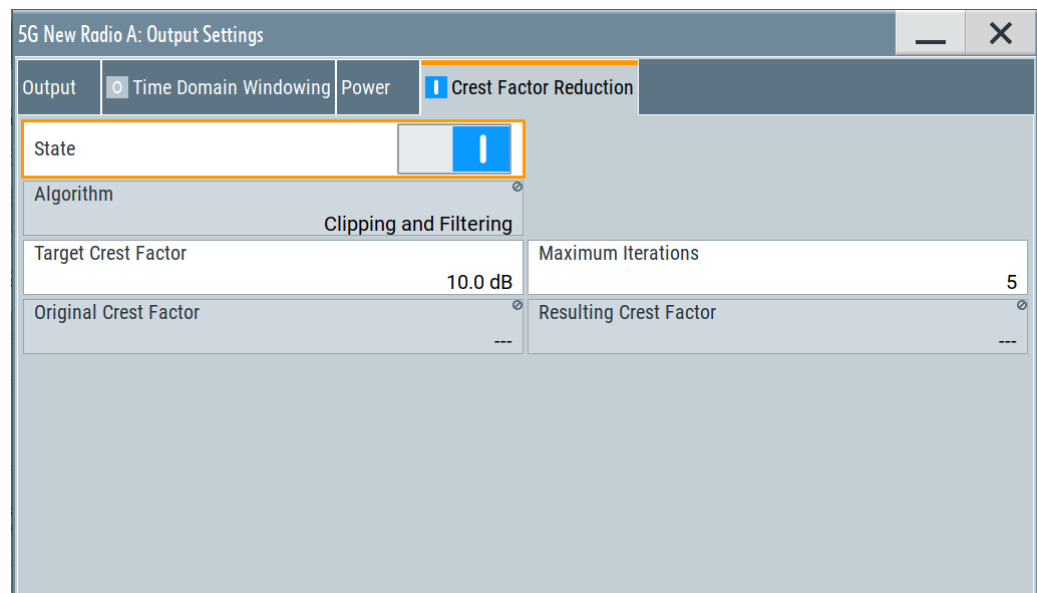
Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:POWer:BWRef:ACRL?` on page 622

7.9 Crest Factor Reduction Settings

Access:

- Select the "Baseband > 5GNR > Output/Power...".



The remote commands required to define these settings are described in [Chapter 12, "Remote-Control Commands"](#), on page 405.

Settings:

State.....	233
Algorithm.....	233
Target Crest Factor.....	233
Max Iterations.....	233
Original Crest Factor.....	233
Resulting Crest Factor.....	233

State

Enables the crest factor reduction calculation.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:STATe` on page 624

Algorithm

Displays the algorithm used for the crest factor reduction. The "Clipping and filtering" algorithm performs a hard clipping. It is followed by a lowpass filtering of the result in an iterative manner until the target crest factor is reached.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:ALGorithm` on page 623

Target Crest Factor

Sets the desired crest factor value.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:TCRFactor` on page 624

Max Iterations

Sets the number of iterations that are used for calculating the resulting crest factor. The iteration process is stopped when the desired crest factor is achieved by 0.1 dB.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:ITERations` on page 623

Original Crest Factor

Displays the original crest factor of the waveform after the calculation of the resulting crest factor is completed. The original crest factor is calculated as an average over the whole waveform, including any idle periods that might be present in TDD waveforms.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:OCFactor?` on page 623

Resulting Crest Factor

Displays the resulting crest factor of the waveform after the calculations are completed. The resulting crest factor is calculated as an average over the whole waveform, including any idle periods that might be present in TDD waveforms.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:OUTPut:CFReduction:RCFactor?` on page 624

8 Observing Current Allocations on the Time Plan

You can observe the current allocations on the time plan.

The time plan shows active channels and signals, the allocations of the active and selected UEs and indicates the cell it applies for. The time plan shows also an overview of the configured BWPs. It indicates conflicting allocations, too.

Per default, the time plan shows the allocation per used channel bandwidth and one frame but you can change the displayed time region to up to 20 subframes. You can also scroll over all available subframes.

Zooming into the time plan is possible using a mouse or the touch screen.

With the mouse, click and hold the left mouse button and drag a rectangle on the area to be zoomed. Double-click the time plan to zoom out.

With the touch screen, tap and drag a rectangle on the area to be zoomed. Double-tap the time plan to zoom out.

In the time plan the DMRS symbols are shown (shaded with the color of the associated allocation type).

Access:

- In the "General" dialog, select "Time Plan".

Allocations are calculated as configured in the "Scheduling" dialog and depend on the "Link Direction" and configured BWPs.

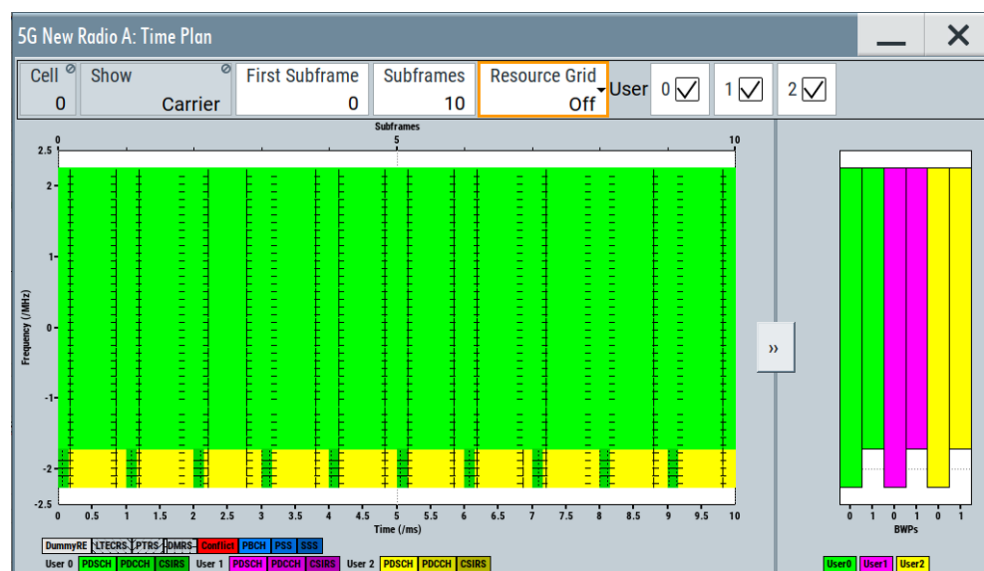


Figure 8-1: Time Plan: understanding the displayed information

- 1 = User 0, BWP 1
- 2 = User 2, BWP 1
- 3 = User 0, BWP 1

- 4 = User 0 , BWP 2
- 3 = User 1 , BWP 1
- 3 = User 1 , BWP 2
- 3 = User 2 , BWP 1
- 3 = User 2 , BWP 2
- a = "No. RBs"
- b = "RB Offset in TxBW" - illustrated as principle (because the time plan shows the entire channel bandwidth and the different Tx BWs use different SCSs, the RB offset in TxBw is not given as an offset relative to the lower edge of the channel bandwidth)

Settings:

Cell.....	235
Show.....	235
First Subframe.....	235
Subframe.....	235
Ressource Grid.....	235
User.....	236

Cell

Selects/indicates to which carrier/cell the settings apply.

Remote command:

via suffix at `CELL<ch>`

Show

Defines which portion of the carrier bandwidth is displayed:

"Carrier" Displayed is the entire carrier bandwidth.

Remote command:

n.a.

First Subframe

Selects the first subframe to be displayed.

Remote command:

n.a.

Subframe

Selects the number of subframes to be displayed.

Change the value to zoom in and out in the time plan. A maximum of 20 subframes can be displayed, where more than 10 subframes are allowed if the "Output > Sequence Length ≥ 2".

Remote command:

n.a.

Ressource Grid

Displays a grid in the time plan. The size of the grid can be changed between coarse and fine.

Remote command:

n.a.

User

Enable a User to display its allocations on the time plan.

Remote command:

n.a.

9 Performing BS Tests According to TS 38.141 Specifications

The "Test Case Wizard" supports tests on base stations according to the 3GPP [TS 38.141](#) specifications.

The [TS 38.141](#) specifications are divided in two parts depending on the required test methodology:

- [TS 38.141-1](#): Part 1: Conducted conformance testing
- [TS 38.141-2](#): Part 2: Radiated conformance testing

The "Test Case Wizard" offers a selection of predefined settings according to test cases in 3GPP [TS 38.141-1](#) and [TS 38.141-2](#). For an overview of the test cases covered by the test case wizard, refer to [Chapter 9.3, "Supported Test Cases"](#), on page 239.

With the "Test Case Wizard", it is possible to create highly complex test scenarios with just a few keystrokes.

The "Test Case Wizard" has effect on frequency and level settings, link direction, filter, trigger, baseband clock source, marker settings and base station configuration.

The "Test Case Wizard" also affects:

- AWGN
- Co-located modulation signals
- CW interferers



The "Test Case Wizard" presets the instrument for tests according to 3GPP [TS 38.141-1](#) and [TS 38.141-2](#) specifications. If it is required, you can change the predefined settings by varying the corresponding parameter in the 5G NR dialogs.

9.1 Introduction to BS Conformance Testing

The main purpose of the conformance testing is to ensure that the base station (BS) is fulfilling a defined level of minimum performance.

3GPP defines several requirements for the 5G new radio BS:

- **TS 38.104**: NR; Base Station (BS) radio transmission and reception
- **TS 38.113**: NR; Base Station (BS) ElectroMagnetic Compatibility (EMC)
- **TS 38.141**: NR; Base Station (BS) conformance testing
- **TS 38.817-02**: General aspects for Base Station (BS) Radio Frequency (RF) for NR

BS RF conformance test specifications

- The BS RF conformance tests are based on the core specification [TS 38.104](#) and are defined in the [TS 38.141](#) specifications.
- [TS 38.141-1](#): NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing
- [TS 38.141-2](#): NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing

A BS type 1-C only has conducted requirements so it requires compliance to [TS 38.141-1](#) only.

A BS type 1-H has both conducted and radiated requirements so it requires compliance to the applicable requirements of [TS 38.141-1](#) and [TS 38.141-2](#).

BS type 1-O and BS type 2-O have only radiated requirements so they require compliance to [TS 38.141-2](#) only.

The supported BS RF conformance tests [TS 38.141-1](#) and [TS 38.141-2](#) are described in [Chapter 9.3, "Supported Test Cases"](#), on page 239.

9.2 Required Options

The basic equipment layout for performing test with the aid of "Test Case Wizard" is the same as for the 5G NR signal generation. It includes the options:

- Standard or wideband baseband generator (R&S SMW-B10 or /-B9)
- Baseband main module (R&S SMW-B13 or /-B13T) or wideband baseband main module (R&S SMW-B13XT)
- Digital standard 5G new radio (NR) (R&S SMW-K144)
- Frequency option (e.g. R&S SMW-B1003)

Some of the tests require further options. You find a list of the required option at the beginning of each section that describes a group of test cases.

The following equipment and options are required to support **all test cases**:

- 2x option baseband generator (R&S SMW-B10) or
2x option wideband baseband generator (R&S SMW-B9)
- 1x option baseband main module (R&S SMW-B13T) or
1x option wideband baseband main module (R&S SMW-B13XT)
- 4x option fading simulator (R&S SMW-B15)
- 1x option frequency (e.g. R&S SMW-B1003)
- 1x option frequency (e.g. R&S SMW-B2003)
- 2x option additive white Gaussian noise (AWGN) (R&S SMW-K62)
- 2x option digital standard 5G NR (R&S SMW-K144)
- 2x option closed loop feedback 5G NR (R&S SMW-K145)
- 1x option 5G NR Release 16 (R&S SMW-K148)



Test cases where the signal generator hardware and/or software equipment is not sufficient are grayed out and not selectable.

RF power and frequency limitations of the hardware equipment restrict the setting ranges.

9.3 Supported Test Cases

The BS RF conformance tests defined in the [TS 38.141-1](#) and [TS 38.141-2](#) specifications are divided into the following three main groups:

- [Transmitter characteristics tests](#)
- [Receiver characteristics tests](#)
- [Performance requirements tests](#)

The "Test Case Wizard" supports the test cases listed in the tables below.



Only the test cases that require a signal generator are implemented in the "Test Case Wizard".

Table 9-1: Transmitter characteristics tests

Chapter	Test case	Section in this document with further information
Conducted tests. Specification TS 38.141-1		
6.7	Reference sensitivity level	chap. 9.7.4, on page 269
Radiated tests. Specification TS 38.141-2		
6.8	OTA transmitter intermodulation	chap. 9.10.4, on page 338

Table 9-2: Receiver characteristics tests

Chapter	Test case	Section in this document with further information
Conducted tests. Specification TS 38.141-1		
7.2	Reference sensitivity level	chap. 9.8.4, on page 273
7.3	Dynamic range	chap. 9.8.5, on page 275
7.4.1	Adjacent channel selectivity (ACS)	chap. 9.8.6, on page 278
7.4.2A	In-band general blocking	chap. 9.8.7, on page 279
7.4.2B	In-band narrow-band blocking	chap. 9.8.8, on page 282
7.5	Out-of-band blocking	chap. 9.8.9, on page 283
7.7	Receiver intermodulation	chap. 9.8.10, on page 285
7.8	In-channel selectivity	chap. 9.8.11, on page 289
Radiated tests. Specification TS 38.141-2		

Chapter	Test case	Section in this document with further information
7.2	OTA sensitivity	chap. 9.11.4, on page 346
7.3	OTA reference sensitivity level	chap. 9.11.5, on page 347
7.4	OTA dynamic range	chap. 9.11.6, on page 350
7.5.1	OTA adjacent channel selectivity (ACS)	chap. 9.11.7, on page 351
7.5.2A	OTA in-band general blocking	chap. 9.11.8, on page 353
7.5.2B	OTA in-band narrowband blocking	chap. 9.11.9, on page 356
7.6	OTA out-of-band blocking	chap. 9.11.10, on page 358
7.8	OTA receiver intermodulation	chap. 9.11.11, on page 360
7.9	OTA in-channel selectivity	chap. 9.11.12, on page 363

Table 9-3: Performance requirements tests

Chapter	Test case	Section in this document with further information
Conducted tests. Specification TS 38.141-1		
8.2.1	PUSCH transform precoding disabled	chap. 9.9.4, on page 296
8.2.2	PUSCH transform precoding enabled	chap. 9.9.5, on page 309
8.2.3	UCI multiplexed on PUSCH	chap. 9.9.6, on page 311
8.3.1	Performance requirements for PUCCH format 0	chap. 9.9.7, on page 314
8.3.2.1	NACK to ACK detection for PUCCH format 1	chap. 9.9.8, on page 316
8.3.2.2	ACK missed detection for PUCCH format 1	chap. 9.9.9, on page 319
8.3.3.1	ACK missed detection for PUCCH format 2	chap. 9.9.10, on page 321
8.3.3.2	UCI BLER for PUCCH format 2	chap. 9.9.11, on page 323
8.3.4	Performance requirements for PUCCH format 3	chap. 9.9.12, on page 324
8.3.5	Performance requirements for PUCCH format 4	chap. 9.9.13, on page 327
8.3.6.1A	NACK to ACK detection for multi-slot PUCCH format 1	chap. 9.9.14, on page 330
8.3.6.1B	ACK missed detection for multi-slot PUCCH format 1	chap. 9.9.15, on page 331
8.4.1	PRACH false alarm probability and missed detection	chap. 9.9.16, on page 333
Radiated tests. Specification TS 38.141-2		
8.2.1	OTA PUSCH with transform precoding disabled	chap. 9.12.4, on page 369
8.2.2	OTA PUSCH with transform precoding enabled	chap. 9.12.5, on page 370
8.2.3	OTA UCI multiplexed on PUSCH	chap. 9.12.6, on page 372
8.3.1	OTA performance requirements for PUCCH format 0	chap. 9.12.7, on page 373

Chapter	Test case	Section in this document with further information
8.3.2.1	OTA NACK to ACK detection for PUCCH format 1	chap. 9.12.8, on page 375
8.3.2.2	OTA ACK missed detection for PUCCH format 1	chap. 9.12.9, on page 376
8.3.3.1	OTA ACK missed detection for PUCCH format 2	chap. 9.12.10, on page 378
8.3.3.2	OTA UCI BLER for PUCCH format 2	chap. 9.12.11, on page 379
8.3.4	OTA performance requirements for PUCCH format 3	chap. 9.12.12, on page 381
8.3.5	OTA performance requirements for PUCCH format 4	chap. 9.12.13, on page 382
8.3.6.1A	OTA NACK to ACK detection for multi-slot PUCCH format 1	chap. 9.12.14, on page 384
8.3.6.1B	OTA ACK missed detection for multi-slot PUCCH format 1	chap. 9.12.15, on page 385
8.4.1	OTA PRACH false alarm probability and missed detection	chap. 9.12.16, on page 387

9.3.1 Generic Structure of the Description of the Implemented Test Cases

The description of the test cases in this document follows a common structure.

- Test case number and test case name
- Short description and test purpose
Some of the definitions are directly taken from the 3GPP test specification.
- Prerequisites and required hardware and software options
- Test setup
- Description of test case-specific parameters

9.4 Exemplary Test Setups

The tests can be performed using the standard test setup according to [TS 38.141-1](#) and [TS 38.141-2](#). Test setups beside the standard test setups described below are specified at the individual description of the corresponding test case.

9.4.1 Exemplary Test Setups for Conducted Tests (TS 38.141-1)

9.4.1.1 Exemplary Test Setup - One Path

For two-path instruments, signal routing to path A is assumed for the graph below. RF port A outputs the wanted signal (with or without interference) and is connected to the Rx port of the base station. The signal generator starts signal generation at the first received **gNB** frame trigger.

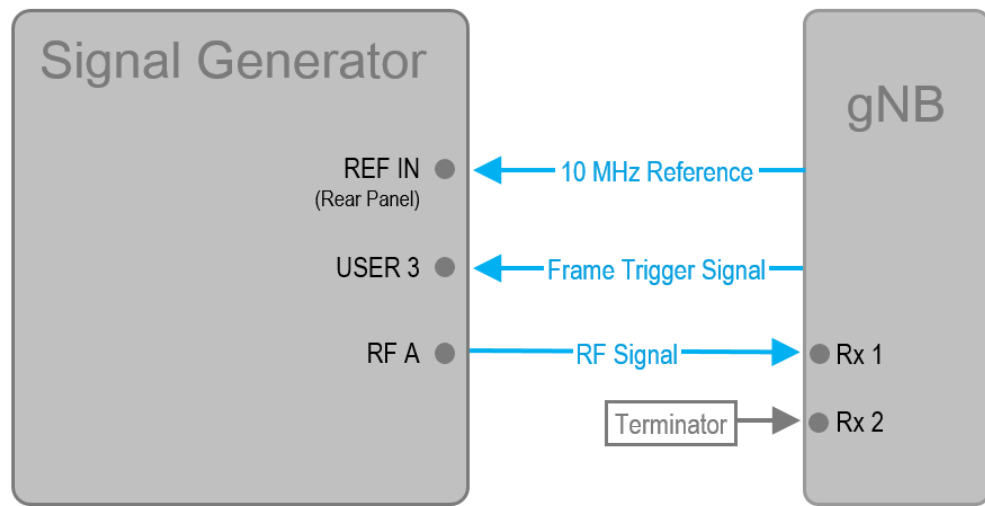


Figure 9-1: One path test setup (example of R&S SMW simulating the test case 7.3 "Dynamic range")

For two-path instruments, it is also possible to route baseband signal A to RF output B and connect RF output B to the Rx port of the base station.

9.4.1.2 Exemplary Test Setup - Two Paths

Two-paths measurements require option for second RF path (e.g. R&S SMW-B2003), an option baseband main module (R&S SMW-B13T or /-B13XT) and at least one option for the interfering signal in addition. The signal routing is fixed.

The signal generator outputs the reference measurement channel signal, i.e. the wanted signal at output RF A and the interfering signal at output RF B. After combining the two (three) signals, the sum signal is fed into the base station Rx port. The signal generator starts signal generation at the first received **gNB** frame trigger.

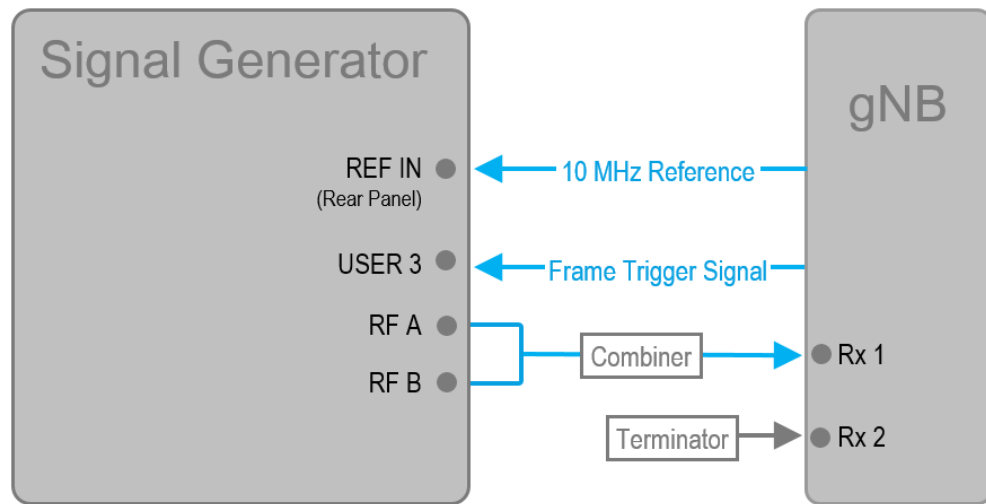


Figure 9-2: Two paths test setup (example of R&S SMW simulating test case 7.7 "Receiver intermodulation")

9.4.2 Exemplary Test Setups for Radiated (OTA) Tests (TS 38.141-2)

9.4.2.1 Exemplary Test Setup - One Path

For two-path instruments, signal routing to path A is assumed for the graph below. RF port A outputs the wanted signal (with or without interference) and is connected to the test antenna port of the OTA chamber. The signal generator starts signal generation at the first received gNB frame trigger.

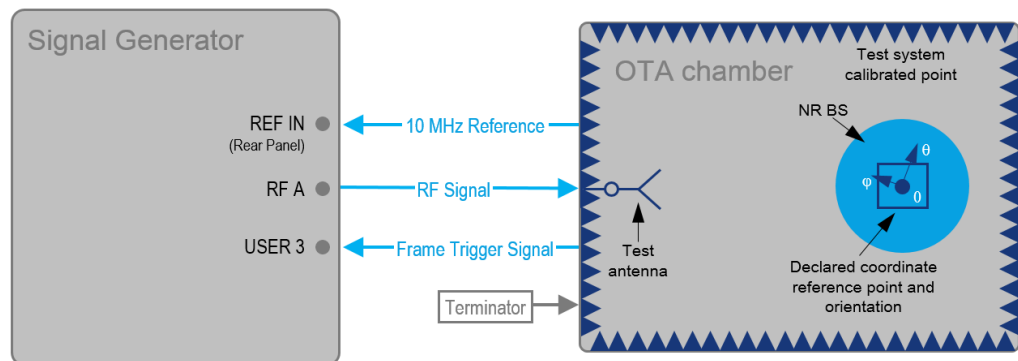


Figure 9-3: One path test setup (example of R&S SMW simulating the test case 7.4 "OTA dynamic range")

For two-path instruments, it is also possible to route baseband signal A to RF output B and connect RF output B to the test antenna port of the OTA chamber.

9.4.2.2 Exemplary Test Setup - Two Paths

Two-paths measurements require option for second RF path (e.g. R&S SMW-B2003), an option baseband main module (R&S SMW-B13T or /-B13XT) and at least one option for the interfering signal in addition. The signal routing is fixed.

The signal generator outputs the reference measurement channel signal, i.e. the wanted signal at output RF A and the interfering signal at output RF B. After combining the two (three) signals, the sum signal is fed into the test antenna port of the OTA chamber. The signal generator starts signal generation at the first received gNB frame trigger.

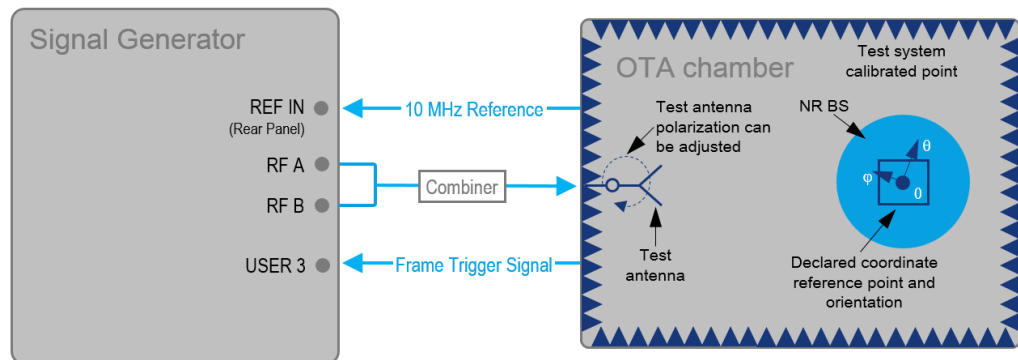


Figure 9-4: Two paths test setup (example of R&S SMW simulating test case 7.8 "OTA receiver intermodulation")

9.5 General Considerations

This section lists some common topics for all BS RF conformance tests. Considerations specific to one conformance test part, are described at the corresponding section.

Test frequencies

5G NR is designed to operate in the operating bands defined in TS 38.104, tables 5.2-1 and 5.2-2.

The measurements have to be performed using appropriate frequencies in the bottom, middle and top of the operating frequency band of the base station (BS). These frequencies are denoted as RF channels bottom, middle and top (B, M and T).

Reference frequency

When building up the measurement setups according to TS 38.141-1 and TS 38.141-2, it can be useful that all the instruments share a common reference frequency. Fed in the external reference frequency at the REF IN connector and enable "RF > Reference Frequency > Source = External".

Reference Frequency	Reference Output	Adjustment	LO Coupling
Source			
Deactivate RF Output (if external reference is missing)	☐		
External Reference Frequency			
Synchronization Bandwidth			

In the external reference mode, an external signal with selectable frequency and defined level must be input at the REF IN connector. This signal is output at the REF OUT connector. The reference frequency setting is effective for both paths. For achieving good reference sources of high spectral purity, a wideband setting is provided.

Baseband clock

The clock source is automatically switched to internal when the test case settings are activated.

Resource block offset

In this implementation, the RBs are allocated by default at the left edge of the spectrum. However, some test cases do not require allocation of the entire bandwidth or RB allocation at a specific part of the bandwidth. Adjust the additional parameter "RB Offset" to define the position of the RBs.



Use also the [Observing Current Allocations on the Time Plan](#) to visualize the RB allocation for the wanted signal (path A) and the interfering signal (path B).

9.5.1 General Considerations for Radiated (OTA) Tests

Base stations and reference points

In [TS 38.141-2](#) and [TS 38.104](#) two different base station types are defined for frequency range one (FR1) and two (FR2). Radiated requirements are also referred to as OTA requirements.

BS type 1-O and 2-O (FR1, FR2, radiated)

For base station types 1-O and 2-O the radiated characteristics are defined over-the-air (OTA) where the OTA interface is referred to as radiated interface boundary (RIB). Co-location requirements are specified at the conducted interface of the co-location reference antenna.

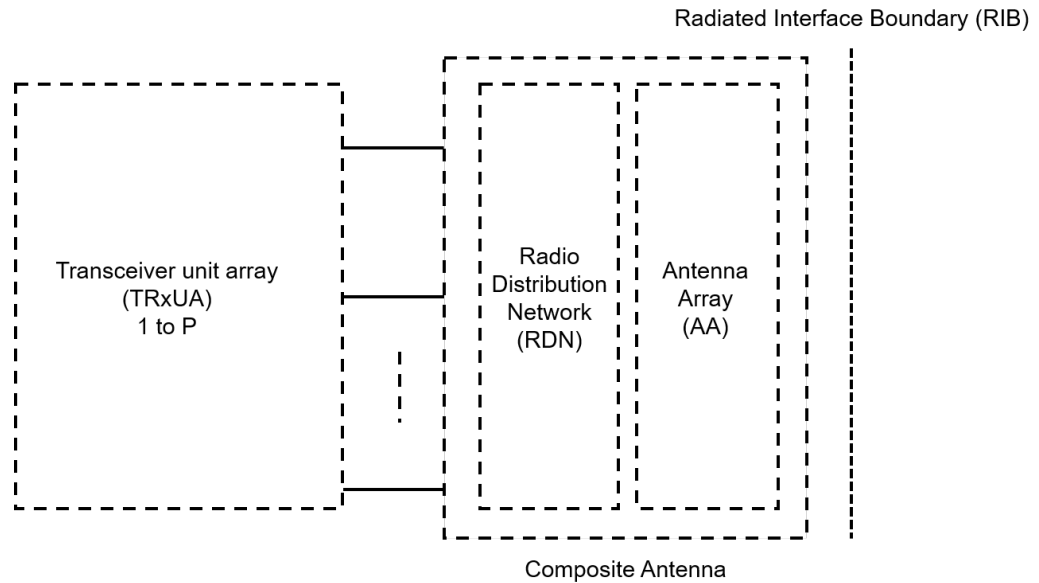


Figure 9-5: Radiated reference points for BS type 1-O and BS type 2-O as defined in TS 38.141-2

BS type 1-H (hybrid, radiated)

This base station type has two reference points fulfilling both radiated and conducted requirements.

Radiated characteristics are defined OTA and to be measured at the radiated interface boundary (RIB). The specific requirements and test cases are defined in TS 38.141-2.

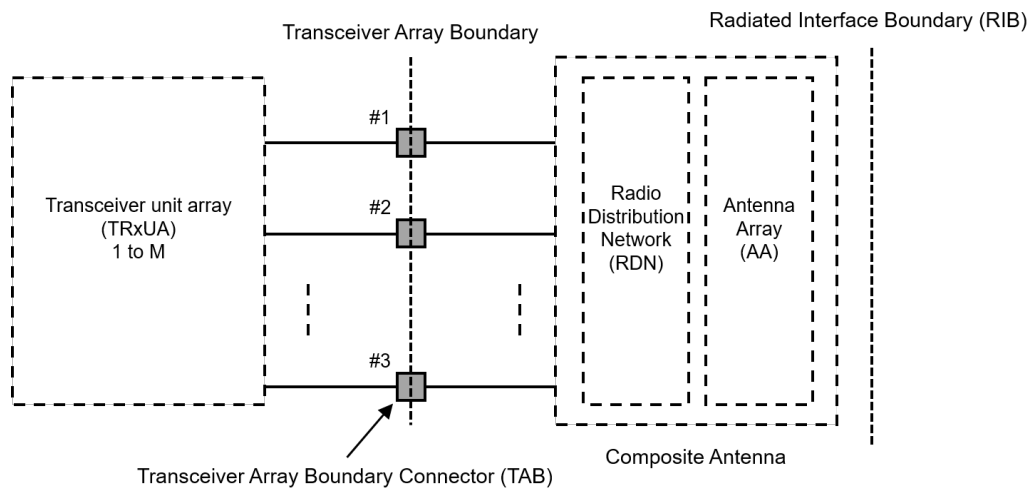


Figure 9-6: Radiated and conducted reference points for BS type 1-H as defined in TS 38.141-2

Base station classes

The specification TS 38.104 distinguishes base station classes by BS type 1-O and 2-O (Table 9-4) and BS type 1-H (Table 9-5).

Table 9-4: Base station classes for BS types 1-O and 2-O

BS type	BS class	Cell size	Minimum distance along the ground (m)
Type 1-O and type 2-O	Wide area	Macro cell	35
	Medium area	Micro cell	5
	Local area	Pico cell	2

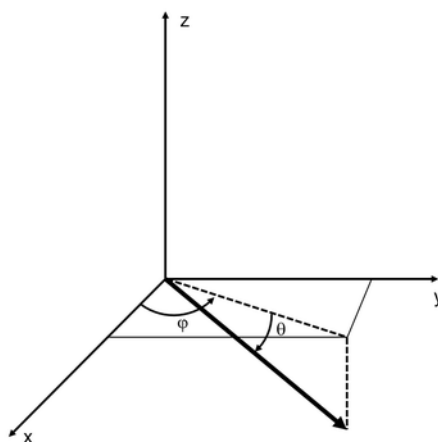
Table 9-5: Base station classes for BS type 1-H

BS type	BS class	Cell size	Minimum coupling loss (dB)
Type 1-H	Wide area	Macro cell	70
	Medium area	Micro cell	53
	Local area	Pico cell	45

Reference coordinate system

For radiated test setups a reference coordinate system is required. The reference coordinate system should be associated to an identifiable physical feature on the base station enclosure.

The reference coordinate system is created of a Cartesian coordinate system with rectangular axis x,y,z and spherical angles θ , φ as shown in [Figure 9-7](#).

**Figure 9-7: Reference coordinate system**

9.6 User Interface

Access:

- Select "Baseband Block > 5G NR > General > Test Case Wizard".

The "Test Case Wizard" graphically shows the actual test case configuration in a diagram in the upper part of the dialog.

The corresponding settings are displayed in tabs in the lower part of the dialog.

The number of displayed tabs depends on the selected test case. Use the fields in the different tabs to modify the default setting values as needed.

The "Test Case Wizard" dialog contains the tabs:

•	General Settings.....	248
•	Test Case Settings.....	249
•	OTA Declaration.....	250
•	Instrument Settings.....	252
•	Antenna Settings.....	253
•	Wanted Signal Settings.....	254
•	Frequency Allocation Settings.....	259
•	Interfering Signal Settings.....	260
•	Feedback Settings.....	264
•	AWGN Settings	265

9.6.1 General Settings

- Access:
- Select "Baseband Block > 5G NR > General > Test Case Wizard".

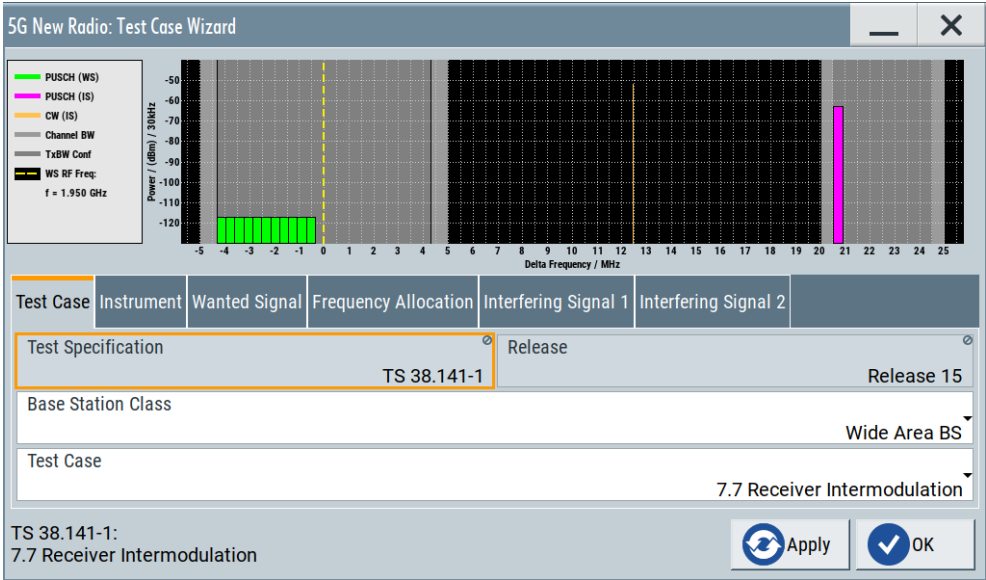


Diagram.....	248
Apply,OK.....	249

Diagram

In the upper part, the dialog displays a graph with the interference scenario defined by power level and frequency offset of the currently selected test case.

Apply,OK

Activates the current settings of the test case wizard.

The "Apply" triggers a selective preset of the signal generator before the presetting according to the selected test case. Further modification of the generator settings is still possible. Signal generation starts with the first trigger event.

Use "Ok" to apply the settings and close the dialog.

Note: The settings of the selected test case become active only after selecting "Apply" or "OK" button.

Before triggering the signal generator, you can still change these other settings. This configuration is particularly useful when compensating for cable loss or adjusting the RF power level offset of also inserted attenuators.

Signal generation is started at the first trigger received by the generator. The RF output is not activated /deactivated by the test case wizard. Activate the "RF > State > On" at the beginning of the measurement.

Note: The settings in the dialogs "5G NR > Trigger/Marker/Clock" and in the "Global/ Local Connector Settings" are not affected by the selective preset, if the parameter "Trigger/Marker Configuration" is set to "Unchanged".

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:APPLY on page 642

9.6.2 Test Case Settings

Access:

- 1. Select "Baseband Block > 5G NR > General > Test Case Wizard".
- 2. Select "Test Case".

Test Case	Instrument	Wanted Signal	Frequency Allocation	Interfering Signal 1	Interfering Signal 2	
Test Specification			Release			
TS 38.141-1			Release 15			
Base Station Class			Wide Area BS			
Test Case			7.7 Receiver Intermodulation			

This dialog comprises the settings for selecting the test case, the 3GPP test specification, release, and BS class.

Test Specification.....	249
Release.....	250
Base Station Class.....	250
Test Case.....	250

Test Specification

Displays the 3GPP test specification used as a guide line for the test cases.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:SPEC on page 651

Release

Displays the 3GPP test specification release version used as a guide line for the test cases.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RELease on page 651

Base Station Class

Determines whether the test is to be performed for an NR local area, NR medium area or an NR wide area base station. The different base station classes are specified for different output power (see also "Power Level" on page 257).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:BSCLass on page 644

Test Case

Selects the test case.

See [Chapter 9.3, "Supported Test Cases"](#), on page 239 for an overview of the available test cases.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:TC on page 653

9.6.3 OTA Declaration

Access:

1. Select "Baseband Block > 5G NR > General > Test Case Wizard".
2. Select "OTA Declaration".

Test Case	OTA Declaration	Instrument	Antenna	Wanted Signal	Feedback	AWGN
Base Station Type		Declared Direction				
1-0		OTA REFSENS Reference Direction				
Minimum EIS		EIS 50M				
-101.0 dBm		-101.0 dBm				
BeW(θ REFSENS)		BeW(φ REFSENS)				
300.0 deg		300.0 deg				

This dialog comprises the settings for the OTA sensitivity directions declaration (OSDD).

Base Station Type	251
Declared Direction	251
Minimum EIS	251
EIS 50M	251

BeW(θ REFSSENS).....	251
BeW(φ REFSSENS).....	252
Frequency Range.....	252

Base Station Type

Sets the base station type used for the OSDD.

"1-H"

Sets the BS type 1-H (FR1, hybrid) for the OTA settings.
This base station type has two reference points fulfilling both radiated and conducted requirements. Radiated characteristics are defined over-the air (OTA) and to be measured at the radiated interface boundary (RIB) as specified in [TS 38.141-2](#).

"1-O"

Sets the BS type 1-O (FR1) for the OTA settings.

"2-O"

Sets the BS type 2-O (FR2) for the OTA settings.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TCW:BSType](#) on page 644

Declared Direction

Sets the reference for the OSDD.

"OTA minSENS Reference Direction"

Sets the OTA minimum sensitivity (minSENS) value as the reference for the OSDD.

"OTA REFSSENS Reference Direction"

Sets the OTA reference sensitivity (REFSENS) value as the reference for the OSDD.

"Other Direction"

Sets a value different than the minSENS and REFSSENS as the reference for the OSDD.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TCW:DCLDirection](#) on page 644

Minimum EIS

Sets the lowest equivalent isotropic sensitivity value ($EIS_{minSENS}$) for the OSDD.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TCW:MEIS](#) on page 650

EIS 50M

Sets the $EIS_{REFSENS\_50M}$ level value applicable in the OTA REFSSENS RoAoA.

The $EIS_{REFSENS\_50M}$ value is the declared OTA reference sensitivity basis level for FR2 based on a reference measurement channel with 50MHz BS channel bandwidth.

Remote command:

[\[:SOURce<hw>\]:BB:NR5G:TCW:E50](#) on page 645

BeW(θ REFSSENS)

Sets the angle of the beamwidth for to the OTA REFSSENS RoAoA in the θ -axis ($BeW_{\theta,REFSENS}$), applicable for FR1 only.

Remote command:
[:SOURce<hw>] :BB:NR5G:TCW:BEWThet on page 644

BeW(φ REFSENS)
Sets the angle of the beamwidth for to the OTA REFSENS RoAoA in the φ -axis (BeW _{θ ,REFSENS}), applicable for FR1 only.
Remote command:
[:SOURce<hw>] :BB:NR5G:TCW:BEWPhi on page 643

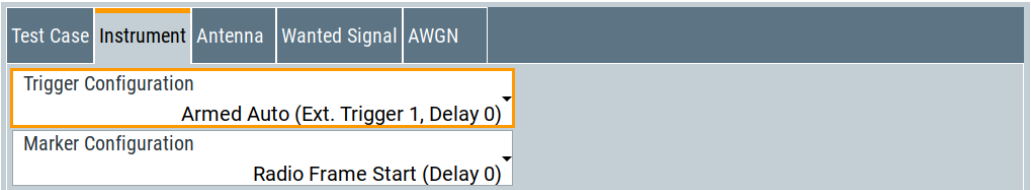
Frequency Range
Available if [Test Case](#) > "7.5.1 OTA Adjacent Channel Selectivity (ACS)" and [Base Station Type](#) > "2-O".
Sets the frequency range FR2 for the BS type 2-O.
Note: To reach the frequency range FR2, connect an external RF device to your instrument, e.g. an R&S SGS100A.
Remote command:
[:SOURce<hw>] :BB:NR5G:TCW:FR on page 645

9.6.4 Instrument Settings

Access:

1. Select "Baseband Block > 5G NR > General > Test Case Wizard".
2. Select "Instrument".

The "Instrument" dialog comprises instrument-related settings, like trigger and marker settings or routing related settings.



Trigger Configuration	252
Marker Configuration	253

Trigger Configuration
Selects the trigger configuration. The trigger is used to synchronize the signal generator to the other equipment.

"Armed Auto (Ext. Trigger 1, Delay 0)"

The trigger settings are customized for the selected test case. The following settings apply:

- "Trigger Mode > Armed Auto"
- "Trigger Source > External Global Trigger 1"
- "Trigger Delay = 0"

Thus, the base station frame timing is able to synchronize the signal generator by a periodic trigger.

"Unchanged"

The current trigger settings of the signal generator are retained unchanged.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:TRIGgerconfig` on page 656

Marker Configuration

Selects the marker configuration. The marker can be used to synchronize the measuring equipment to the signal generator.

"Radio Frame Start (Delay 0)"

The marker settings are customized for the selected test case. The following settings apply:

- "Marker Mode 1/2/3 > Radio Frame Start"
 - "Global Connector Settings > User 1/2 > Direction > Output" and "User 1/2 > Signal > Baseband A Marker 1/2"
 - "Local Connector Settings > T/M 2/3 > Direction > Output" and "T/M 2/3 > Signal > Marker A 1/2"
- Marker signals "Marker 1" and "Marker 2" are output at the local T/M 2/3 and global USER1/2 connectors
- "Marker Delay = 0"

"Unchanged"

The current marker settings of the signal generator are retained unchanged.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:MARKerconfig` on page 650

9.6.5 Antenna Settings

Access:

1. Select "Baseband Block > 5G NR > General > Test Case Wizard".
2. Select "Antenna".

The "Antenna" dialog comprises instrument-related settings, like Tx and Rx antenna-related settings.

Test Case	Instrument	Antenna	Wanted Signal	AWGN	
		Tx Antennas			Rx Antennas
		1			2

Tx Antennas.....	254
Rx Antennas.....	254

Tx Antennas

Shows or sets the number of Tx antennas used for test case.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:ANT:TXAntennas on page 643

Rx Antennas

Shows or sets the number of Rx antennas used for test case.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:ANT:RXAntennas on page 643

9.6.6 Wanted Signal Settings

The following settings are available for almost all transmitter and receiver characteristics and performance requirements tests. Specific parameters are listed together with the description of the corresponding test case.

Test Case	Instrument	Wanted Signal	Frequency Allocation	Interfering Signal	
		RF Frequency	1.950 000 000 GHz	Channel Bandwidth	10 MHz
		Sub Carrier Spacing	30 kHz NCP	Cell ID	0
		UE ID	0	DMRS TypeA Position	2
		FRC	G-FR1-A1-2	RB Offset	1
		Power Level	-97.4 dBm		

Additional DMRS.....	255
Cell ID.....	255
CSI Part.....	255
CSI 1 Pattern.....	255
CSI 2 Pattern.....	255
Channel Bandwidth.....	255
DMRS Type A Position.....	256
Duplexing.....	256
Fraction of Max. Throughput.....	256
FRC.....	256
Frequency Offset.....	256
Mapping Type.....	256
Mode.....	257

Number of OFDM Symbols.....	257
Preamble Format.....	257
Power Level.....	257
Propagation Conditions.....	257
PTRS.....	257
RB Offset.....	258
RF Frequency.....	258
Sub Carrier Spacing / Sub Carrier Spacing (BWP).....	258
Sub Carrier Spacing (PRACH).....	258
Test Setup.....	258
Timing Offset Base Value.....	258
UCI Bits.....	259
UE ID.....	259

Additional DMRS

Enables or disabled the additional DMRS.

Additional DMRS signals increase the probability that the UE receives the demodulation reference symbols. It leads to a support of lower SNR conditions.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:WS:ADMRs:STATe` on page 656

Cell ID

Sets the cell ID.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:WS:CELLid` on page 656

CSI Part

Defines the CSI part selected for the test case.

The PUCCH-based CSI and the PUSCH-based CSI reporting, always padding the CSI report to the worst-case UCI payload size would result in too large overhead. For these cases, the CSI content is instead divided into two CSI parts.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:WS:UCI:CSIPart` on page 663

CSI 1 Pattern

Defines the frequency and time domain of the CSI part 1 subcarrier location.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:WS:UCI:CSI1:PATtern` on page 662

CSI 2 Pattern

Defines the frequency and time domain of the CSI part 2 subcarrier location.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:WS:UCI:CSI2:PATtern` on page 663

Channel Bandwidth

Selects the channel bandwidth (see also [Chapter 3.2, "5G NR Numerology"](#), on page 18).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:CBW on page 656

DMRS Type A Position

Sets l_0 , i.e. the position of first DM-RS symbol for PUSCH (and PDSCH) mapping type A (dmrs-TypeA-Position).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:TAPos on page 662

Duplexing

The duplexing mechanism used can be switched between FDD and TDD.

TDD	Time division duplex is used. In TDD mode, both uplink and downlink use the same spectrum frequencies but at different times.
FDD	Frequency division duplex is used. In FDD mode, both uplink and downlink can transmit at the same time at different spectrum frequencies.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:DUPLex on page 657

Fraction of Max. Throughput

The required throughput is expressed as a fraction of maximum throughput for the FRC. The performance requirements assume HARQ retransmissions.

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs at the given SNR.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:FMTHroughput? on page 657

FRC

Displays the fixed reference channel used. An overview of the FRCs and the cross-reference between the selected [Channel Bandwidth](#) and [Sub Carrier Spacing / Sub Carrier Spacing \(BWP\)](#) is given in the individual description of the test cases.

See also 3GPP TS 138 141-1, annex A (normative): Reference measurement channels.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:FRC:TYPE on page 657

Frequency Offset

Sets the frequency offset used for the PRACH.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:FROffset on page 658

Mapping Type

Sets the mapping type A or B for the PUSCH.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:MAPType on page 659

Mode

Switches between the detection rate (Pd) and the false detection rate (Pfa).

Detection rate Pd is defined as the probability of detection of preamble.
(Pd)

False detection Pfa is defined as the total probability of false detection of the preamble.
rate (Pfa) ble.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:MODE on page 659

Number of OFDM Symbols

Sets the number of used OFDM symbols.

The starting symbol index is 13 for 1 OFDM symbol and 12 for 2 OFDM symbols.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:SYMNumber on page 661

Preamble Format

Sets the designated PRACH preamble format.

The preamble is used to obtain the UL synchronization. In 5G NR, there are 64 preambles defined in each time-frequency PRACH occasion. The preamble consists of two parts cyclic prefix (CP) and preamble sequence.

In 5G NR, there are 13 types of preamble format supported known as format 0, format 1, format 2, format 3, format A1, format A2, format A3, format B1, format B2, format B3, format B4, format C0, format C1.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:PRACH:FORMat on page 659

Power Level

Displays the power level, depending on the selected test case.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:PLEVel on page 659

Propagation Conditions

The propagation conditions define the multipath fading environment.

They indicated as a combination of channel model name and maximum Doppler frequency, i.e. TDLA<DS>-<Doppler> where <DS> indicates the desired delay spread and <Doppler> indicates the maximum Doppler frequency.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:PROCondition on page 660

PTRS

Available for [Test Cases](#) "8.2.1 OTA PUSCH" and "8.2.3 OTA UCI multiplexed on PUSCH" with [Base Station Type](#) "2-O".

Enables PTRS (phase-tracking reference signal) for the wanted signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:PTRS:STATe on page 660

RB Offset

Sets the shift of the allocated wanted signal in No. of RBs (see also ["Resource block offset"](#) on page 245).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:RBOffset on page 660

RF Frequency

Sets the RF frequency of the wanted signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:RFFrequency on page 661

Sub Carrier Spacing / Sub Carrier Spacing (BWP)

Sets the subcarrier spacing using normal cyclic prefix (NCP) or extended cyclic prefix (ECP). See also [Chapter 3.2, "5G NR Numerology"](#), on page 18.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:SCSPacing on page 661

Sub Carrier Spacing (PRACH)

Sets the subcarrier spacing for PRACH.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:PRACH:SCSPacing on page 660

Test Setup

With the test setup selector, the signal definitions can be switched.

Parameter	Test Setup 1	Test Setup 2
Modulation	QPSK	
First PRB prior to frequency hopping	0	
Intra-slot frequency hopping	enabled	
First PRB after frequency hopping	The largest PRB index (number of PRBs -1)	
Group and sequence hopping	neither	
Hopping ID	0	
Number of PRBs	1	3
Number of symbols	14	4
Number of UCI information bits	16	
First symbol	0	

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:TSETup on page 662

Timing Offset Base Value

Displays the timing offset base value.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:TIOBase? on page 662

UCI Bits

Set the number of UCI bits used.

Defines the size of the uplink control information bits carried in the PUCCH channel. They consist of the HARQ feedback, CSI and SR.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:UCI:BITS on page 662

UE ID

Sets the UE ID.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:WS:UEID on page 663

9.6.7 Frequency Allocation Settings

Determines the frequency position of the wanted and the interfering signal.

Test Case	Instrument	Wanted Signal	Frequency Allocation	Interfering Signal	
				Interfering Signal	At Higher Frequencies

Frequency Allocation of the Interfering signal

Determines the frequency position of the wanted and the interfering signal.

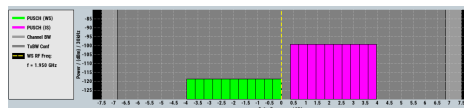
Example: Wanted and interfering signal within the same channel

"Test Case" = "7.8 In-channel selectivity"

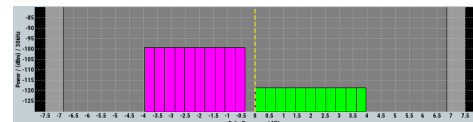
"Channel Bandwidth" = 15 MHz

The parameter "Frequency Allocation" determines the position of the allocated RBs within the channel. Allocation in the lower or higher frequencies is possible.

"Frequency Allocation of the Interfering signal"
= At higher resource blocks



"Frequency Allocation of the Interfering signal"
= At lower resource blocks



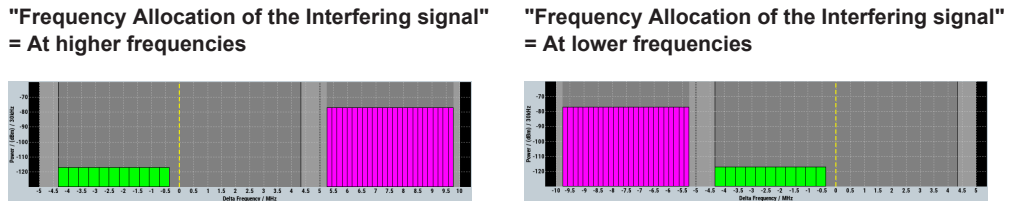
Example: Interfering signal in the adjacent channel

"Test Case" = "7.4.1 Adjacent channel selectivity"

"Channel Bandwidth (WS)" = 10 MHz

"Channel Bandwidth (IS)" = 5 MHz

The parameter "Frequency Allocation" determines the position of the wanted signal compared to the interfering signal. Allocation in the lower or higher frequencies is possible, i.e. the position of the allocated bandwidth of the wanted and the interfering signal can be mirrored.



Remote command:
[:SOURce<hw>]:BB:NR5G:TCW:FA:FRAllocation on page 646

9.6.8 Interfering Signal Settings

Almost all receiver tests require an interfering signal (IS).

Test Case	Instrument	Wanted Signal	Frequency Allocation	Interfering Signal	
RF Frequency		1.957 507 500 GHz		Channel Bandwidth	5 MHz
Sub Carrier Spacing		15 kHz NCP		Cell ID	0
UE ID		0		Number of Resource Blocks	1
RB Offset		0		Power Level	-49.0 dBm
Frequency Shift m		0		Interfering RB Center Frequency	1.955 355 000 GHz

Figure 9-8: Interfering signal for in-band narrowband blocking (7.4.2B)

Band.....	261
n.....	261
Duplexing.....	261
Test Model.....	261
Interferer Type.....	261
Test Requirement	262
RF Frequency.....	262
Channel Bandwidth.....	263
Sub Carrier Spacing.....	263
Cell ID.....	263
UE ID.....	263

Number of Resource Blocks.....	263
RB Offset.....	263
Power Level.....	264
Frequency Shift m.....	264
Interfering RB Center Frequency.....	264
Distance.....	264

Band

Set the frequency band (n1 to n86) for the interfering signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:BAND on page 646

n

Set the offset factor for the interfering signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:OFN on page 648

Duplexing

The duplexing mechanism used for the interfering signal can be switched between FDD and TDD.

TDD	Time division duplex is used. In TDD mode, both uplink and downlink use the same spectrum frequencies but at different times.
FDD	Frequency division duplex is used. In FDD mode, both uplink and downlink can transmit at the same time at different spectrum frequencies.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:DUPLex on page 647

Test Model

Shows the test model set for the test case. The NR-TMs for FR1 are defined in TS 38.141-1 section 4.9.2.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:TModel? on page 649

Interferer Type

Selects the type of the interfering signal:

- For **out-of-band blocking** tests, the interfering signal is always a CW signal.
- For **receiver intermodulation** tests, the first interfering signal can be an 5G NR signal or narrow-band 5G NR signal.
- The second interfering signal is always a CW signal.

Refer to [Chapter 9.8.9, "Test Case 7.5: Out-of-Band Blocking"](#), on page 283.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:IFTYpe on page 647

[:SOURce<hw>] :BB:NR5G:TCW:IS2:IFTYpe on page 647

Test Requirement

For CW interfering signal, selects whether the standard out-of-band blocking test is performed or the optional test, when the BS is co-located with another BS in a different operating band.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:IS:TREquire` on page 650

RF Frequency

Display the center frequency of the interfering signal.

The center frequency is calculated as follows:

- For "Frequency Allocation > Interfering Signal > At Higher Frequencies"
"RF Frequency_{interfering signal}" = "RF Frequency_{wanted signal}" + Delta
- For "Frequency Allocation > Interfering Signal > At Lower Frequencies"
"RF Frequency_{interfering signal}" = "RF Frequency_{wanted signal}" - Delta

Where for both cases Delta is calculated as follows:

$$\text{Delta} = \text{"Channel Bandwidth}_{\text{wanted signal}}"/2 + \text{Offset}_{\text{interfering signal}}$$

Example:

"Channel Bandwidth_{wanted signal}" = 5 MHz

"RF Frequency_{wanted signal}" = 1 950 MHz

Offset_{interfering signal} = 2.5025 MHz.

(see [Table 9-12](#)).

Delta = 5/2 + 2.5025 = 5.0025 MHz

For "Frequency Allocation > Interfering Signal > At Higher Frequencies": "RF Frequency_{interfering signal}" = 1 950 + 5.0025 = 1 955.0025 MHz

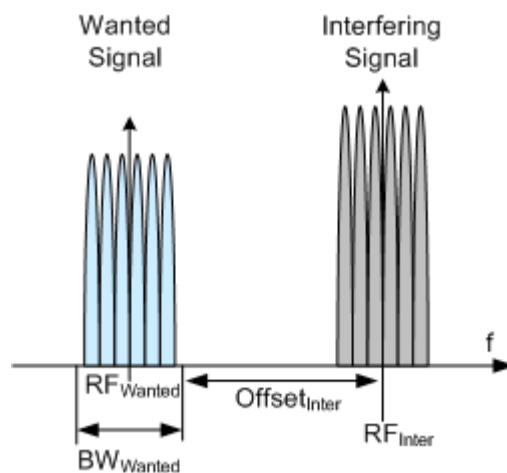


Figure 9-9: Example: adjacent channel selectivity (ACS)

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:TCW:IS:RFFrequency` on page 649

`[ :SOURce<hw> ] :BB:NR5G:TCW:IS2:RFFrequency?` on page 649

Channel Bandwidth

Displays the channel bandwidth of the interfering signal. The bandwidth of the interfering signal is specified by 3GPP for a particular test case. Refer to [Chapter 9.8, "Conducted Receiver Characteristics \(TS 38.141-1, Chapter 7\)"](#), on page 270.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:CHBW? on page 646

Sub Carrier Spacing

Sets the subcarrier spacing for the interfering signal using normal cyclic prefix (NCP) or extended cyclic prefix (ECP). See also [Chapter 3.2, "5G NR Numerology"](#), on page 18.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:SCSPacing? on page 649

Cell ID

Sets the cell ID for the interfering signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:CLID on page 646

UE ID

Sets the UE ID for the interfering signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:UEID on page 650

Number of Resource Blocks

The number of RBs used by the 5G NR interfering signal is set automatically:

- For **ACS and in-channel selectivity measurements**, the number of RBs depends on the selected channel bandwidth for the wanted signal. The bandwidth of the interfering signal is specified by 3GPP for a particular test case. Refer to [Chapter 9.8, "Conducted Receiver Characteristics \(TS 38.141-1, Chapter 7\)"](#), on page 270.
- For **narrow-band blocking** tests, the interfering signal is a single resource block 5G NR signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:NRBLock? on page 648

RB Offset

(Test cases 7.4.x, 7.7 and 7.8 only)

The position of the RBs allocated by the 5G NR interfering signal is determined automatically, depending on the selected "Channel Bandwidth" and the RBs allocation of the wanted signal.

- For **ACS testing, in-band blocking testing** and **receiver intermodulation testing**, the "RB Offset" is fixed to 0.
- For **in-channel selectivity testing**, the "RB Offset" is set in the way, that depending on the "Frequency Allocation" of the interfering signal. This parameter is used to allocate the wanted and the interfering signal around the center frequency (see also [Figure 9-13](#)).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:RBOffset on page 649

Power Level

The power level of the interfering 5G NR signal is set automatically depending on the selected channel bandwidth.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:PLEVel? on page 648

[:SOURce<hw>] :BB:NR5G:TCW:IS2:PLEVel? on page 648

Frequency Shift m

By default, the narrow-band interfering signal is allocated at the most left (interfering signal at higher frequencies)/ most right (interfering signal at lower frequencies) sub-carrier in the allocated channel bandwidth. However, the position of the interfering signal can be set by the parameter "Frequency Shift m", i.e. the allocated RB can be offset to a different center frequency (see [Figure 9-11](#)).

The parameter displays the center frequency of the resource block the interfering signal is allocated on. See also [Table 9-14](#).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:FRShift on page 647

Interfering RB Center Frequency

Displays the center frequency of the single resource block interfering signal (see also [Figure 9-11](#)).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:RBCFrequency? on page 648

Distance

Sets the distance between the test object and test antenna injecting the interferer signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:IS:DISTance on page 645

9.6.9 Feedback Settings

Access:

1. Select "Baseband Block > 5G NR > General > Test Case Wizard".
2. Select "Feedback".

The "Feedback" dialog comprises settings for the closed loop feedback.

Test Case	Instrument	Antenna	Wanted Signal	Feedback	AWGN
Realtime Feedback Mode				Serial	Serial Rate 1.92 Mbps
Additional User Delay -2.00 Slots				Connector Local	
Baseband Selector 0					

Realtime Feedback Mode	265
Serial Rate	265
Additional User Delay	265
Connector	265
Baseband Selector	265

Realtime Feedback Mode

Defines the serial line mode used for the real-time feedback.

Serial Sets the serial line to 16 bits width.

Serial 3x8 Sets the serial line to an array with 3 times 8 bits width (24 bits).

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RTF:MODE on page 652

Serial Rate

Sets the data rate of serial connection used.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RTF:SERRate on page 652

Additional User Delay

Defines the delay added to the real-time feedback.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RTF:AUSDelay on page 651

Connector

Sets the connector used for the real-time feedback.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RTF:CONNector on page 652

Baseband Selector

Defines which baseband selector index is used in the serial messages to address the baseband.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:RTF:BBSelector on page 651

9.6.10 AWGN Settings

Comprises the settings of the interfering signal (only for test case 7.3 Dynamic Range).

Test Case	Instrument	Wanted Signal	AWGN
Power Level			-79.3 dBm (within 8.64 MHz BW)

Power Level

Displays the power level of the AWGN signal. The value is set automatically.

Remote command:

[:SOURce<hw>] :BB:NR5G:TCW:AWGN:PLEvel? on page 643

9.7 Conducted Transmitter Characteristics (TS 38.141-1, Chapter 6)

The wizard supports 3GPP tests [TS 38.141-1](#), chapter 6: Conducted transmitter characteristics.

The 3GPP TS 38.141-1 contains several test cases in chapter 6, but only one transmitter test needs a signal generator. Therefore only one test case is listed in this document.

The transmitter requirements are divided into the following main categories, intended to:

- Prove the transmitters ability to transmit the wanted signal:
 - Output power dynamics (6.3)
 - Transmit ON/OFF power (6.4)
- Prove how susceptible the transmitter is to different types of interfering signals:
 - Transmitter signal quality (6.5)
 - Unwanted emissions (6.6)
- Prove the transmitter intermodulation:
 - [Chapter 9.7.4, "Test Case 6.7: Transmitter Intermodulation"](#), on page 269

The tests cover a wide range of scenarios with different impairments on the wanted signal, that occur depending on the frequency offset between the wanted and the interfering signal.

9.7.1 Required Options

The table below lists the required options for performing the transmitter tests according to 3GPP [TS 38.141-1](#), chapter 6.

Table 9-6: Required options

Chapter in TS 38.141-1	Hardware options					Software options	
	RF path		Baseband		BB genera- tor	AWGN	5G NR
	A	B	1 path	2 paths			
	B100x	B200x	B13 B13XT	B13T B13XT	B10 B9	K62	K144
6.7 Transmitter Intermodulation					1		1

The following equipment and options are required, for **transmitter characteristics tests**:

- 1x option baseband generator (R&S SMW-B10 or /-B9)
- 1x option digital standard 5G NR (R&S SMW-K144)
- Spectrum analyzer like an R&S FSW or R&S FSVA3000.

9.7.2 Prior Considerations

BS type 1-C

General test conditions for conducted transmitter tests are given in TS 38.141-1. These test conditions include interpretation of measurement results and configurations for testing. Base station configurations are also given in TS 38.141-1.

If some single-band connectors or multi-band connectors have been declared equivalent, only a representative one is necessary to be tested to demonstrate conformance.

BS type 1-H

General test conditions for conducted transmitter tests are given in TS 38.141-1. Test conditions include interpretation of measurement results and configurations for testing. Base stations configurations are also given in TS 38.141-1.

If some single-band connectors or multi-band connectors have been declared equivalent, only a representative one is necessary to be tested to demonstrate conformance.

The manufacturer of the base stations has to declare the minimum number of supported geographical cells (i.e. geographical areas). This number relates to the base station setting with the minimum amount of cell splitting supported with transmission on all TAB connectors supporting the operating band. The manufacturer also declares the TAB connector Tx min cell groups. Every TAB connector supporting transmission in an operating band map to one TAB connector Tx min cell group supporting the same operating band. The mapping of TAB connectors to cells is implementation-dependent.

Test purpose

The minimum requirement applies per single-band connector, or per multi-band connector supporting transmission in the operating band.

Test requirements

The test purpose is to verify the accuracy of the maximum carrier output power across the frequency range and under normal and extreme conditions.

9.7.3 General Workflow for Carrying Out a Transmitter Test

The following instruction lists the general steps for performing a BS conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the base station, refer to the corresponding description.

1. Connect the instrument and the base station according to the corresponding test case setup.
See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.
2. Set the base station to the basic state:
 - a) Initialize the base station.
 - b) Set the frequency.
 - c) Set the base station to transmit the downlink signal (for most transmitter test cases).
 - d) Adjust ATT attenuator so that level of the interfering signal is as defined in clause 6.7.5 of 3GPP [TS 38.141-1](#).
3. Preset the signal generator to ensure a defined instrument state.
4. Configure the test case wizard.
 - a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
 - b) Select a test case, e.g. [TS 38.141-1: "6.7 Transmitter Intermodulation"](#).
 - c) Enter additional required parameters, e.g. base station class.
 - d) Enter the test frequency of the wanted signal.
The setting must match with the base station configuration.
 - e) Select "Apply Settings" to activate the settings.
The signal generator is now ready.
5. Switch on RF output.
6. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.
See also [Chapter 9.5, "General Considerations"](#), on page 244.
7. Start the measurement.
 - a) Send a start trigger impulse from the base station to the signal generator.
The signal generator starts signal generation.

8. Calculate the results.

9.7.4 Test Case 6.7: Transmitter Intermodulation

Test purpose

The test purpose is to verify the ability of the transmitter units associated with the single-band connectors or multi-band connector under test to restrict the generation of intermodulation products in its nonlinear elements. The nonlinear elements are caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna to below specified levels.

Required options

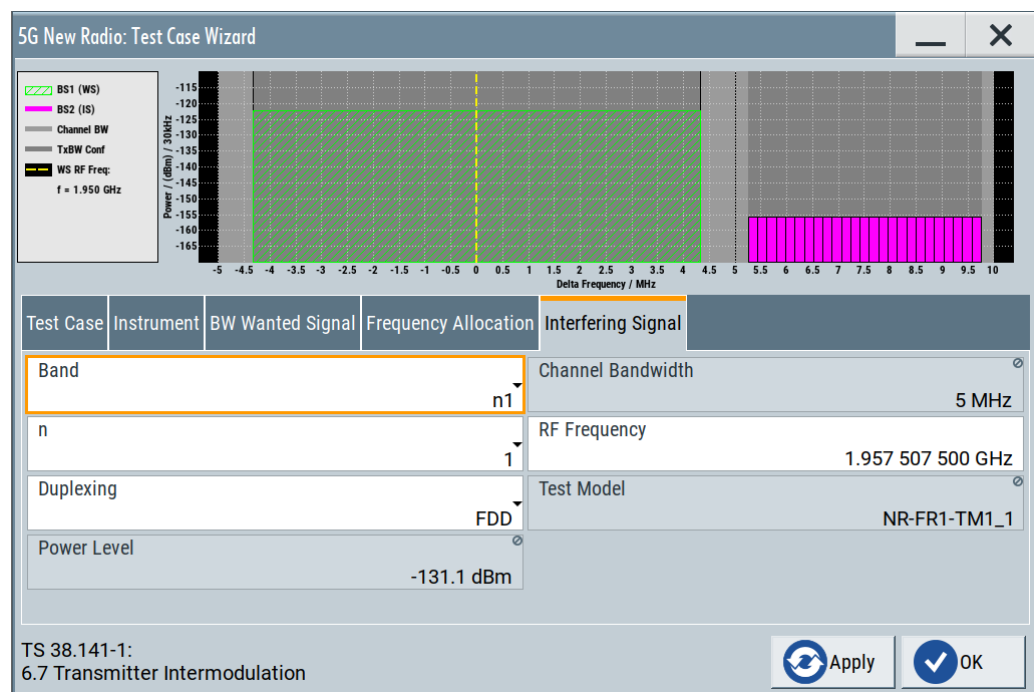
See also [Chapter 9.7.1, "Required Options"](#), on page 266.

Test setup

See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Short description

The transmitter intermodulation requirement reflects the capability of the transmitter unit to inhibit the generation of signals in its non-linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter unit. The requirement applies during the transmitter ON period and the transmitter transient period.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.8 Conducted Receiver Characteristics (TS 38.141-1, Chapter 7)

The wizard supports 3GPP tests [TS 38.141-1](#), chapter 7: Conducted receiver characteristics.

Most of the receiver tests can be performed with the signal generator only, i.e. without additional measurement equipment.

The receiver requirements are divided into the following main categories, intended to:

- Prove the receiver's ability to receive the wanted signal:
 - [Chapter 9.8.4, "Test Case 7.2: Reference Sensitivity Level"](#), on page 273
 - [Chapter 9.8.5, "Test Case 7.3: Dynamic Range"](#), on page 275
- Prove how susceptible the receiver is to different types of interfering signals:
 - [Chapter 9.8.6, "Test Case 7.4.1: Adjacent Channel Selectivity \(ACS\)"](#), on page 278
 - [Chapter 9.8.7, "Test Case 7.4.2A: In-Band General Blocking"](#), on page 279
 - [Chapter 9.8.8, "Test Case 7.4.2B: In-Band Narrowband Blocking"](#), on page 282
 - [Chapter 9.8.9, "Test Case 7.5: Out-of-Band Blocking"](#), on page 283
 - [Chapter 9.8.10, "Test Case 7.7: Receiver Intermodulation "](#), on page 285
 - [Chapter 9.8.11, "Test Case 7.8: In-Channel Selectivity"](#), on page 289

The tests cover a wide range of scenarios with different impairments on the wanted signal, that occur depending on the frequency offset between the wanted and the interfering signal.

9.8.1 Required Options

The table below lists the required options for performing the receiver tests according to 3GPP [TS 38.141-1](#), chapter 7.

Table 9-7: Required options

Chapter in TS 38.141-1	Hardware options					Software options	
	RF path		Baseband		BB generator	AWGN	5G NR
	A	B	1 path	2 paths			
	e.g., B1003	e.g., B2003	B13 B13XT	B13T B13XT	B10 B9	K62	K144
7.2 Reference sensitivity level	1		1		1		1
7.3 Dynamic range	1		1		1	1	1

Chapter in TS 38.141-1	Hardware options					Software options	
	RF path		Baseband		BB generator	AWGN	5G NR
	A	B	1 path	2 paths			
	e.g., B1003	e.g., B2003	B13 B13XT	B13T B13XT	B10 B9	K62	K144
7.4.1 Adjacent channel selectivity (ACS)	1	1		1	2		2
7.4.2A In-band general blocking	1	1		1	2		2
7.4.2B In-band narrowband blocking	1	1		1	2		2
7.5 Out-of-band blocking ¹⁾	1	1		1	2		2
7.6 Receiver spurious emissions ²⁾							
7.7 Receiver intermodulation	1	1		1	2	1	2
7.8 In-channel sensitivity ¹⁾	1	1		1	2		2

¹⁾ An additional R&S instrument required for CW/5G NR signal

²⁾ No signal generator required

The following equipment and options are required, for **receiver characteristics tests**:

- 2x option baseband generator (R&S SMW-B10 or /-B9)
- 1x option baseband main module (R&S SMW-B13T or /-B13XT)
- 1x option frequency (e.g. R&S SMW-B1003)
- 1x option frequency (e.g. R&S SMW-B2003)
- 1x option additive white Gaussian noise (AWGN) (R&S SMW-K62)
- 2x option digital standard 5G NR (R&S SMW-K144)
- For CW blocking interferer (7.5) and receiver intermodulation (7.7) tests:
An additional R&S device required for interfering signal

9.8.2 Prior Considerations

Fixed reference channels (FRC)

The receiver tests use fixed reference channels (FRC) as defined in TS 38.141-1, annex A "Reference measurement channels".

The following FRCs are defined for the receiver tests.

Table 9-8: Supported FRC

FRC	Description
G-FR1-A1-1 to G-FR1-A1-9	FRC for FR1 reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation and in-channel selectivity (QPSK, R=1/3)
G-FR1-A2-1 to G-FR1-A2-6	FRC for FR1 dynamic range (16QAM, R=2/3)

Channels

According to the [TS 38.141-1](#), the channels to test are located in the bottom (B), middle (M) and the top (T) of the supported frequency range of the base station. See [Chapter 9.5, "General Considerations"](#), on page 244 for an overview of the supported frequency operating bands.

Channel bandwidth of the 5G NR interfering signal

For all test cases using an interfering 5G NR signal, the bandwidth of the interfering signal must be the same as the wanted signal.

Reference sensitivity power level P_{REFSENS}

The reference sensitivity power level P_{REFSENS} is the minimum mean power received at the BS connector.

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in [TS 38.104](#), tables 7.2.2-x (see [Table 9-9](#)).

Table 9-9: Reference sensitivity levels

Channel bandwidth in MHz	Subcarrier spacing in kHz	FRC	Reference sensitivity power level, P_{REFSENS} in dBm
5, 10, 15	15	G-FR1-A1-2	-101.7
10, 15	30	G-FR1-A1-3	-101.8
10, 15	60	G-FR1-A1-4	-98.9
20, 25, 30, 40, 50	15	G-FR1-A1-5	-95.3
20, 25, 30, 40, 50, 60, 70, 80, 90, 100	30	G-FR1-A1-6	-95.6
20, 25, 30, 40, 50, 60, 70, 80, 90, 100	60	G-FR1-A1-2	-95.7

Filter settings

The 3GPP 5G NR specifications do not define a standardized transmit filter for the UE or for the base station. Therefore, when a test case for the UL direction is activated, a filter type 5G NR with "Per BWP" is automatically selected

9.8.3 General Workflow for Carrying Out a Receiver Test

The following instruction lists the general steps for performing a BS conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the base station, refer to the corresponding description.

1. Connect the instrument and the DUT according to the corresponding test case setup.
See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.
2. Set the base station to the basic state:
 - a) Initialize the base station.
 - b) Set the frequency.
 - c) Set the base station to receive the fixed reference channel (for most receiver test cases).
3. Preset the signal generator to ensure a defined instrument state.
4. Configure the test case wizard.
 - a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
 - b) Select a test case, e.g. [TS 38.141-1: "7.3 Dynamic Range"](#).
 - c) Enter additional required parameters, e.g. base station class.
 - d) Enter the test frequency of the wanted signal, e.g. M.
The setting must match with the base station configuration.
 - e) Select "Apply Settings" to activate the settings.
The signal generator is now ready to start signal generation.
5. Switch on RF output.
6. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.
See also [Chapter 9.5, "General Considerations"](#), on page 244.
7. Start the measurement.
 - a) Send a start trigger impulse from the base station to the signal generator.
The signal generator starts signal generation.
8. Calculate the results.
The base station internally calculates the BER, BLER, or the probability of detection of preamble (Pd), depending on the test case. This value is compared to the required value.

9.8.4 Test Case 7.2: Reference Sensitivity Level

Test purpose

To verify that at the BS reference sensitivity level, the throughput requirements are met for a specified reference measurement channel.

The reference sensitivity power level P_{REFSENS} is the minimum mean power received at the BS connector at which a throughput requirement is met for a specified reference measurement channel.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Short description

The reference sensitivity level measurement is a test case that aims to verify the noise figure of the receivers. The test case uses FRCs with QPSK modulation.

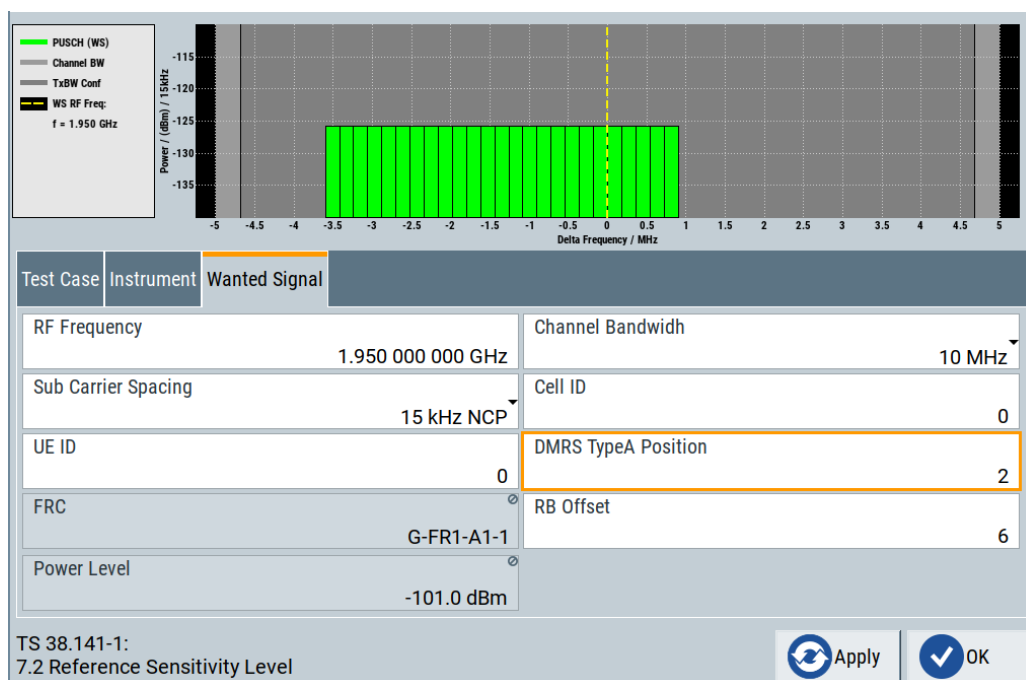
Perform the test on three channels (B, M and T). The selected "Channel Bandwidth" and "Sub Carrier Spacing" determine the used FRC and the "Wanted Signal Power Level". For channels larger than 5 MHz not all RBs are allocated; to adjust the position of the allocated RBs within the selected channel bandwidth, use the parameter "RB Offset".

For the parameter in the following table, the throughput measured must be equal or greater than 95%.

Table 9-10: Reference sensitivity levels

Channel band-width in MHz	Subcarrier spacing in kHz	FRC	Base station class	Reference sensitivity power level, P_{REFSENS} in dBm		
				$f \leq 3.0 \text{ GHz}$	$3.0 \text{ GHz} < f \leq 4.2 \text{ GHz}$	$4.2 \text{ GHz} < f \leq 6.0 \text{ GHz}$
5, 10, 15	15	G-FR1-A1-1	wide area	-101	-100.7	-100.5
			medium area	-96	-95.7	-95.5
			local area	-93	-92.7	-92.5
10, 15	30	G-FR1-A1-2	wide area	-101.1	-100.8	-100.6
			medium area	-96.1	-95.8	-95.6
			local area	-93.1	-92.8	-92.6
10, 15	60	G-FR1-A1-3	wide area	-98.2	-97.9	-97.7
			medium area	-93.2	-92.9	-92.7
			local area	-90.2	-89.9	-89.7
20, 25, 30, 40, 50	15	G-FR1-A1-4	wide area	-94.6	-94.3	-94.1
			medium area	-89.6	-89.3	-89.1
			local area	-86.6	-86.3	-86.1
20, 25, 30, 40, 50, 60,	30	G-FR1-A1-5	wide area	-94.9	-94.6	-94.4
			medium area	-89.9	-89.6	-89.4

Channel band-width in MHz	Subcarrier spacing in kHz	FRC	Base station class	Reference sensitivity power level, P_{REFSENS} in dBm		
				$f \leq 3.0 \text{ GHz}$	$3.0 \text{ GHz} < f \leq 4.2 \text{ GHz}$	$4.2 \text{ GHz} < f \leq 6.0 \text{ GHz}$
70, 80, 90, 100			local area	-86.9	-86.6	-86.4
20, 25, 30, 40, 50, 60, 70, 80, 90, 100	60	G-FR1-A1-6	wide area	-95	-94.7	-94.5
			medium area	-90	-89.7	-89.5
			local area	-87	-86.7	-86.5



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.8.5 Test Case 7.3: Dynamic Range

Test purpose

To verify that at the BS receiver dynamic range, the relative throughput fulfills the specified limit.

Required options

- See [Chapter 9.8.1, "Required Options"](#), on page 270.

- Option additive white Gaussian noise AWGN (R&S SMW-K62)

Test setup

See [Chapter 9.4.1.1, "Exemplary Test Setup - One Path"](#), on page 242.

Short description

The dynamic range test aims to stress the receiver and measure its capability to demodulate the signal even in the presence of an interfering signal inside the received channel bandwidth. The test case uses FRCs with 16QAM modulation. The throughput measurements are performed for different level of the wanted and the interfering AWGN signals.

Perform the test on three channels (B, M and T). The selected "Channel Bandwidth" and "Sub Carrier Spacing" determine the used FRC and the "Wanted Signal Power Level". For channels larger than 5 MHz not all RBs are allocated; to adjust the position of the allocated RBs within the selected channel bandwidth, use the parameter "RB Offset".

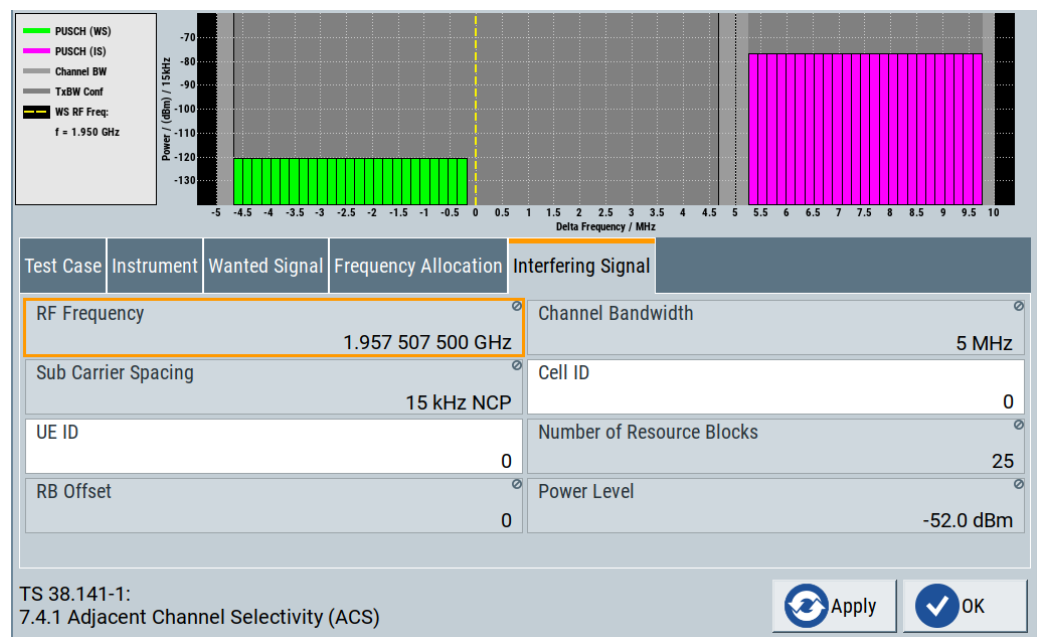
For the parameter in the following table, the throughput must be equal or greater than 95%.

Table 9-11: Dynamic range (NR wide area BS)

Channel bandwidth in MHz	Subcarrier spacing in kHz	Reference measurements channel	Wanted signal: mean power in dBm	Interfering signal: mean power in dBm / BW_{Config}	Type of interfering signal
5	15	G-FR1-A2-1	-70.7	-82.5	AWGN
	30	G-FR1-A2-2	-71.4		
10	15	G-FR1-A2-1	-70.7	-79.3	AWGN
	30	G-FR1-A2-2	-71.4		
	60	G-FR1-A2-3	-68.4		
15	15	G-FR1-A2-1	-70.7	-77.5	AWGN
	30	G-FR1-A2-2	-71.4		
	60	G-FR1-A2-3	-68.4		
20	15	G-FR1-A2-4	-64.5	-76.2	AWGN
	30	G-FR1-A2-5	-64.5		
	60	G-FR1-A2-6	-64.8		
25	15	G-FR1-A2-4	-64.5	-75.2	AWGN
	30	G-FR1-A2-5	-64.5		
	60	G-FR1-A2-6	-64.8		
30	15	G-FR1-A2-4	-64.5	-74.4	AWGN
	30	G-FR1-A2-5	-64.5		
	60	G-FR1-A2-6	-64.8		

Channel bandwidth in MHz	Subcarrier spacing in kHz	Reference measurements channel	Wanted signal: mean power in dBm	Interfering signal: mean power in dBm / BW _{Config}	Type of interfering signal
40	15	G-FR1-A2-4	-64.5	-73.1	AWGN
	30	G-FR1-A2-5	-64.5		
	60	G-FR1-A2-6	-64.8		
50	15	G-FR1-A2-4	-64.5	-72.2	AWGN
	30	G-FR1-A2-5	-64.5		
	60	G-FR1-A2-6	-64.8		
60	30	G-FR1-A2-5	-64.5	-71.4	AWGN
	60	G-FR1-A2-6	-64.8		
70	30	G-FR1-A2-5	-64.5	-70.8	AWGN
	60	G-FR1-A2-6	-64.8		
80	30	G-FR1-A2-5	-64.5	-70.1	AWGN
	60	G-FR1-A2-6	-64.8		
90	30	G-FR1-A2-5	-64.5	-69.9	AWGN
	60	G-FR1-A2-6	-64.8		
100	30	G-FR1-A2-5	-64.5	-69.1	AWGN
	60	G-FR1-A2-6	-64.8		

For the parameters of the other base station classes (NR local area BS and NR medium area BS), refer to 3GPP [TS 38.141-1](#).



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.8.6 Test Case 7.4.1: Adjacent Channel Selectivity (ACS)

Test purpose

To verify the ability of the BS receiver filter to suppress interfering signals in the channels next to the wanted channel.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

See [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242.

Short description

The adjacent channel selectivity (ACS) test verifies that a BS receiver is able to demodulate a "weak" useful signal being superimposed by a "strong" interfering signal in the adjacent channel.

The reference measurement channel for the wanted signal is identified in [Table 9-10](#). The interfering signal is a 5G NR QPSK signal (PUSCH) allocated selectable at higher or lower frequencies (see [Figure 9-9](#)). Perform the test on three channels (B, M and T).

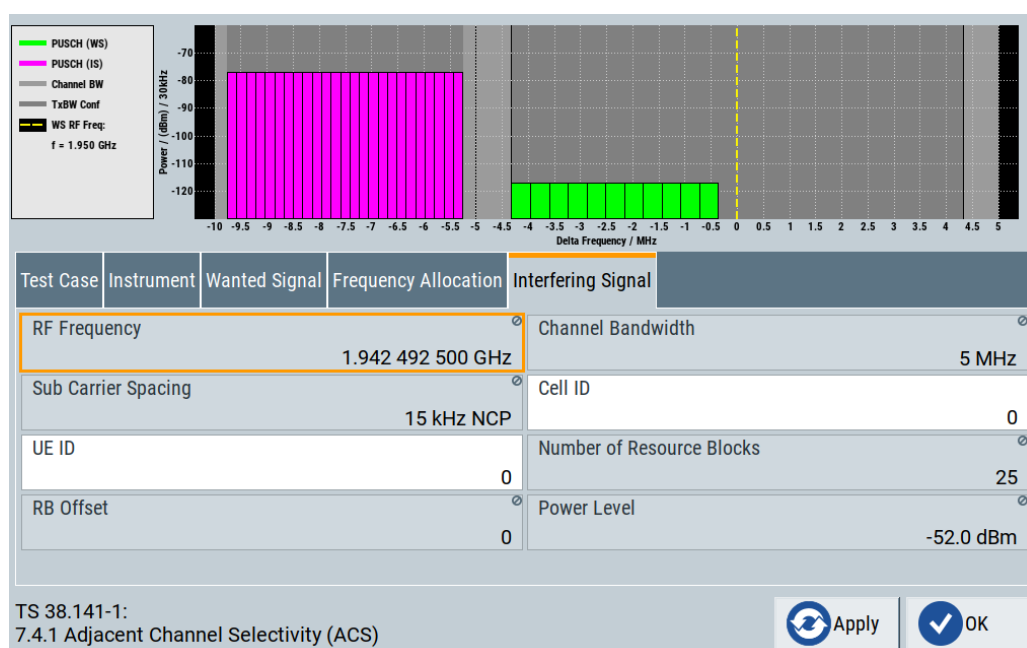
For the parameter in the [Table 9-12](#), the throughput has to be equal or greater than 95%.

Table 9-12: Adjacent channel selectivity

Channel bandwidth in MHz	Interfering signal center frequency offset from the lower (upper) edge of the wanted signal in MHz	Type of interfering signal	Interfering signal: mean power in dBm	Wanted signal: mean power in dBm
5	±2.5025	5 MHz 5G NR signal, 15 kHz SCS, 25 RBs	wide area: -52 medium area: -47 local area: -44	$P_{\text{REFSENS}} + 6 \text{ dB}$
10	±2.5075			
15	±2.5125			
20	±2.5025			
25	±9.4675	20 MHz 5G NR signal, 15 kHz SCS, 100 RBs		
30	±9.4725			
40	±9.4675			
50	±9.4625			
60	±9.4725			

Channel band-width in MHz	Interfering signal center frequency offset from the lower (upper) edge of the wanted signal in MHz	Type of interfering signal	Interfering signal: mean power in dBm	Wanted signal: mean power in dBm
70	±9.4675			
80	±9.4625			
90	±9.4725			
100	±9.4675			

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in TS 38.104, tables 7.2.2-x (see Table 9-9).



The general and instrument-related settings are described in Chapter 9.6, "User Interface", on page 247.

The settings of the wanted signal are described in Chapter 9.6.6, "Wanted Signal Settings", on page 254.

Refer to Chapter 9.6.8, "Interfering Signal Settings", on page 260 for description of the corresponding settings.

9.8.7 Test Case 7.4.2A: In-Band General Blocking

Test purpose

The test stresses the ability of the BS receiver to withstand high-level interference from unwanted signals at specified frequency offsets without undue degradation of its sensitivity.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

The blocking test using a 5G NR interfering signal can be performed with one instrument, see [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242. This setup can also be used for the CW interfering signal up to 3 GHz or 6 GHz carrier, depending on the installed option. For tests with CW with frequency greater than 6 GHz a second signal generator is necessary, like R&S SMF for instance.

Short description

The blocking characteristics is a test case that verifies the ability of the receiver to demodulate a wanted signal in the presence of a strong interfering signal.

The reference measurement channel for the wanted signal is identified in [Table 9-10](#). The interfering signal is a 5G NR QPSK signal (PUSCH) allocated selectable at higher or lower frequencies (see [Figure 9-9](#)).

The test of in-band blocking is performed with an 5G NR interfering signal inside one of the operating bands defined in [TS 38.104](#), table 5.2-1, but not next to the wanted signal.

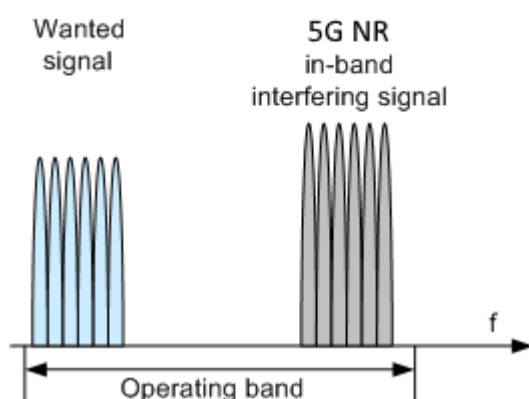


Figure 9-10: Example: Blocking

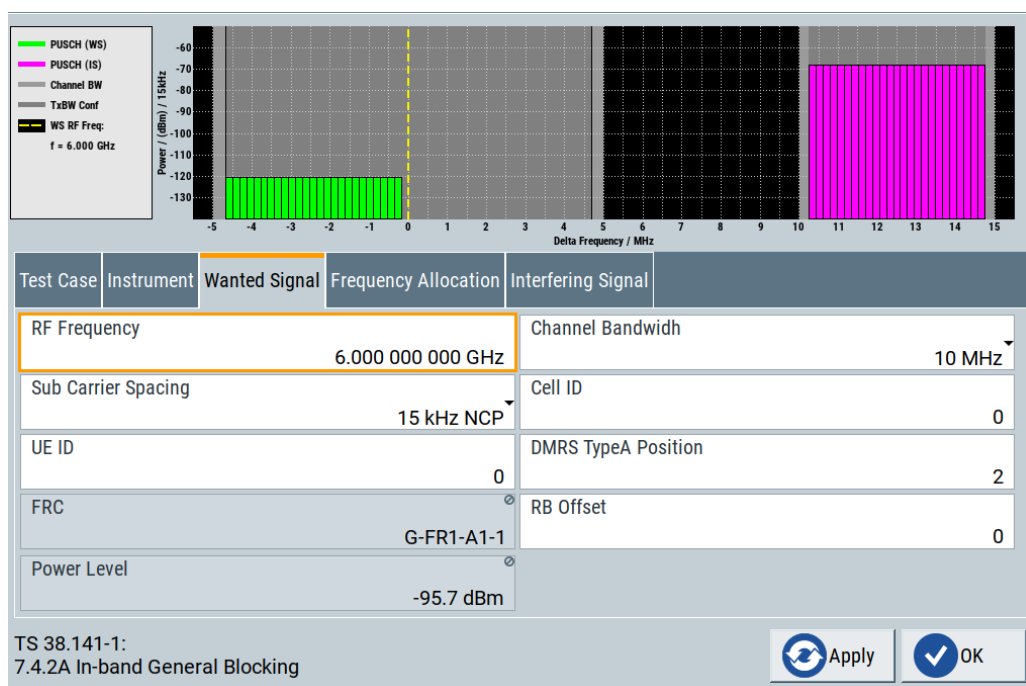
Perform the test on one channel (M).

For the parameter in the following table, the throughput has to be equal or greater than 95%.

Table 9-13: 5G NR interfering signals for in-band general blocking tests

BS channel bandwidth of the lowest/highest received carrier in MHz	Wanted signal: mean power in dBm	Interfering signal: mean power in dBm	Interfering signal center frequency minimum offset to the lower (upper) channel edge of the wanted signal in MHz	Type of interfering signal
5, 10, 15, 20	$P_{\text{REFSENS}} + 6\text{dB}$	wide area: -43 medium area: -38 local area: -35	± 7.5	5 MHz 5G NR signal, 15 kHz SCS, 25 RBs
25, 30, 40, 50, 60, 70, 80, 90, 100	$P_{\text{REFSENS}} + 6\text{dB}$	wide area: -43 medium area: -38 local area: -35	± 30	20 MHz 5B NR signal, 15 kHz SCS, 100 RBs

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in TS 38.104, tables 7.2.2-x (see Table 9-9).



The general and instrument-related settings are described in Chapter 9.6, "User Interface", on page 247.

The settings of the wanted signal are described in Chapter 9.6.6, "Wanted Signal Settings", on page 254.

9.8.8 Test Case 7.4.2B: In-Band Narrowband Blocking

Test purpose

To verify the ability of the BS receiver filter to suppress interfering signals in the channels next to the wanted channel.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

See [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242.

Short description

The narrow-band blocking test verifies that a BS receiver is able to demodulate a "weak" useful signal being superimposed by a "strong" narrow-band interfering signal in the adjacent channel.

The reference measurement channel for the wanted signal is identified in [Table 9-10](#).

The interfering signal is a single resource block 5G NR signal in a channel with the same bandwidth as the wanted signal. The interfering signal is at a specified center frequency offset and adjacently to the lower (upper) channel edge of the wanted signal (see [Figure 9-11](#)).

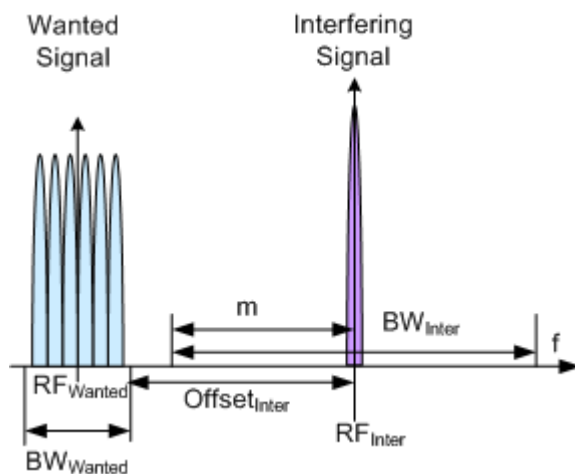


Figure 9-11: Example: Narrow-band blocking

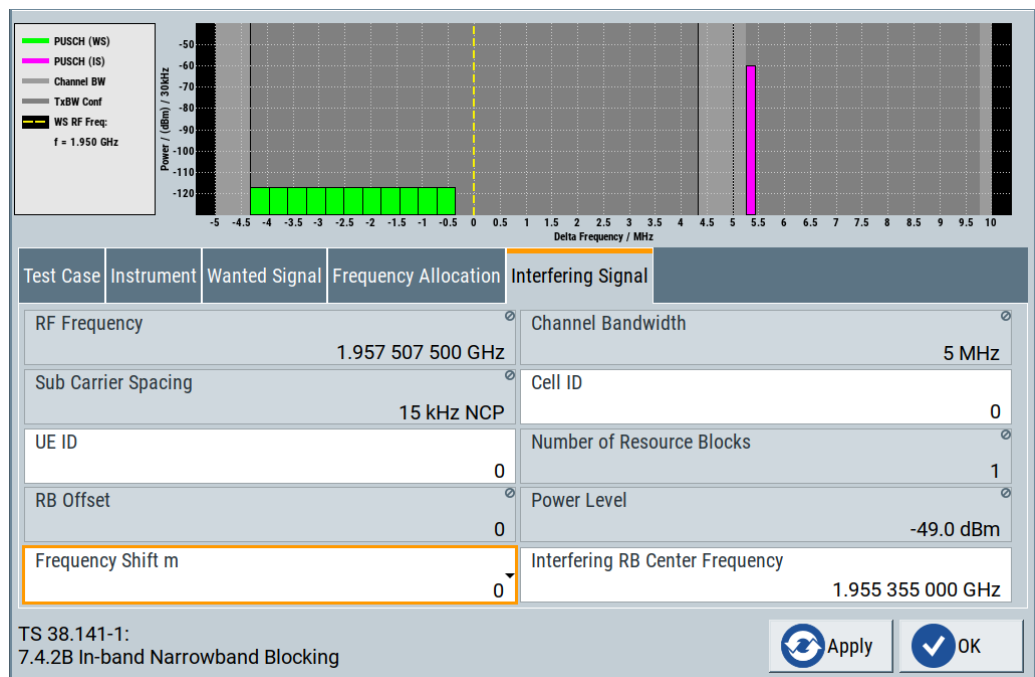
Perform the test on one channel (M).

For the parameter in the following table, the throughput has to be equal or greater than 95%.

Table 9-14: 5G NR interfering signals for in-band narrowband blocking tests

BS channel bandwidth of the lowest/highest received carrier in MHz	Wanted signal: mean power in dBm	Interfering signal: mean power in dBm
5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 The SCS for the lowest/highest carrier received is the lowest SCS supported by the BS for that BS channel bandwidth	$P_{\text{REFSENS}} + 6\text{dB}$	wide area: -43 medium area: -38 local area: -35

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in TS 38.104, tables 7.2.2-x (see Table 9-9).



The general and instrument-related settings are described in Chapter 9.6, "User Interface", on page 247.

The settings of the wanted signal are described in Chapter 9.6.6, "Wanted Signal Settings", on page 254.

Refer to Chapter 9.6.8, "Interfering Signal Settings", on page 260 for description of the corresponding settings.

9.8.9 Test Case 7.5: Out-of-Band Blocking

Test purpose

The test stresses the ability of the BS receiver to withstand high-level interference from unwanted signals at specified frequency offsets without undue degradation of its sensitivity.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

The out-of-band blocking test uses a CW interfering signal up to 3 GHz or 6 GHz carrier, depending on the installed option. It can be performed with one instrument, see [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242. For tests with CW with frequency greater than 6 GHz, a second signal generator capable of the frequency is necessary.

Short description

The blocking characteristics is a test case that verifies the ability of the receiver to demodulate a wanted signal in the presence of a strong interfering signal.

The reference measurement channel for the wanted signal is identified in [Table 9-10](#).

Test of out-of-band blocking is performed with a CW interfering signal with 1 MHz up to 12.750 GHz.

There is an additional (optional) blocking requirement for co-location with other base station.

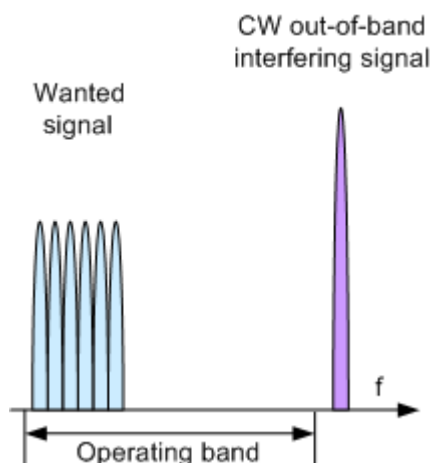


Figure 9-12: Example: Blocking

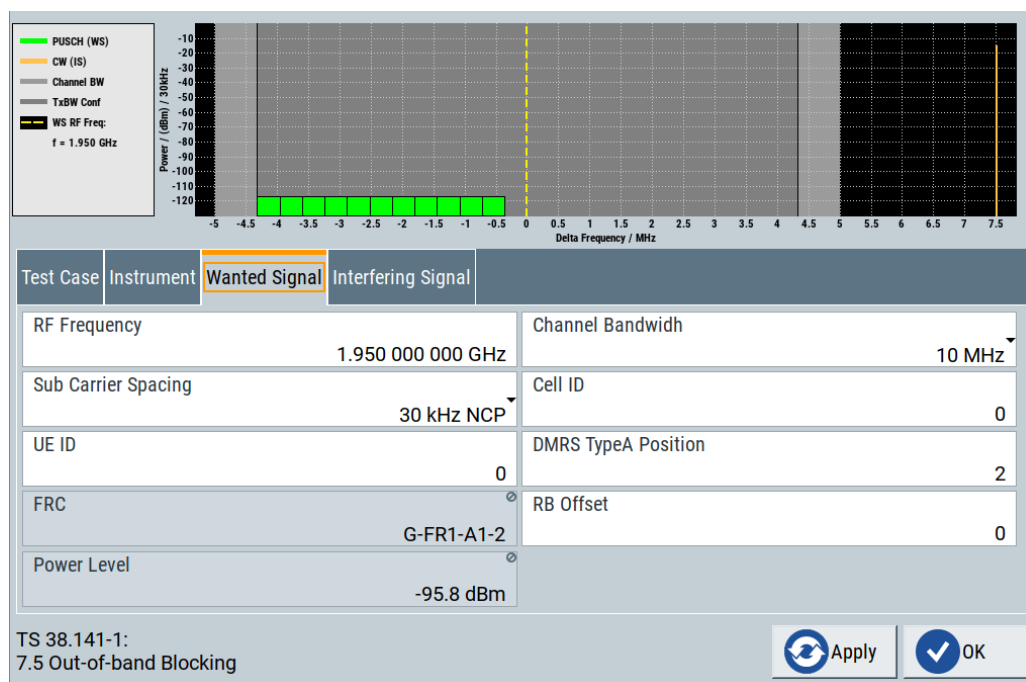
Perform the test on one channel (M).

For the parameter in the following table, the throughput has to be equal or greater than 95%.

Table 9-15: 5G NR interfering signals for blocking performance requirement

Wanted signal: mean power in dBm	Interfering signal: mean power in dBm	Type of interfering signal
$P_{\text{REFSENS}} + 6\text{dB}$	-15	CW carrier

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in [TS 38.104](#), tables 7.2.2-x (see [Table 9-9](#)).



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.8.10 Test Case 7.7: Receiver Intermodulation

Test purpose

The test verifies the ability of the BS receiver to inhibit the generation of intermodulation products in its non-linear elements caused by the presence of two high-level interfering signals at frequencies with a specific relationship to the frequency of the wanted signal.

Required options

See [Chapter 9.8.1, "Required Options"](#), on page 270.

Test setup

See [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242.

Short description

The receiver intermodulation test is a test scenario with two interfering signals, one CW and one 5G NR signal. The center frequency of the interfering signals is selected so that the third and higher order mixing products falls inside the band of the wanted signal. There is also a second narrow-band intermodulation scenario defined. The 5G NR

interfering signal is a narrow-band signal with single resource block allocation and the CW interfering signal is placed very close to the wanted one.

The reference measurement channel for the wanted signal is identified in [Table 9-10](#).

Perform the test on one channel (M).

For the parameter in the [Table 9-17](#), the throughput has to be equal or greater than 95%.

Table 9-16: Intermodulation requirement

Wanted signal: mean power in dBm	Interfering signal: mean power in dBm
$P_{\text{REFSENS}} + 6\text{dB}$	wide area: -52 medium area: -47 local area: -44

Table 9-17: Interfering signals for general intermodulation requirement

Channel bandwidth in MHz	Interfering signal center frequency offset from the channel edge of the wanted signal in MHz	Type of interfering signal
5	± 7.5	CW
	± 17.5	5 MHz 5G NR signal ¹⁾
10	± 7.45	CW
	± 17.5	5 MHz 5G NR signal ¹⁾
15	± 7.43	CW
	± 17.5	5 MHz 5G NR signal ¹⁾
20	± 7.38	CW
	± 17.5	5 MHz 5G NR signal ¹⁾
25	± 7.45	CW
	± 25	20 MHz 5G NR signal ²⁾
30	± 7.43	CW
	± 25	20 MHz 5G NR signal ²⁾
40	± 7.45	CW
	± 25	20 MHz 5G NR signal ²⁾
50	± 7.35	CW
	± 25	20 MHz 5G NR signal ²⁾
60	± 7.49	CW
	± 25	20 MHz 5G NR signal ²⁾
70	± 7.42	CW
	± 25	20 MHz 5G NR signal ²⁾

Channel bandwidth in MHz	Interfering signal center frequency offset from the channel edge of the wanted signal in MHz	Type of interfering signal
80	± 7.44	CW
	± 25	20 MHz 5G NR signal ²⁾
90	± 7.43	CW
	± 25	20 MHz 5G NR signal ²⁾
100	± 7.45	CW
	± 25	20 MHz 5G NR signal ²⁾
¹⁾ For the 15 kHz subcarrier spacing, the number of RB is 25. For the 30 kHz subcarrier spacing, the number of RB is 10. ²⁾ For the 15 kHz subcarrier spacing, the number of RB is 100. For the 30 kHz subcarrier spacing, the number of RB is 50. For the 60 kHz subcarrier spacing, the number of RB is 24.		

Table 9-18: Interfering signals for narrowband intermodulation requirement in FR1

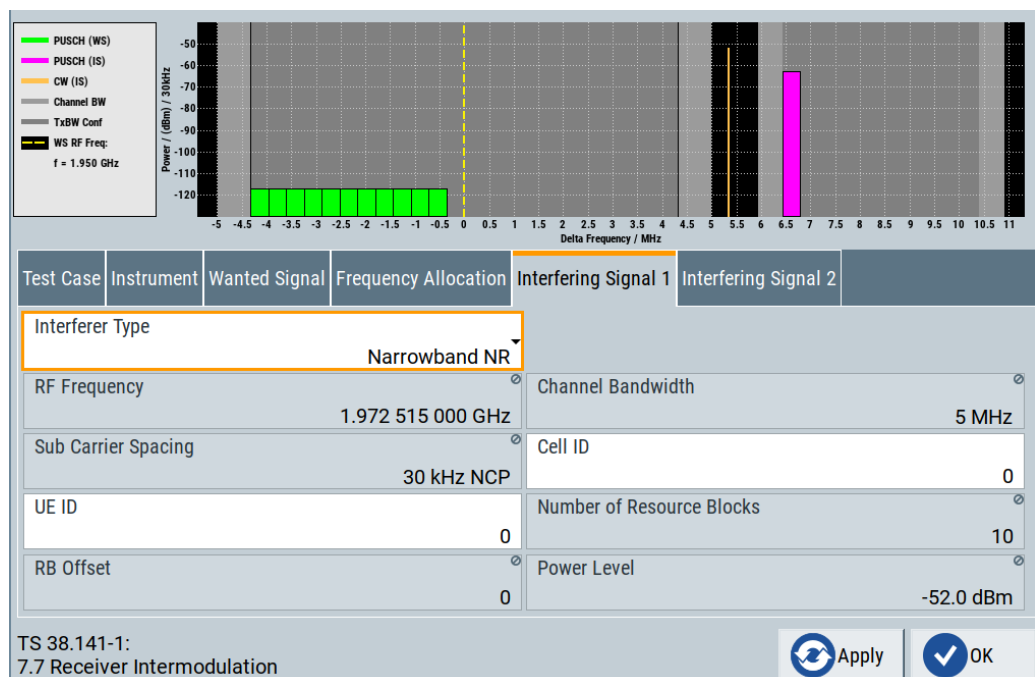
Channel bandwidth in MHz	Interfering signal center frequency offset from the channel edge of the wanted signal in MHz	Type of interfering signal
5	± 360	CW
	± 1420	5 MHz 5G NR signal ¹⁾
10	± 325	CW
	± 1780	5 MHz 5G NR signal ¹⁾
15 ²⁾	± 380	CW
	± 1600	5 MHz 5G NR signal ¹⁾
20 ²⁾	± 345	CW
	± 1780	5 MHz 5G NR signal ¹⁾
25 ²⁾	± 325	CW
	± 1990	20 MHz 5G NR signal ¹⁾
30 ²⁾	± 320	CW
	± 1990	20 MHz 5G NR signal ²⁾
40 ²⁾	± 310	CW
	± 2710	20 MHz 5G NR signal ¹⁾
50 ²⁾	± 330	CW
	± 3250	20 MHz 5G NR signal ¹⁾
60 ²⁾	± 350	CW
	± 3790	20 MHz 5G NR signal ¹⁾

Channel bandwidth in MHz	Interfering signal center frequency offset from the channel edge of the wanted signal in MHz	Type of interfering signal
70 ²⁾	±400	CW
	±4870	20 MHz 5G NR signal ¹⁾
80 ²⁾	±390	CW
	±4870	20 MHz 5G NR signal ¹⁾
90 ²⁾	±340	CW
	±5770	20 MHz 5G NR signal ¹⁾
100 ²⁾	±340	CW
	±5770	20 MHz 5G NR signal ¹⁾

¹⁾ Interfering signal consists of one RB positioned at the stated offset. The bandwidth of the interfering signal is located adjacently to the lower/upper BS RF bandwidth edge or subblock edge inside a subblock gap.

²⁾ This requirement applies only for a G-FRC mapped to the frequency range at the channel edge next to the interfering signals.

P_{REFSENS} depends on the channel bandwidth and subcarrier spacing. Minimum requirements are specified in TS 38.104, tables 7.2.2-x (see Table 9-9).



The general and instrument-related settings are described in Chapter 9.6, "User Interface", on page 247.

Refer to Chapter 9.6.8, "Interfering Signal Settings", on page 260 for description of the corresponding settings.

9.8.11 Test Case 7.8: In-Channel Selectivity

Test purpose

The purpose of this test is to verify the BS receiver ability to suppress the IQ leakage.

Required options

See [Table 9-7](#).

Test setup

See [Chapter 9.4.1.1, "Exemplary Test Setup - One Path"](#), on page 242.

For two paths measurements, see [Chapter 9.4.1.2, "Exemplary Test Setup - Two Paths"](#), on page 242.

Short description

In-channel selectivity (ICS) is a measure of the receiver ability to receive a "weak" wanted signal at its assigned resource block locations in the presence of a "strong" interfering signal. The interfering signal has to be a 5G NR signal with the same bandwidth as the wanted signal. The wanted and the interfering signal are allocated adjacently around the center frequency. To swap the position of the wanted and interfering signal, use the parameter "Frequency Allocation".

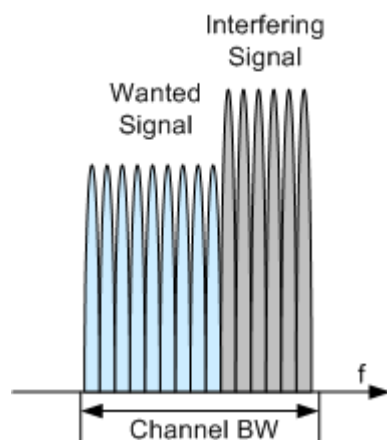


Figure 9-13: Example: In-channel selectivity, frequency allocation = lower frequency

In a one-path instrument, the wanted and the interfering 5G NR signals are both generated using the same path. The interfering signal is simulated as an additional user equipment (UE). The level difference between the wanted and the interfering signals is handled in the baseband. As the interferer level is higher, it is used as a reference; the level of the wanted signal is set relatively lower to the interferer.

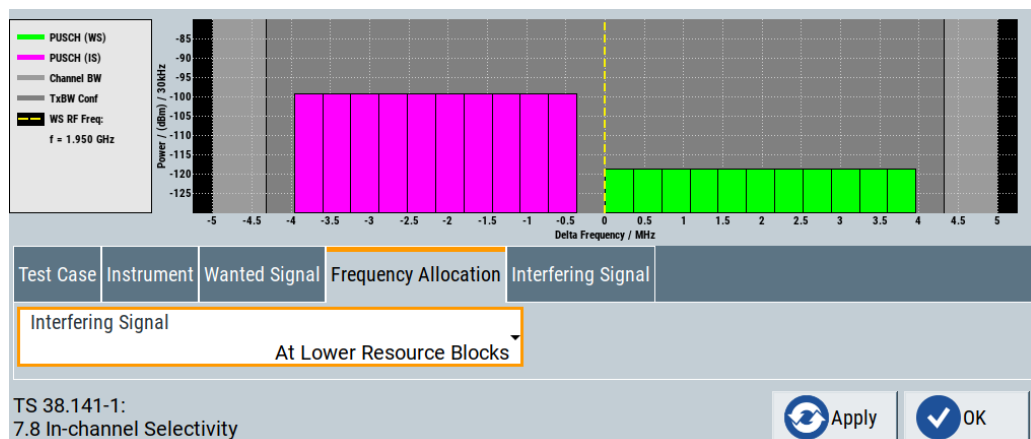
Perform the test on one channel (M).

For the parameter in the following table, the throughput has to be equal or greater than 95%.

Table 9-19: In-channel selectivity (NR wide area BS)

Channel bandwidth in MHz	Sub-carrier spacing in kHz	FRC	Wanted signal: mean power in dBm			Interfering signal: mean power in dBm	Type of interfering signal
			$f \leq 3.0$ GHz	$3.0 \text{ GHz} < f \leq 4.2 \text{ GHz}$	$4.2 \text{ GHz} < f \leq 6.0 \text{ GHz}$		
5	15	G-FR1-A1-7	-99.2	-98.8	-98.5	-81.4	5G NR signal, 15 kHz SCS, 10 RBs
10, 15, 20, 25, 30	15	G-FR1-A1-1	-97.3	-96.9	-96.6	-77.4	5G NR signal, 15 kHz SCS, 25 RBs
40, 50	15	G-FR1-A1-4	-90.9	-90.5	-90.2	-71.4	5G NR signal, 15 kHz SCS, 100 RBs
5	30	G-FR1-A1-8	-99.9	-99.5	-99.2	-81.4	5G NR signal, 30 kHz SCS, 5 RBs
10, 15, 20, 25, 30	30	G-FR1-A1-2	-97.4	-97	-96.7	-78.4	5G NR signal, 30 kHz SCS, 10 RBs
40, 50, 60, 70, 80, 90, 100	30	G-FR1-A1-5	-91.2	-90.8	-90.5	-71.4	5G NR signal, 30 kHz SCS, 50 RBs
10, 15, 20, 25, 30	60	G-FR1-A1-9	-96.8	-96.4	-96.1	-78.4	5G NR signal, 60 kHz SCS, 5 RBs
40, 50, 60, 70, 80, 90, 100	60	G-FR1-A1-6	-91.3	-90.9	-90.6	-71.6	5G NR signal, 60 kHz SCS, 24 RBs

For the parameters of the other base station classes (NR local area BS and NR medium area BS), refer to 3GPP TS 38.141-1.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Refer to [Chapter 9.6.8, "Interfering Signal Settings"](#), on page 260 for description of the corresponding settings.

9.9 Conducted Performance Characteristics (TS 38.141-1, Chapter 8)

The wizard supports 3GPP tests [TS 38.141-1](#), chapter 8: Conducted performance characteristics.

Most of the performance tests can be performed with the signal generator only, i.e. without additional measurement equipment.

The performance requirements are divided into the following main categories, intended to:

- Performance requirements for PUSCH:
 - [Chapter 9.9.4, "Test Case 8.2.1: PUSCH Transform Precoding Disabled"](#), on page 296
 - [Chapter 9.9.5, "Test Case 8.2.2: PUSCH Transform Precoding Enabled"](#), on page 309
 - [Chapter 9.9.6, "Test Case 8.2.3: UCI Multiplexed on PUSCH"](#), on page 311
- Performance requirements for PUCCH:
 - [Chapter 9.9.7, "Test Case 8.3.1: Performance Requirements for PUCCH Format 0"](#), on page 314
 - [Chapter 9.9.8, "Test Case 8.3.2.1: NACK to ACK Detection for PUCCH Format 1"](#), on page 316
 - [Chapter 9.9.9, "Test Case 8.3.2.2: ACK Missed Detection for PUCCH Format 1"](#), on page 319

- Chapter 9.9.10, "Test Case 8.3.3.1: ACK Missed Detection for PUCCH Format 2", on page 321
- Chapter 9.9.11, "Test Case 8.3.3.2: UCI BLER for PUCCH Format 2", on page 323
- Chapter 9.9.12, "Test Case 8.3.4: Performance Requirements for PUCCH Format 3", on page 324
- Chapter 9.9.13, "Test Case 8.3.5: Performance Requirements for PUCCH Format 4", on page 327
- Chapter 9.9.14, "Test Case 8.3.6.1A: NACK to ACK Detection for Multi-Slot PUCCH Format 1", on page 330
- Chapter 9.9.15, "Test Case 8.3.6.1B: ACK Missed Detection for Multi-Slot PUCCH Format 1", on page 331
- Performance requirements for PRACH:
 - Chapter 9.9.16, "Test Case 8.4.1: PRACH False Alarm Probability and Missed Detection", on page 333

9.9.1 Required Options

The table below lists the required options for performing the transmitter tests according to 3GPP TS 38.141-1, chapter 6.

Table 9-20: Required options

Chapter in TS 38.141-1		Hardware options				Software options				Remark
		RF path		BB gener- ator	Fading simula- tor	AWG N	MIMO Fad./ Rout	5G NR	Cl. loop	
		A	B							
		B1 00x	B2 00x	B9 B10	B15 B14	K62	K74	K144	K145	
8.2.1 PUSCH Trans- form Precoding Dis- abled	1 Tx, 2 Rx	1	1	1	2	2		1	1	
	1 Tx, 4 Rx	1	1	2	4	2	1	1	1	additional 2 Rx antenna with 2 SGT + 2 x SMW- K19
	1 Tx, 8 Rx	1	1	2	4	2	1	1	1	additional 6 Rx antenna with 6 SGT + 2 x SMW- K19
	2 Tx, 2 Rx	1	1	2	2	2	1	2	2	

Chapter in TS 38.141-1		Hardware options				Software options				Remark
		RF path		BB gener- ator	Fading simula- tor	AWG N	MIMO Fad./ Rout	5G NR	CI. loop	
		A	B							
		B1 00x	B2 00x	B9 B10	B15 B14	K62	K74	K144	K145	
	2 Tx, 4 Rx	1	1	2	4	2	1	2	2	additional 2 Rx antenna with 2 SGT + 2 x SMW- K19
	2 Tx, 8 Rx	1	1	2	4	2	1	2	2	additional 6 Rx antenna with 6 SGT + 2 x SMW- K19
8.2.2 PUSCH Transform Precoding Enabled		1	1	2	4	2	1	1	1	additional SGT required for 4/8 Rx
8.2.3 UCI multiplexed on PUSCH		1	1	2	2	2		1	1	
8.3.1 Performance requirements for PUCCH Format 0		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.2.1 NACK to ACK Detection for PUCCH Format 1		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.2.2 ACK Missed Detection for PUCCH Format 1		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.3.1 ACK Missed Detection for PUCCH Format 2		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.3.2 UCI BLER for PUCCH Format 2		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.4 Performance requirements for PUCCH Format 3		1	1	2	4	2	1	1		additional SGT required for 4/8 Rx

Chapter in TS 38.141-1	Hardware options				Software options				Remark
	RF path		BB gener- ator	Fading simula- tor	AWG N	MIMO Fad./ Rout	5G NR	Cl. loop	
	A	B							
	B1 00x	B2 00x	B9 B10	B15 B14	K62	K74	K144	K145	
8.3.5 Performance requirements for PUCCH Format 4	1	1	2	4	2	1	1		additional SGT required for 4/8 Rx
8.3.6.1A NACK to ACK Detection for Multi-Slot PUCCH Format 1	1	1	1	2	2		1		
8.3.6.1B ACK Missed Detection for Multi-Slot PUCCH Format 1	1	1	1	2	2		1		
8.4.1 PRACH flase alarm propability and missed detection	1	1	2	4	2	1	1		additional SGT required for 4/8 Rx

The following equipment and options are required, for **performance characteristics tests**:

- 2x option baseband generator (R&S SMW-B10 or -B9)
- 1x option frequency (e.g. R&S SMW-B1003)
- 1x option frequency (e.g. R&S SMW-B2003)
- 4x option baseband fading simulator (R&S SMW-B15)
- 2x option additive white Gaussian noise (AWGN) (R&S SMW-K62)
- 2x option digital standard 5G NR (R&S SMW-K144)
- 2x option digital standard 5G NR (R&S SMW-K145)

9.9.2 General

Conducted performance requirements specify the ability of the base station to demodulate signals in various conditions and configurations. Conducted performance requirements are specified at the antenna connectors (for BS type 1-C) and at the TAB connectors (for BS type 1-H).

Conducted performance requirements for the base stations are specified for the fixed reference channels and the propagation conditions defined in TS 38.141-1 annex A and annex H. The requirements only apply to those FRCs that are supported by the base station.

Performance requirements apply for a single carrier only, unless stated differently by the test case. Performance requirements for a base station supporting carrier aggregation are defined in terms of single carrier requirements.

For FDD operation, the requirements of [TS 38.141-1](#) must be met with the transmitter units associated with antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) in the operating band turned ON.

9.9.3 General Workflow for Carrying Out a Performance Test

The following instruction lists the general steps for performing a BS conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the base station, refer to the corresponding description.

1. Connect the instrument and the base station according to the corresponding test case setup.
See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.
2. Set the base station to the basic state:
 - a) Initialize the base station.
 - b) Set the frequency.
3. Preset the signal generator to ensure a defined instrument state.
4. Configure the test case wizard.
 - a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
 - b) Select a test case, e.g. [TS 38.141-1](#): "8.2.2 PUSCH Transform Precoding Disabled".
 - c) Enter additional required parameters, e.g. base station class.
 - d) Enter the test frequency of the wanted signal.
The setting must match with the base station configuration.
 - e) Select "Apply Settings" to activate the settings.
The signal generator is now ready.
5. Switch on RF output.
6. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.
See also [Chapter 9.5, "General Considerations"](#), on page 244.
7. Start the measurement.
 - a) Send a start trigger impulse from the base station to the signal generator.
The signal generator starts signal generation.
8. Calculate the results.

The base station internally calculates the BER, BLER, or the probability of detection of preamble (Pd), depending on the test case. This value is compared to the required value.

9.9.4 Test Case 8.2.1: PUSCH Transform Precoding Disabled

The performance requirement of PUSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in TS 38.141-1 annex A. The performance requirements assume HARQ retransmissions. Transform precoding is disabled.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fraction of maximum throughput must be 70% for all test case 8.2.1 measurements.

Table 9-21: Test requirements for PUSCH, type A, 5 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-1.7
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	10.7
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	12.9
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-5.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	6.8
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	9.4
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	3.6
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	6.2

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	1.8
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	19.0
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	11.8
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	-4.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	7.6

Table 9-22: Test requirements for PUSCH, type A, 10 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-1.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	10.8
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	12.8
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-5.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	3.7
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	6.1
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	2.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	19.1

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	-1.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	12.0
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	-4.7
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	7.6

Table 9-23: Test requirements for PUSCH, type A, 20 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	10.6
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	13.0
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-4.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	6.8
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-7.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	3.6
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	6.1
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	2.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	19.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	-1.0
		Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	11.9

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	-4.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	7.7

Table 9-24: Test requirements for PUSCH, type A, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-1.7
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	10.8
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	13.4
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-5.0
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	7.0
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-8.0
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	3.9
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	6.1
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	2.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	19.2
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	-1.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	12.0
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	-4.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	7.8

Table 9-25: Test requirements for PUSCH, type A, 20 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-2.3
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	10.8
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	13.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-5.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	7.0
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-8.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	3.8
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	6.1
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	2.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	18.9
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	-1.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	12.1
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	-4.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	7.7

Table 9-26: Test requirements for PUSCH, type A, 40 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-1.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	10.6

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
	4	Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	13.0
		Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-5.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	9.1
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	3.7
		Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	6.0
	2	Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	2.1
			TDLC300-10 0 Low	G-FR1-A4-27	pos1	20.3
		Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	-1.5
			TDLC300-10 0 Low	G-FR1-A4-27	pos1	12.1
		Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	-4.4
			TDLC300-10 0 Low	G-FR1-A4-27	pos1	7.7

Table 9-27: Test requirements for PUSCH, type A, 100 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-2.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	10.8
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	13.6
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-5.2

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	7.1
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	9.6
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	3.8
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	6.4
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	2.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	20.0
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	-1.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	12.4
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	-4.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	7.9

Table 9-28: Test requirements for PUSCH, type B, 5 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-1.7
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	10.8
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	13.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-5.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	9.5

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
2	8	Normal	TDLB100-40 0 Low	G-FR1-A3-8	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-8	pos1	3.6
		Normal	TDLA30-10 Low	G-FR1-A5-8	pos1	6.3
	2	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	2.3
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	19.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	11.9
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-22	pos1	-4.6
		Normal	TDLC300-10 0 Low	G-FR1-A4-22	pos1	7.6

Table 9-29: Test requirements for PUSCH, type B, 10 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-1.7
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	11.1
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	13.2
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-5.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	7.1
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	9.5
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-9	pos1	-8.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-9	pos1	3.8

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
		Normal	TDLA30-10 Low	G-FR1-A5-9	pos1	6.4
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	2.8
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	19.5
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	12.1
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-23	pos1	-4.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-23	pos1	7.8

Table 9-30: Test requirements for PUSCH, type B, 20 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	11.0
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	12.9
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-5.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	9.4
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-10	pos1	-7.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-10	pos1	3.7
		Normal	TDLA30-10 Low	G-FR1-A5-10	pos1	6.3
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	2.4

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
	4	Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	18.9
		Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	-1.2
	8	Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	12.0
		Normal	TDLB100-40 0 Low	G-FR1-A3-24	pos1	-4.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-24	pos1	7.7

Table 9-31: Test requirements for PUSCH, type B, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-1.8
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	10.7
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	13.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-5.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	7.0
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-11	pos1	-8.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-11	pos1	3.8
		Normal	TDLA30-10 Low	G-FR1-A5-11	pos1	6.2
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	1.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	19.3
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	-1.7

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	12.1
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-25	pos1	-4.8
		Normal	TDLC300-10 0 Low	G-FR1-A4-25	pos1	7.8

Table 9-32: Test requirements for PUSCH, type B, 20 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-2.3
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	10.7
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	13.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-5.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	9.2
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-12	pos1	-8.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-12	pos1	3.7
		Normal	TDLA30-10 Low	G-FR1-A5-12	pos1	6.2
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	2.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	19.0
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	-1.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	12.0

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-26	pos1	-4.6
		Normal	TDLC300-10 0 Low	G-FR1-A4-26	pos1	7.8

Table 9-33: Test requirements for PUSCH, type A, 40 MHz channel bandwidth, 30 kHz SCS

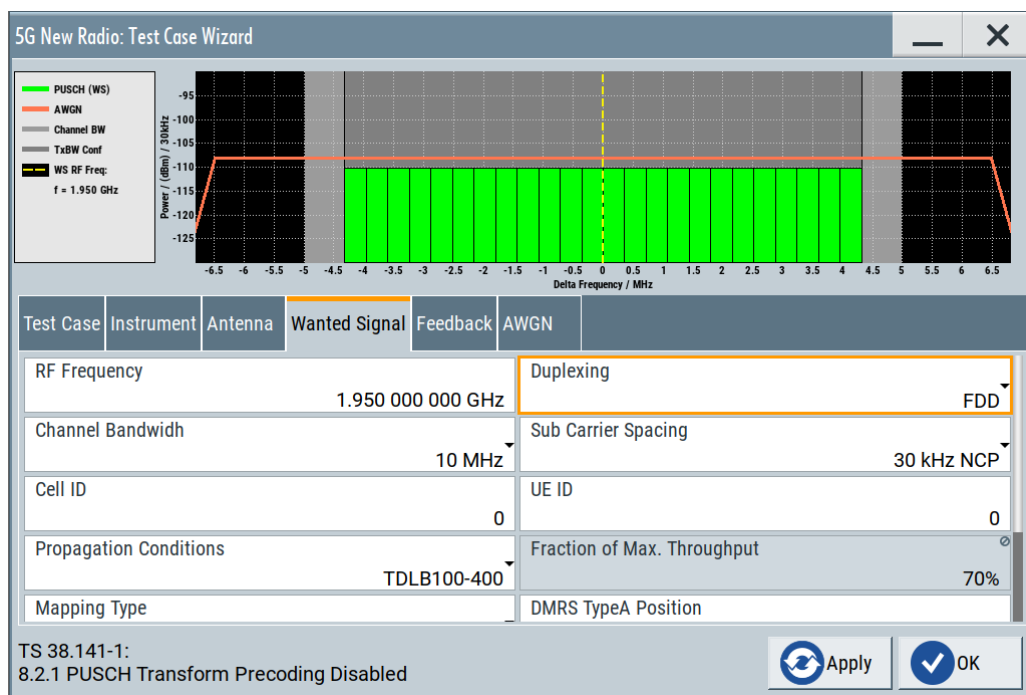
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-1.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	10.6
		Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	13.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-5.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	6.8
		Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	9.3
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-13	pos1	-8.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-13	pos1	3.6
		Normal	TDLA30-10 Low	G-FR1-A5-13	pos1	6.1
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	2.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-27	pos1	19.5
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	-1.3
		Normal	TDLC300-10 0 Low	G-FR1-A4-27	pos1	12.0
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-27	pos1	-4.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-27	pos1	7.7

Table 9-34: Test requirements for PUSCH, type B, 100 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-1.9
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	10.7
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	13.7
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-5.2
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	6.9
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	9.8
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-14	pos1	-8.1
		Normal	TDLC300-10 0 Low	G-FR1-A4-14	pos1	3.7
		Normal	TDLA30-10 Low	G-FR1-A5-14	pos1	6.5
2	2	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	2.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	20.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	-1.4
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	12.4
	8	Normal	TDLB100-40 0 Low	G-FR1-A3-28	pos1	-4.5
		Normal	TDLC300-10 0 Low	G-FR1-A4-28	pos1	7.9

Short description

For a given SNR, the receiver must achieve a certain throughput under multipath fading propagation conditions. Transform precoding is disabled.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.5 Test Case 8.2.2: PUSCH Transform Precoding Enabled

The performance requirement of PUSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in [TS 38.141-1 annex A](#). The performance requirements assume HARQ retransmissions. Transform precoding is enabled.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fraction of maximum throughput must be 70% for all test case 8.2.2 measurements.

Table 9-35: Test requirements for PUSCH, type A, 5 MHz channel bandwidth, 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-1.8
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-5.1
	6	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-7.9

Table 9-36: Test requirements for PUSCH, type A, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-1.9
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-5.1
	6	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-7.8

Table 9-37: Test requirements for PUSCH, type B, 5 MHz channel bandwidth, 15 kHz SCS

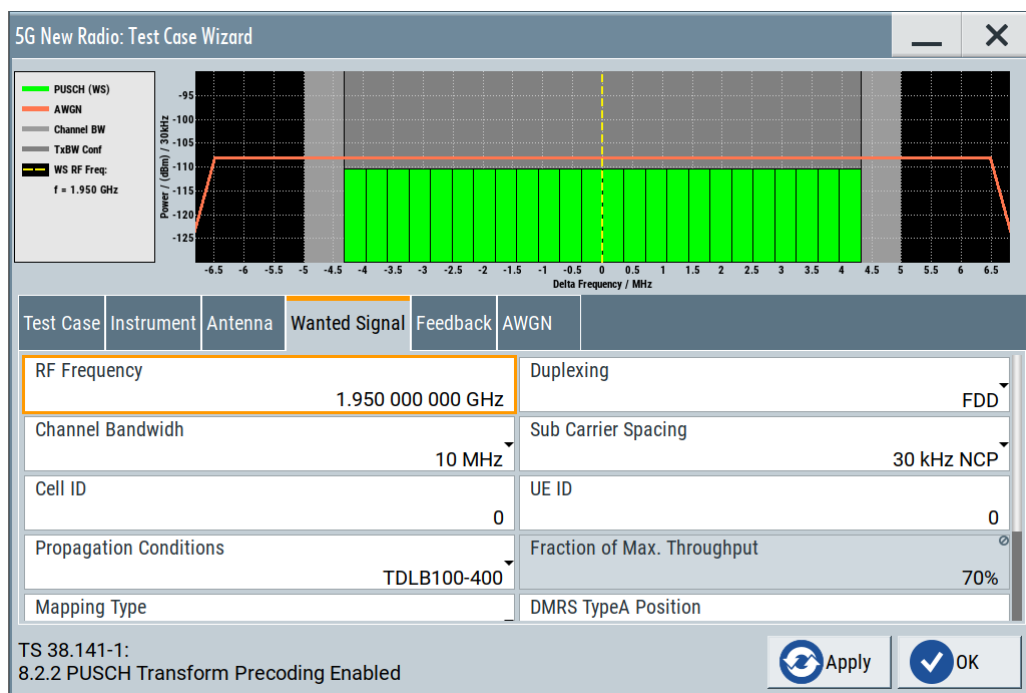
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-1.7
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-5.2
	6	Normal	TDLB100-40 0 Low	G-FR1-A3-31	pos1	-8.0

Table 9-38: Test requirements for PUSCH, type B, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	FRC (annex A)	Additional DM-RS position	SNR (dB)
1	2	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-2.1
	4	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-5.4
	6	Normal	TDLB100-40 0 Low	G-FR1-A3-32	pos1	-8.2

Short description

For a given SNR, the receiver must achieve a certain throughput under multipath fading propagation conditions. Transform precoding is enabled.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.6 Test Case 8.2.3: UCI Multiplexed on PUSCH

The performance requirement of UCI multiplexed on PUSCH is determined by two parameters:

- Block error probability (BLER) of CSI part 1 and

- Block error probability of CSI part 2.

The performance is measured by the required SNR at block error probability of CSI part 1 not exceeding 0.1 %. Also the required SNR at block error probability not exceeding 1 %.

- CSI part 1 BLER definition:
The probability of incorrectly decoding the CSI part 1 information when the CSI part 1 information is sent.
- CSI part 2 BLER definition:
The probability of incorrectly decoding the CSI part 2 information when the CSI part 2 information is sent.

In the test of UCI multiplexed on PUSCH, the UCI information only contains CSI part 1 and CSI part 2 information. There is no HACK/ACK information transmitted.

The number of UCI information bit payloads per slot is defined for two cases as follows:

- 7 bits UCI
 - CSI part 1: 5 bits
 - CSI part 2: 2 bits
- 40 bits UCI
 - CSI part 1: 20 bits
 - CSI part 2: 20 bits

The 7 bits UCI information case is further defined with the bitmap [c0 c1 c2 c3 c4] = [0 1 0 1 0] for CSI part 1 information, where c0 is mapping to the RI information, and with the bitmap [c0 c1] = [1 0] for CSI part 2 information.

The 40 bits UCI information case is assumed random information bit selection.

In both tests, PUSCH data, CSI part 1 and CSI part 2 are transmitted simultaneously.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement**Table 9-39: Test requirements for UCI multiplexed on PUSCH, type A, CSI part 1 10 MHz channel bandwidth, 30 kHz SCS**

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	UCI bits (CSI part 1, CSI part 2)	Additional DM-RS position	FRC (annex A)	SNR (dB)
1	2	Normal	TDLC300-100 Low	7 (5, 2)	pos1	G-FR1-A4-11	6.0
	2	Normal	TDLC300-100 Low	40 (20, 20)	pos1	G-FR1-A4-11	4.9

Table 9-40: Test requirements for UCI multiplexed on PUSCH, type B, CSI part 1, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	UCI bits (CSI part 1, CSI part 2)	Additional DM-RS position	FRC (annex A)	SNR (dB)
1	2	Normal	TDLC300-100 Low	7 (5, 2)	pos1	G-FR1-A4-11	6.4
	2	Normal	TDLC300-100 Low	40 (20, 20)	pos1	G-FR1-A4-11	4.7

Table 9-41: Test requirements for UCI multiplexed on PUSCH, type A, CSI part 2, 10 MHz channel bandwidth, 30 kHz SCS

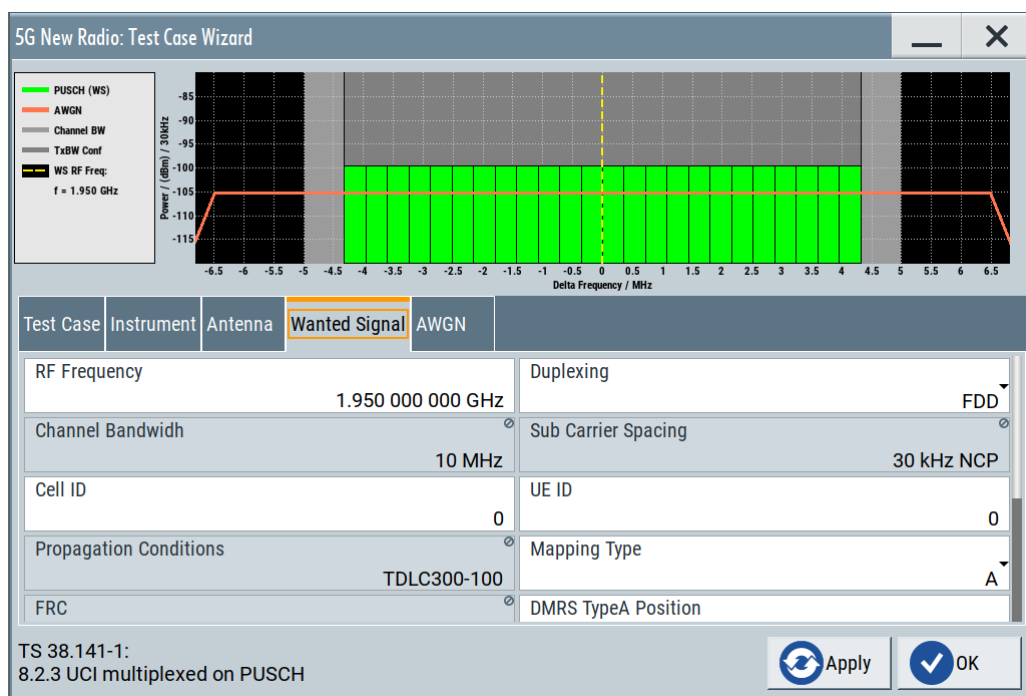
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	UCI bits (CSI part 1, CSI part 2)	Additional DM-RS position	FRC (annex A)	SNR (dB)
1	2	Normal	TDLC300-100 Low	7 (5, 2)	pos1	G-FR1-A4-11	0.4
	2	Normal	TDLC300-100 Low	40 (20, 20)	pos1	G-FR1-A4-11	3.0

Table 9-42: Test requirements for UCI multiplexed on PUSCH, type B CSI part 2, 10 MHz channel bandwidth, 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	UCI bits (CSI part 1, CSI part 2)	Additional DM-RS position	FRC (annex A)	SNR (dB)
1	2	Normal	TDLC300-100 Low	7 (5, 2)	pos1	G-FR1-A4-11	0.9
	2	Normal	TDLC300-100 Low	40 (20, 20)	pos1	G-FR1-A4-11	3.2

Short description

The test verifies the receiver's ability to detect UCI with CSI part 1 and CSI part 2 bits multiplexed on PUSCH under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.7 Test Case 8.3.1: Performance Requirements for PUCCH Format 0

The performance requirement of single user PUCCH format 0 for ACK missed detection is determined by the two parameters:

- probability of false detection of the ACK and
- the probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

The transient period is not considered for performance requirement testing, where the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fractions of falsely detected ACKs must be less than 1%. The fractions of correctly detected ACKs are larger than 99% for the SNR listed in the following tables.

Table 9-43: Test requirements for PUCCH format 0 kHz and 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Propagation conditions and correlation matrix (annex G)	Number of OFDM symbols	Channel bandwidth / SNR (dB)		
				5 MHz	10 MHz	20 MHz
1	2	TDLC-300-100 Low	1	10.0	9.4	9.9
			2	3.4	4.3	3.9
1	4	TDLC-300-100 Low	1	3.6	3.5	3.8
			2	-0.4	0.1	-0.2
1	8	TDLC-300-100 Low	1	-0.5	-0.5	-0.5
			2	-3.5	-3.3	-3.4

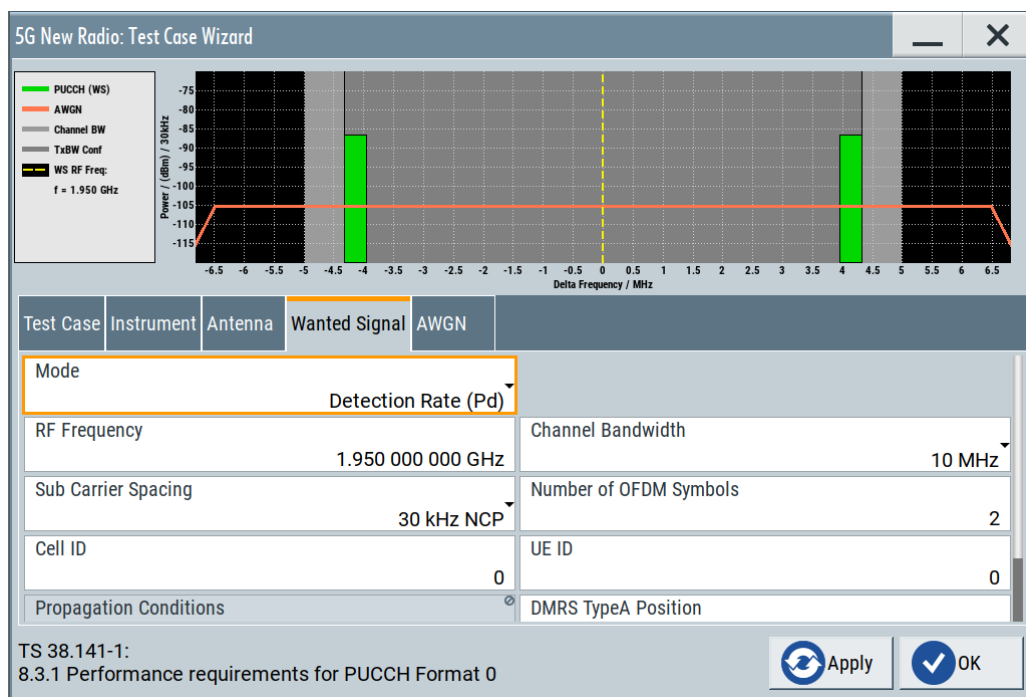
Table 9-44: Test requirements for PUCCH format 0 kHz and 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Propagation conditions and correlation matrix (annex G)	Number of OFDM symbols	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	2	TDLC-300-100 Low	1	10.4	10.4	10.1	9.8
			2	4.8	4.2	4.4	4.1

Number of Tx antennas	Number of Rx antennas	Propagation conditions and correlation matrix (annex G)	Number of OFDM symbols	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	4	TDLC-300 -100 Low	1	4.0	4.0	3.6	3.9
			2	0.3	0.2	0.1	-0.2
1	8	TDLC-300 -100 Low	1	-0.4	-0.4	-0.5	-0.4
			2	-3.1	-3.2	-3.4	-3.3

Short description

The test verifies the receiver's ability to detect ACK under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.8 Test Case 8.3.2.1: NACK to ACK Detection for PUCCH Format 1

The performance requirement of PUCCH format 1 for NACK to ACK detection is determined by the two parameters:

- probability of false detection of the ACK and

- the NACK to ACK detection probability.

The performance is measured by the required SNR at probability of the NACK to ACK detection equal to 0.1% or less. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK at particular bit position when input is only noise. Each false bit detection is counted as one error.

The NACK to ACK detection probability is the probability of detecting an ACK bit when an NACK bit was sent on particular bit position. Each NACK bit erroneously detected as ACK bit is counted as one error. Erroneously detected NACK bits in the definition do not contain the NACK bits which are mapped from DTX, i.e. NACK bits received when DTX sent is not considered.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fractions of falsely detected ACK bits must be less than 1% and the fraction of NACK bits falsely detected as ACK must be less than 0.1% for the SNR listed in the following tables.

Table 9-45: Required SNR for PUCCH format 1 with 15 kHz SCS

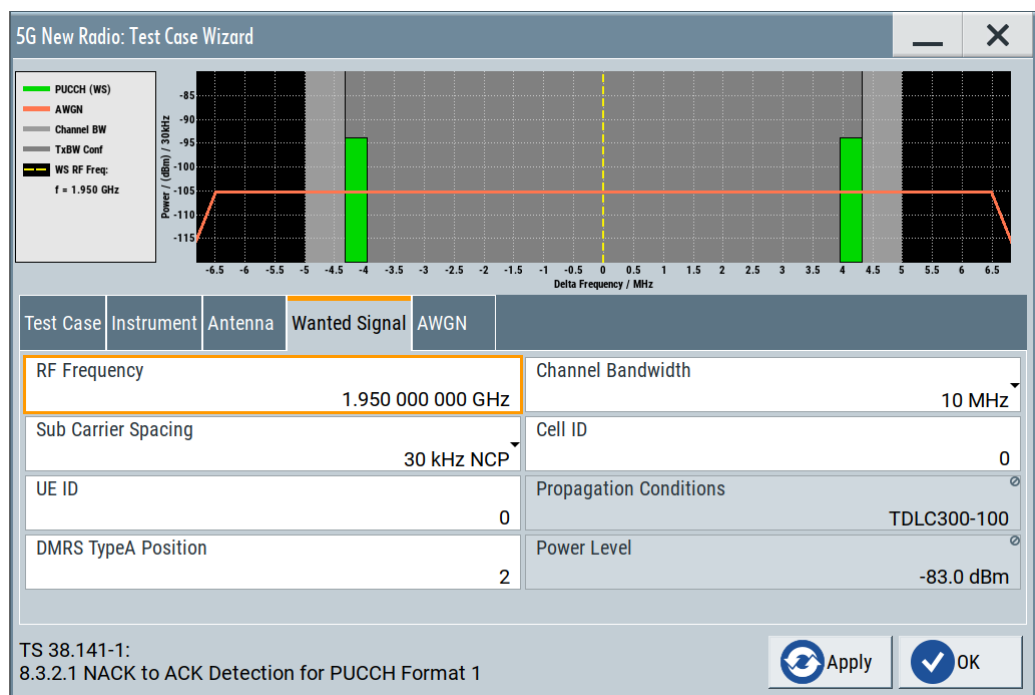
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)		
				5 MHz	10 MHz	20 MHz
1	2	Normal	TDLC-300-100 Low	-3.2	-3.0	-3.0
	4	Normal	TDLC-300-100 Low	-7.8	-7.0	-7.8
	8	Normal	TDLC-300-100 Low	-11.2	-10.8	-10.8

Table 9-46: Required SNR for PUCCH format 1 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	2	Normal	TDLC-300 -100 Low	-2.2	-2.7	-3.3	-2.9
	4	Normal	TDLC-300 -100 Low	-7.5	-7.7	-6.9	-7.4
	8	Normal	TDLC-300 -100 Low	-10.9	-10.6	-10.1	-10.7

Short description

The test verifies the receiver's ability to distinguish between ACK bits and NACK bits. NACK bits have to be not detected as ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.9 Test Case 8.3.2.2: ACK Missed Detection for PUCCH Format 1

The performance requirement of PUCCH format 1 for ACK missed detection is determined by the two parameters:

- probability of false detection of the ACK and
- the probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fractions of falsely detected ACK bits must be less than 1% and the fraction of correctly detected ACK bits are larger than 99% for the SNR listed in the following tables.

Table 9-47: Required SNR for PUCCH format 1 with 15 kHz SCS

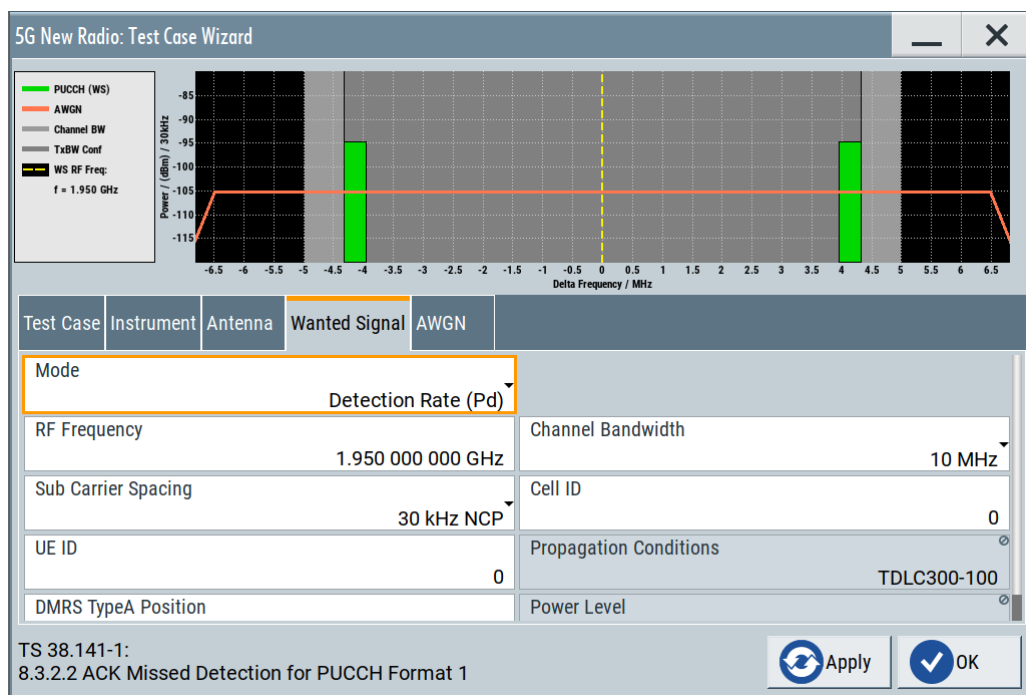
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)		
				5 MHz	10 MHz	20 MHz
1	2	Normal	TDLC-300-100 Low	-4.4	-3.8	-4.4
	4	Normal	TDLC-300-100 Low	-8.0	-7.6	-7.9
	8	Normal	TDLC-300-100 Low	-10.1	-10.9	-10.9

Table 9-48: Required SNR for PUCCH format 1 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	2	Normal	TDLC-300 -100 Low	-3.3	-3.8	-3.8	-3.6
	4	Normal	TDLC-300 -100 Low	-7.4	-7.5	-7.8	-7.7
	8	Normal	TDLC-300 -100 Low	-10.8	-10.8	-10.8	-10.8

Short description

The test verifies the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.10 Test Case 8.3.3.1: ACK Missed Detection for PUCCH Format 2

The performance requirement of PUCCH format 2 for ACK missed detection is determined by the two parameters:

- probability of false detection of the ACK and
- the probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as probability of detection of the ACK when the signal is present.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fractions of falsely detected ACKs must be less than 1% and the fraction of correctly detected ACKs must be larger than 99% for the SNR listed in the following tables.

Table 9-49: Required SNR for PUCCH format 2 with 15 kHz SCS

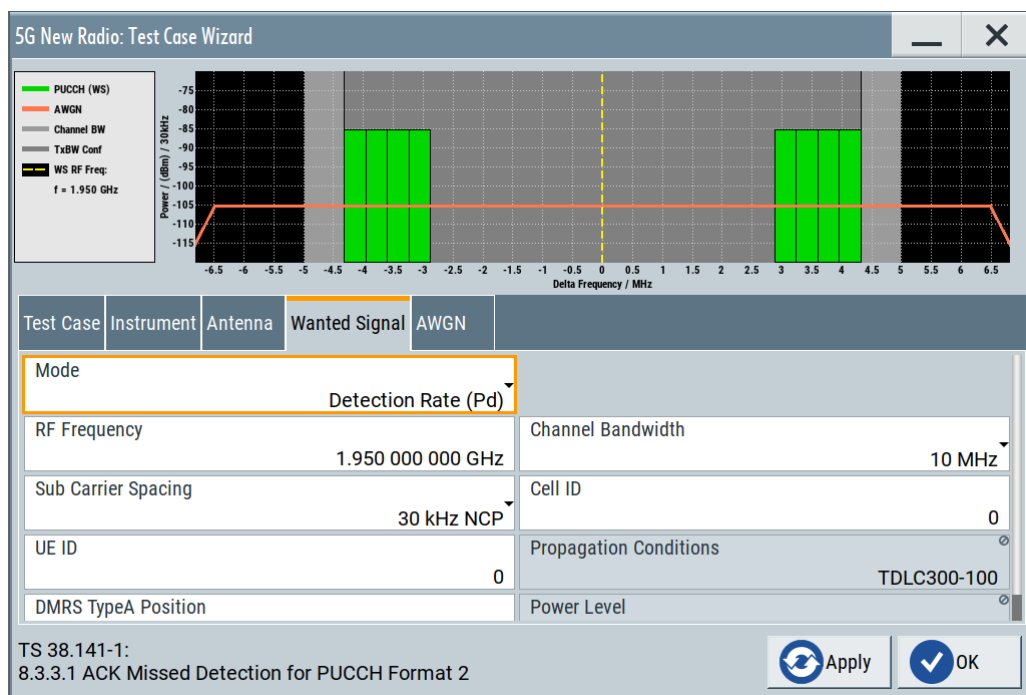
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)		
				5 MHz	10 MHz	20 MHz
1	2	Normal	TDLC-300-100 Low	6.4	6.2	6.5
	4	Normal	TDLC-300-100 Low	1.0	1.1	0.9
	8	Normal	TDLC-300-100 Low	-2.9	-2.9	-2.9

Table 9-50: Required SNR for PUCCH format 2 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	2	Normal	TDLC-300-100 Low	6.1	6.2	6.1	6.3
	4	Normal	TDLC-300-100 Low	0.9	0.8	0.9	1.0
	8	Normal	TDLC-300-100 Low	-3.0	-3.0	-2.9	-2.7

Short description

The test verifies the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.11 Test Case 8.3.3.2: UCI BLER for PUCCH Format 2

The performance is measured by the required SNR at UCI block error probability must not exceed 1%.

The UCI block error probability is defined as the probability of incorrectly decoding the UCI information when the UCI information is sent. The UCI information does not contain CSI part 2.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fraction of incorrectly decoded UCI must be less than 1% for the SNR listed in the following tables.

Table 9-51: Required SNR for PUCCH format 2 with 15 kHz SCS

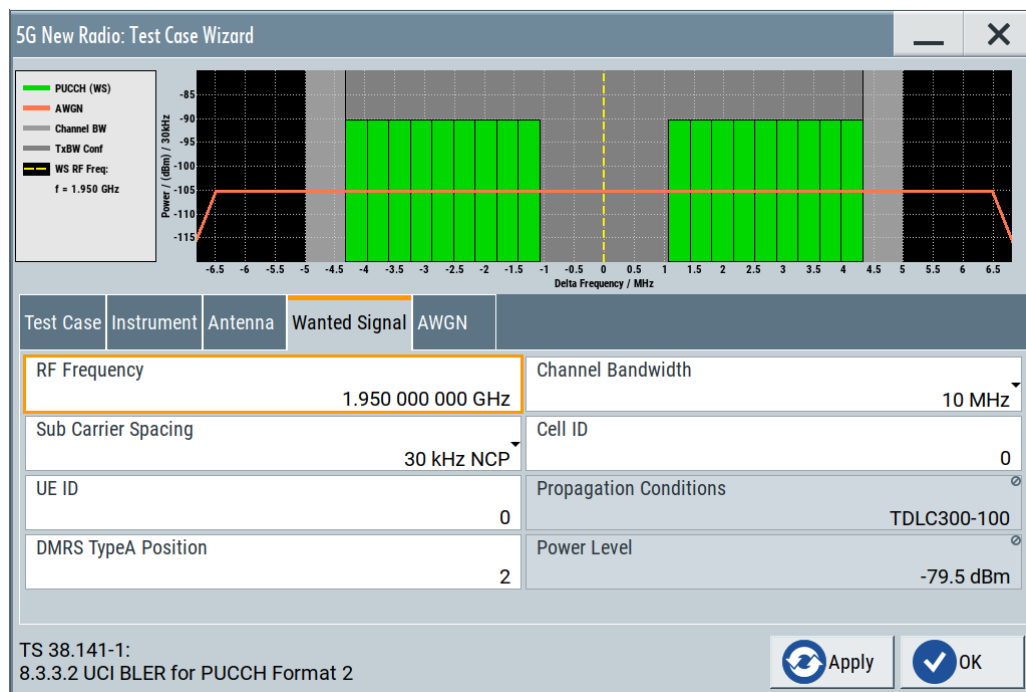
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)		
				5 MHz	10 MHz	20 MHz
1	2	Normal	TDLC-300-100 Low	0.8	1.4	1.8
	4	Normal	TDLC-300-100 Low	-3.0	-2.6	-2.6
	8	Normal	TDLC-300-100 Low	-6.2	-6.1	-6.2

Table 9-52: Required SNR for PUCCH format 2 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)			
				10 MHz	20 MHz	40 MHz	100 MHz
1	2	Normal	TDLC-300-100 Low	1.1	1.7	1.0	0.9
	4	Normal	TDLC-300-100 Low	-2.7	-2.3	-2.7	-2.8
	8	Normal	TDLC-300-100 Low	-5.2	-5.3	-6.1	-5.3

Short description

The test verifies the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.12 Test Case 8.3.4: Performance Requirements for PUCCH Format 3

The performance is measured by the required SNR at UCI block error probability not exceeding 1%.

The UCI block error probability is defined as the conditional probability of incorrectly decoding the UCI information when the UCI information is sent. The CSI part 2 is not contained in the UCI information.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

The fraction of incorrectly decoded UCI must be less than 1% for the SNR listed in the following tables.

Table 9-53: Required SNR for PUCCH format 3 with 15 kHz SCS

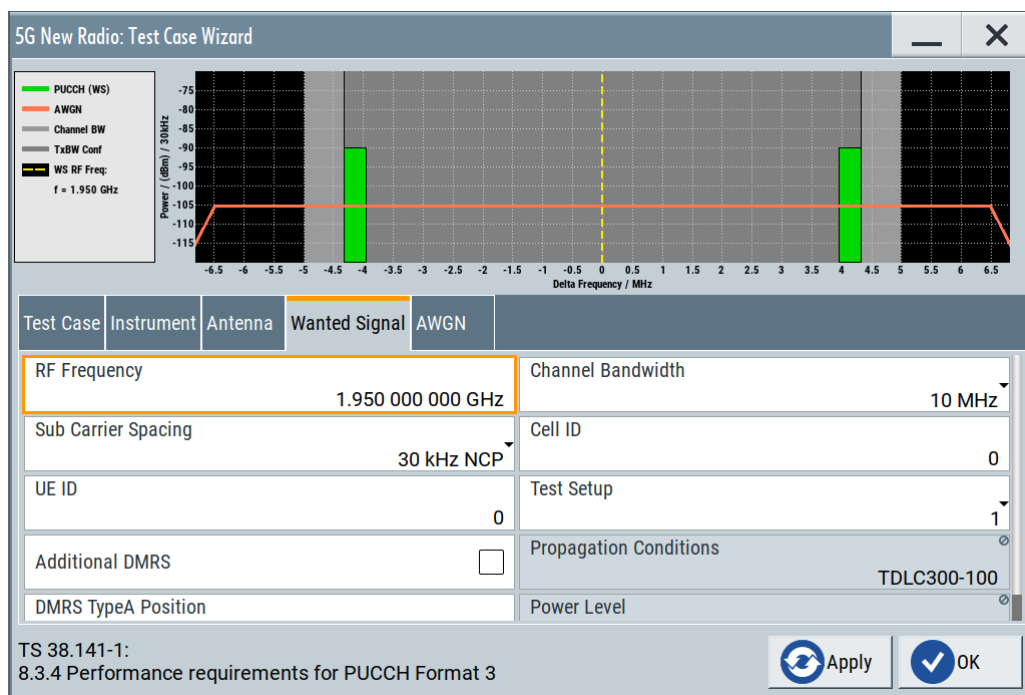
Test number	Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)		
						5 MHz	10 MHz	20 MHz
1	1	2	Normal	TDLC-3 00-100 Low	No additional DM-RS	0.8	1.7	0.9
					No additional DM-RS	0.5	1.1	0.5
		4	Normal	TDLC-3 00-100 Low	No additional DM-RS	-3.2	-2.7	-3.2
					No additional DM-RS	-3.7	-3.4	-3.4
		8	Normal	TDLC-3 00-100 Low	No additional DM-RS	-6.4	-6.1	-6.3
					No additional DM-RS	-7.1	-6.9	-7.1
2	1	2	Normal	TDLC-3 00-100 Low	No additional DM-RS	-2.0	2.8	2.6
		4	Normal	TDLC-3 00-100 Low	No additional DM-RS	-2.5	-1.9	-1.9
		8	Normal	TDLC-3 00-100 Low	No additional DM-RS	-5.9	-5.4	-5.6

Table 9-54: Required SNR for PUCCH format 3 with 30 kHz SCS

Test number	Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)			
						10 MHz	20 MHz	40 MHz	100 MHz
1	1	2	Normal	TDLC-300-100 Low	No additional DM-RS	1.5	1.2	1.2	1.5
					No additional DM-RS	1.1	0.9	0.6	0.7
		4	Normal	TDLC-300-100 Low	No additional DM-RS	-2.5	-2.8	-2.6	-2.9
					No additional DM-RS	-3.1	-3.5	-3.4	-3.6
		8	Normal	TDLC-300-100 Low	No additional DM-RS	-6.0	-6.1	-6.2	-6.2
					No additional DM-RS	-6.9	-7.0	-7.0	-7.1
2	1	2	Normal	TDLC-300-100 Low	No additional DM-RS	2.4	2.6	2.6	2.1
		4	Normal	TDLC-300-100 Low	No additional DM-RS	-2.3	-2.4	-1.8	-2.4
		8	Normal	TDLC-300-100 Low	No additional DM-RS	-5.8	-5.4	-5.8	-5.6

Short description

The test verifies the receiver's ability to detect UCI under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.13 Test Case 8.3.5: Performance Requirements for PUCCH Format 4

The performance is measured by the required SNR at UCI block error probability must not exceed 1%.

The UCI block error probability is defined as the conditional probability of incorrectly decoding the UCI information when the UCI information is sent. The CSI part 2 is not contained in the UCI information.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement for BS type 1-O

The fraction of incorrectly decoded UCI must be less than 1% for the SNR listed in the following tables.

Table 9-55: Required SNR for PUCCH format 4 with 15 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)		
					5 MHz	10 MHz	20 MHz
1	2	Normal	TDLC-300-100 Low	No additional DM-RS	2.4	3.2	2.8
				Additional DM-RS	2.2	3.0	2.4

Table 9-56: Required SNR for PUCCH format 4 with 30 kHz SCS

Number of Tx antennas Number of Tx	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)			
					10 MHz	20 MHz	40 MHz	100 MHz
1	2	Normal	TDLC-300-100 Low	No additional DM-RS	3.7	3.4	3.7	3.4
				Additional DM-RS	3.4	2.9	3.7	2.8

Test requirement for BS type 2-O

The fraction of incorrectly decoded UCI must be less than 1% for the SNR listed in the following tables.

Table 9-57: Required SNR for PUCCH format 4 with 60 kHz SCS

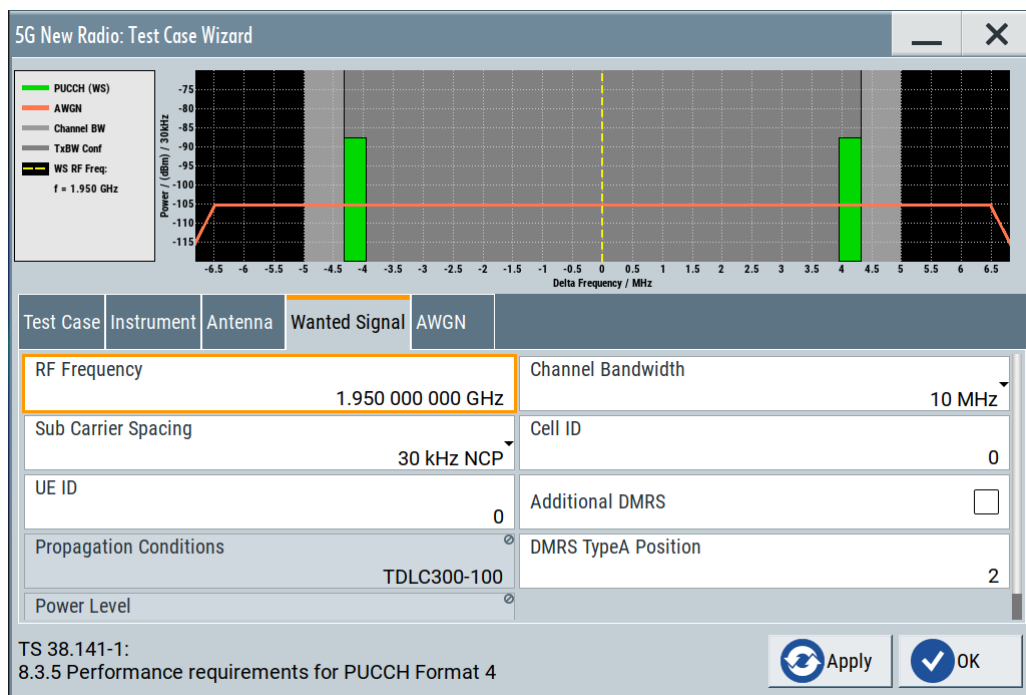
Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)	
					50 MHz	100 MHz
1	2	Normal	TDLC-300-100 Low	No additional DM-RS	3.6	3.3
				Additional DM-RS	3.7	4.1

Table 9-58: Required SNR for PUCCH format 4 with 120 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Additional DM-RS configuration	Channel bandwidth / SNR (dB)		
					50 MHz	100 MHz	200 MHz
1	2	Normal	TDLC-30 0-100 Low	No additional DM-RS	3.4	3.4	4.1
				Additional DM-RS	4.2	4.4	3.8

Short description

The test verifies the receiver's ability to detect UCI under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.14 Test Case 8.3.6.1A: NACK to ACK Detection for Multi-Slot PUCCH Format 1

The performance requirement of PUCCH format 1 for NACK to ACK detection is determined by the two parameters:

- Probability of false detection of the ACK and
- The NACK to ACK detection probability.

The performance is measured by the required SNR at probability of the NACK to ACK detection must be equal to 0.1% or less.

The probability of false detection of the ACK must be 0.01 or less. The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK at particular bit position when input is only noise. Each false bit detection is counted as one error.

The NACK to ACK detection probability is the probability of detecting an ACK bit when an NACK bit was sent on particular bit position. Each NACK bit erroneously detected as ACK bit is counted as one error. Erroneously detected NACK bits in the definition do not contain the NACK bits which are mapped from DTX, i.e. NACK bits received when DTX is sent, are not considered.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

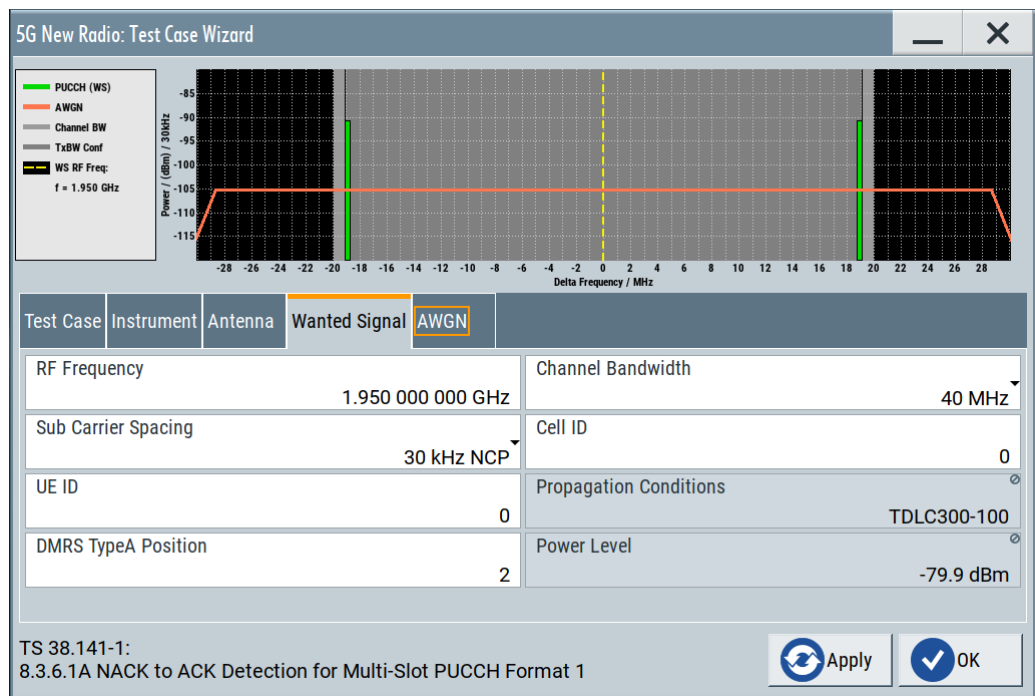
The fractions of falsely detected ACK bits must be less than 1% and the fraction of NACK bits falsely detected as ACK must be less than 0.1% for the SNR listed in the following table.

Table 9-59: Required SNR for multi-slot PUCCH format 1 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)
				40 MHz
1	2	Normal	TDLC-300-100 Low	TBD

Short description

The test verifies the receiver's ability not detect NACK bits as ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.15 Test Case 8.3.6.1B: ACK Missed Detection for Multi-Slot PUCCH Format 1

The performance requirement of PUCCH format 1 for ACK missed detection is determined by the two parameters:

- Probability of false detection of the ACK and
- The probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement

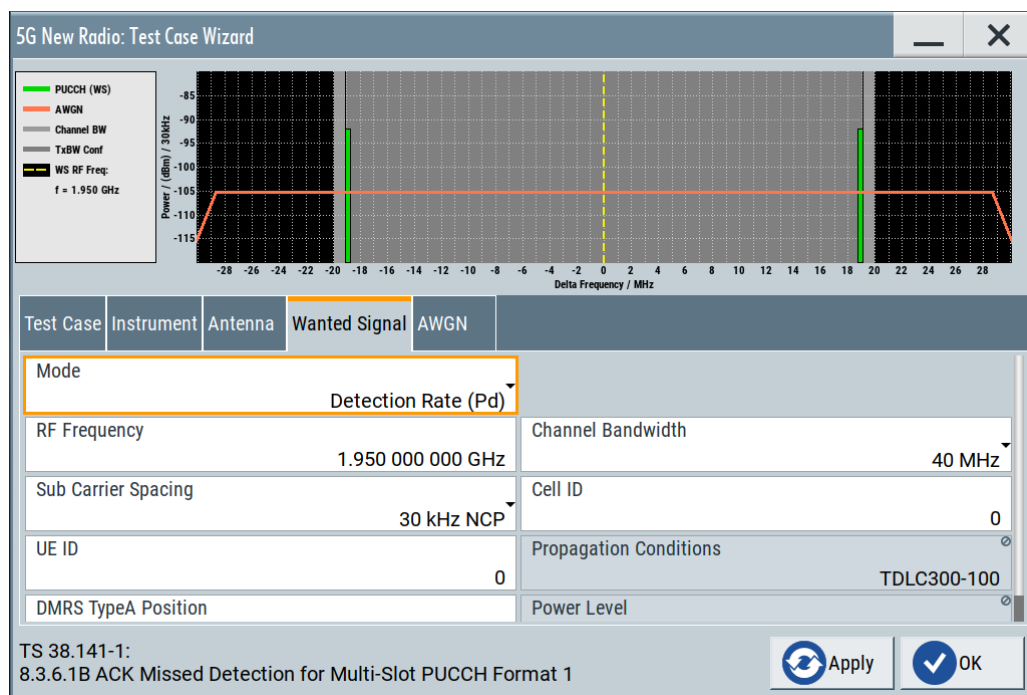
The fractions of falsely detected ACK bits must be less than 1% and the fraction of correctly detected ACK bits must be larger than 99% for the SNR listed in the following table.

Table 9-60: Required SNR for multi-slot PUCCH format 1 with 30 kHz SCS

Number of Tx antennas	Number of Rx antennas	Cyclic prefix	Propagation conditions and correlation matrix (annex G)	Channel bandwidth / SNR (dB)
				40 MHz
1	2	Normal	TDLC-300-100 Low	TBD

Short description

The test verifies the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.9.16 Test Case 8.4.1: PRACH False Alarm Probability and Missed Detection

The performance requirement of PRACH for preamble detection is determined by the two parameters:

- Total probability of false detection of the preamble (P_{fa}) and
- The probability of detection of preamble (P_d).

The performance is measured by the required SNR at probability of detection, the P_d must be 99% or better. P_{fa} must be 0.1% or less.

P_{fa} is defined as a conditional total probability of erroneous detection of the preamble (i.e. erroneous detection from any detector) when input is only noise.

P_d is defined as conditional probability of detection of the preamble when the signal is present.

The erroneous detection consists of several error cases:

- Detecting only different preambles than the one that was sent.
- Not detecting any preamble at all.
- Detecting the correct preamble but with the out-of-bounds timing estimation value

For AWGN, TDLC300-100 and TDLA30-300, a timing estimation error occurs if the estimation error of the timing of the strongest path is larger than the time error tolerance values given in the following table.

Table 9-61: Time error tolerance for AWGN, TDLC300-100 and TDLA30-300

PRACH preamble	PRACH SCS (kHz)	Time error tolerance		
		AWGN	TDLC300-100	TDLA30-300
0	1.25	1.04 μ s	2.55 μ s	N/A
A1, A2, A3, B4, C0, C2	15	0.52 μ s	2.03 μ s	N/A
	30	0.26 μ s	1.77 μ s	N/A
	60 (FR2)	0.13 μ s	N/A	0.28 μ s
	120	0.07 μ s	N/A	0.22 μ s

Required options

See [Chapter 9.9.1, "Required Options"](#), on page 292.

Test setup

See [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

Test requirement for BS type 1-O

P_{fa} must not exceed 0.1%. P_d must be 99% or better, for the SNRs in the following tables.

Table 9-62: PRACH missed detection test requirements for Normal Mode, 1.25 kHz SCS

Number of Tx antennas	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)
				Burst format 0
1	2	AWGN	0	-14.2
		TDLC-300-100 Low	400 Hz	-6.0

Table 9-63: PRACH missed detection test requirements for Normal Mode, 15 kHz SCS

Number of Tx antennas	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)					
				Burst format A1	Burst format A2	Burst format A3	Burst format B4	Burst format C0	Burst format C2
1	2	AWGN	0	-9.0	-12.3	-13.9	-16.5	-6.0	-12.2
		TDLC-300-100 Low	400 Hz	-1.5	-4.2	-6.0	-8.2	1.4	-4.3

Table 9-64: PRACH missed detection test requirements for Normal Mode, 30 kHz SCS

Number of Tx antennas Number of Tx	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)					
				Burst format A1	Burst format A2	Burst format A3	Burst format B4	Burst format C0	Burst format C2
1	2	AWGN	0	-8.8	-11.7	-13.5	-16.2	-5.8	-11.6
		TDLC-300-100 Low	400 Hz	-2.2	-5.1	-6.8	-9.3	0.7	-5.0

Test requirement for BS type 2-O

P_{fa} must not exceed 0.1%. P_d must be 99% or better, for the SNRs in the following tables.

Table 9-65: PRACH missed detection test requirements for Normal Mode, 60 kHz SCS

Number of Tx antennas	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)					
				Burst format A1	Burst format A2	Burst format A3	Burst format B4	Burst format C0	Burst format C2
1	2	AWGN	0	-8.6	-11.6	-13.2	-15.5	-5.7	-11.5
		TDLA-30-300 Low	4000 Hz	-1.0	-3.2	-4.2	-6.3	1.7	-3.3

Table 9-66: PRACH missed detection test requirements for Normal Mode, 120 kHz SCS

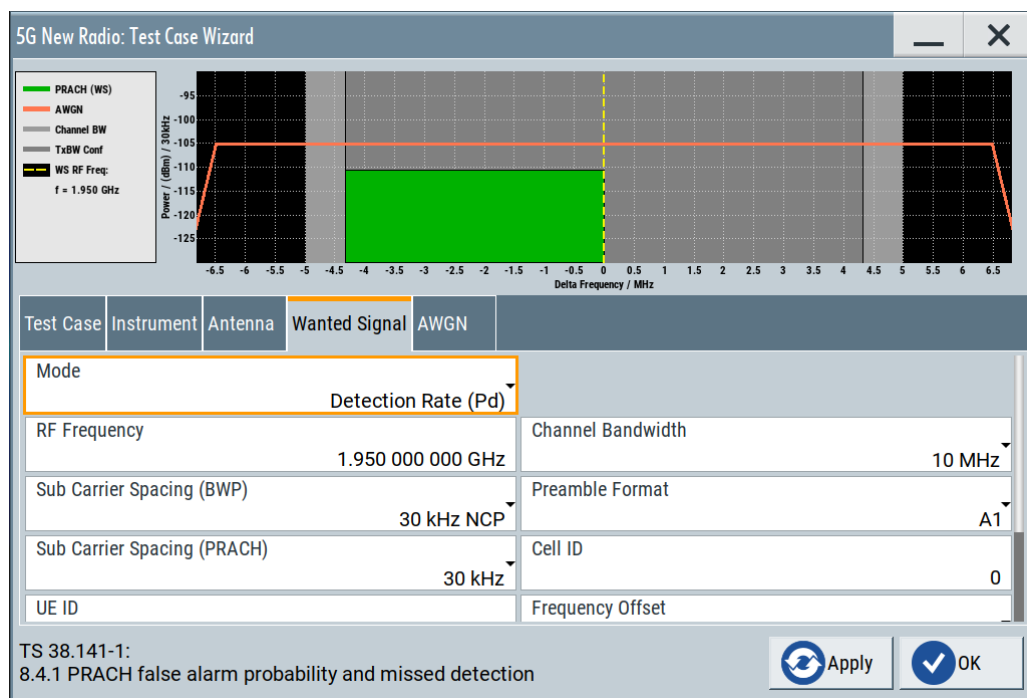
Number of Tx antennas	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)					
				Burst format A1	Burst format A2	Burst format A3	Burst format B4	Burst format C0	Burst format C2
1	2	AWGN	0	-8.4	-11.2	-13.0	-15.5	-5.5	-11.1
		TDLA-30-300 Low	4000 Hz	-1.1	-3.8	-5.2	-6.9	1.8	-3.6

Table 9-67: PRACH missed detection test requirements for Normal Mode, 30 kHz SCS

Number of Tx antennas	Number of demodulation branches	Propagation conditions and correlation matrix (annex J)	Frequency offset	SNR (dB)					
				Burst format A1	Burst format A2	Burst format A3	Burst format B4	Burst format C0	Burst format C2
1	2	AWGN	0	-8.8	-11.7	-13.5	-16.2	-5.8	-11.6
		TDLC-300-100 Low	400 Hz	-2.2	-5.1	-6.8	-9.3	0.7	-5.0

Short description

The test verifies the receiver's ability to detect PRACH preamble under static conditions and multipath fading propagation conditions for a given SNR.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

9.10 Radiated Transmitter Characteristics (TS 38.141-2, Chapter 6)

The wizard supports 3GPP tests [TS 38.141-2](#), chapter 6: Radiated transmitter characteristics.

The 3GPP [TS 38.141-2](#) contains several test cases in chapter 6, but only one transmitter test requires a signal generator. Therefore only one test case is listed in this document.

The radiated transmitter requirements are divided into the following main categories, intended to:

- Prove the transmitters ability to transmit the wanted signal:
 - Test case 6.4: OTA output power dynamics
 - Test case 6.5: OTA transmit ON/OFF power
- Prove how susceptible the transmitter is to different types of interfering signals:
 - Test case 6.6: OTA transmitted signal quality
 - Test case 6.7: OTA unwanted emissions
- Prove the transmitter intermodulation:
 - [Test Case 6.8: OTA Transmitter Intermodulation](#)

The tests cover a wide range of scenarios with different impairments on the wanted signal, that occur depending on the frequency offset between the wanted and the interfering signal.

9.10.1 Required Options

The table below lists the required options for performing the transmitter tests according to 3GPP TS 38.141-2, chapter 6.

Table 9-68: Required options

Chapter in TS 38.141-2	Hardware options					Software options	
	RF path		Baseband		BB generator	AWGN	5G NR
	A	B	1 path	2 paths			
	B100x	B200x	B13 B13XT	B13T B13XT	B10 B9	K62	K144
6.8 OTA Transmitter Intermodulation					1		1

The following equipment and options are required, for **radiated transmitter characteristics tests**:

- 1x option baseband generator (R&S SMW-B10 or -B9)
- 1x option digital standard 5G NR (R&S SMW-K144)
- Spectrum analyzer, e.g. an R&S FSW or R&S FSVA3000.
- OTA chamber, e.g. R&S ATS1800C or R&S PWC200

9.10.2 Prior Considerations

General test conditions for radiated transmitter tests are given in TS 38.141-2. Test conditions include interpretation of measurement results and configurations for testing. Base stations configurations are also given in TS 38.141-2.

Radiated transmitter characteristics requirements apply on the BS type 1-H, BS type 1-O or BS type 2-O including all its functional components active and for all foreseen modes of operation of the BS unless otherwise stated.

9.10.3 General Workflow for Carrying Out a Radiated Transmitter Test

The following instruction lists the general steps for performing a transmitter conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the OTA chamber, refer to its user manual.

1. Select an antenna test system (OTA chamber) that covers the radiated transmitter requirements for the test that you want to perform.

Note: Several antennas can be required to cover both the NR BS and the whole emission frequency range.

2. Connect the instrument to the selected antenna ports in the OTA chamber as specified for the corresponding test case setup.

See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.

3. Set the OTA chamber to the basic state:

- a) Initialize the OTA chamber.
- b) Set the frequency.
- c) Set the base station to transmit the downlink signal (for most transmitter test cases).

4. Preset the signal generator to ensure a defined instrument state.

5. Configure the test case wizard.

- a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
- b) Select a test case, e.g. [TS 38.141-2](#): "6.8 OTA Transmitter Intermodulation".
- c) Enter additional required parameters, e.g. base station class.
- d) Enter the test frequency of the wanted signal.
The setting must match with the base station configuration.
- e) Select "Apply Settings" to activate the settings.

The signal generator is now ready.

6. Switch on RF output.

7. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.

See also [Chapter 9.5, "General Considerations"](#), on page 244.

8. Start the measurement.

- a) Send a start trigger impulse from the base station to the signal generator.

The signal generator starts signal generation.

9. Calculate the results.

9.10.4 Test Case 6.8: OTA Transmitter Intermodulation

Test purpose

The test purpose is to verify the ability of the transmitter units associated with the RIB under test to restrict the generation of intermodulation products in its nonlinear elements caused by presence of the wanted signal and an interfering signal reaching the

transmitter unit via the RDN and antenna array from a co-located base station to below specified levels.

Required options

See also [Chapter 9.10.1, "Required Options"](#), on page 337.

Test setup

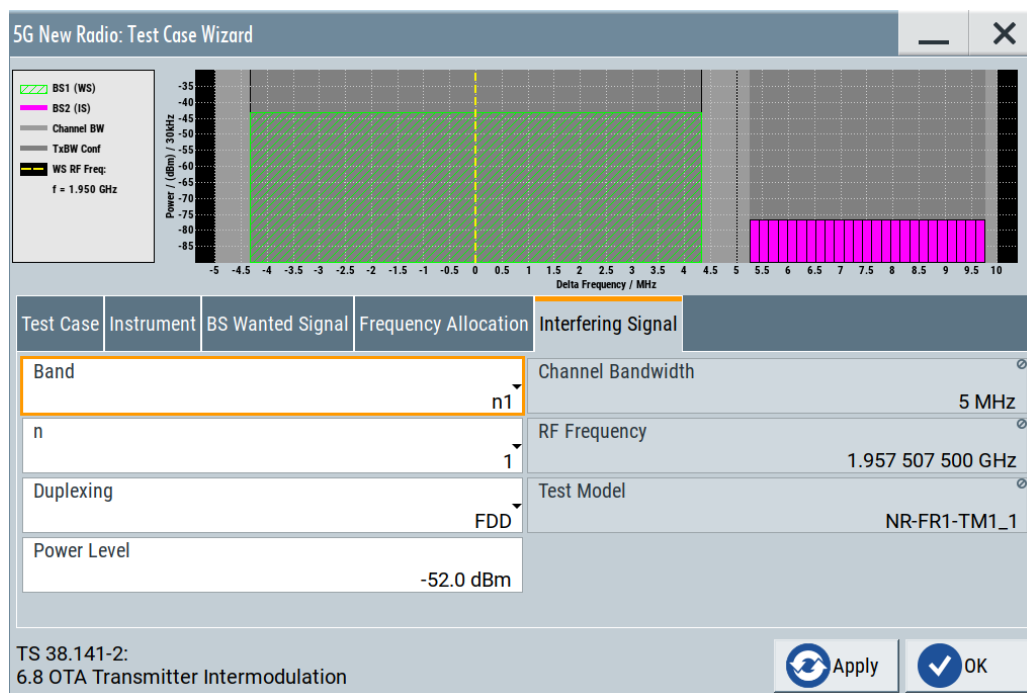
See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The OTA transmitter intermodulation requirement applies during the transmitter ON period and the transmitter transient period. The transmitter intermodulation level is the total radiated power of the intermodulation products when an interfering signal is injected into the colocation test antenna (CLTA).

For BS type 1-O, the transmitter intermodulation requirement is captured by the colocation transmitter intermodulation scenario case, in which the interfering signal is injected into the CLTA.

This requirement is not applicable for BS type 2-O.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA transmitter interdemodulation for BS type 1-O only.

The transmitter intermodulation level must not exceed the TRP unwanted emission limits specified for OTA transmitter spurious emission (except co-location with other base stations), OTA out-of-band emissions and OTA ACLR in the presence of a wanted signal and an interfering signal as specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 6.8 OTA transmitter interdemodulation for more information on the test requirements.

9.11 Radiated Receiver Characteristics (TS 38.141-2, Chapter 7)

The wizard supports 3GPP tests [TS 38.141-2](#), chapter 7: Radiated receiver characteristics.

Most of the receiver tests can be performed with the signal generator and the OTA chamber without additional measurement equipment.

Only four receiver tests can be performed with the signal generator and the OTA chamber without additional measurement equipment.

The receiver requirements are divided into the following main categories, intended to:

- Prove the receiver's ability to receive the wanted signal:
 - [Test Case 7.2: OTA Sensitivity](#)
 - [Test Case 7.3: OTA Reference Sensitivity Level](#)
 - [Test Case 7.4: OTA Dynamic Range](#)
- Prove how susceptible the receiver is to different types of interfering signals:
 - [Test Case 7.5.1: OTA Adjacent Channel Selectivity \(ACS\)](#)
 - [Test Case 7.5.2A: OTA In-Band General Blocking](#)
 - [Test Case 7.5.2B: OTA In-Band Narrowband Blocking](#)
 - [Test Case 7.6: OTA Out-of-Band Blocking](#)
 - [Test Case 7.8: OTA Receiver Intermodulation](#)
 - [Test Case 7.9: OTA In-Channel Selectivity](#)

The tests cover a wide range of scenarios with different impairments on the wanted signal, that occur depending on the frequency offset between the wanted and the interfering signal.

9.11.1 Required Options

[Table 9-69](#) lists the required options for performing the receiver tests according to 3GPP [TS 38.141-2](#), chapter 7.

Table 9-69: Required options

	Hardware options					Software options	
	RF path		Baseband		BB genera- tor	AWGN	5G NR
	A	B	1 path	2 paths			
	e.g., B1003	e.g., B2003	B13 B13XT	B13T B13XT	B10 B9	K62	K144
Chapter in TS 38.141-2							
7.2 OTA sensitivity	1		1		1		1
7.3 OTA reference sensitivity level	1		1		1		1
7.4 OTA dynamic range	1		1		1	1	1
7.5.1 OTA adjacent channel selectivity (ACS)	1	1		1	2		2
7.5.2A OTA in-band general blocking	1	1		1	2		2
7.5.2B OTA in-band narrowband blocking	1	1		1	2		2
7.6 OTA out-of-band blocking ¹⁾	1			1	1		1
7.7 OTA receiver spurious emissions ²⁾							
7.8 OTA receiver intermodulation ¹⁾	1	1		1	2	1	2
7.9 OTA in-channel sensitivity	1	1		1	2		2

¹⁾ An additional R&S instrument required for CW/5G NR signal

²⁾ No signal generator required

The following equipment and options are required, for **radiated receiver characteristics tests**:

- 2x option baseband generator (R&S SMW-B10 or -B9)
- 1x option baseband main module (R&S SMW-B13T or -B13XT)
- 1x option frequency (e.g. R&S SMW-B1003)
- 1x option frequency (e.g. R&S SMW-B2003)
- 1x option additive white Gaussian noise (AWGN) (R&S SMW-K62)
- 2x option digital standard 5G NR (R&S SMW-K144)
- For OTA out-of-band blocking (7.6) and OTA receiver intermodulation (7.8) tests:
An additional R&S device required for interfering signal.

9.11.2 Prior Considerations

Unless otherwise stated, the following arrangements apply for radiated receiver characteristics requirements according to TS 38.141-2:

- Requirements apply during the base station receive period
- Requirements must be met for any transmitter setting
- For FDD operation the requirements must be met with the transmitter units ON

- Throughput requirements defined for the radiated receiver characteristics do not assume HARQ retransmissions
- For ACS, blocking and intermodulation characteristics, the negative offsets of the interfering signal apply relative to the lower base station RF bandwidth edge or subblock edge inside a subblock gap, and the positive offsets of the interfering signal apply relative to the upper base station RF bandwidth edge or subblock edge inside a subblock gap

For FR1 requirements which are to be met over the OTA REFSSENS RoAoA absolute requirement values are offset by the following terms:

- $\Delta_{\text{OTAREFSSENS}} = 44.1 - 10 \cdot \log_{10}(\text{BeW}_{\theta, \text{REFSENS}} \cdot \text{BeW}_{\varphi, \text{REFSENS}})$ (dB), for the reference direction.
- $\Delta_{\text{OTAREFSSENS}} = 41.1 - 10 \cdot \log_{10}(\text{BeW}_{\theta, \text{REFSENS}} \cdot \text{BeW}_{\varphi, \text{REFSENS}})$ (dB), for all other directions.

For requirements which are to be met over the minSENS RoAoA absolute requirement values are offset by the following term:

- $\Delta_{\text{minSENS}} = P_{\text{REFSENS}} - \text{EIS}_{\text{minSENS}}$

For FR2 requirements which are to be met over the OTA REFSSENS RoAoA absolute requirement values are offset by the following terms:

- $\Delta_{\text{FR2\_REFSENS}} = -3$ dB (for the reference direction)
- $\Delta_{\text{FR2\_REFSENS}} = 0$ dB (for all other directions)

Fixed reference channels (FRC)

The receiver tests use fixed reference channels (FRC) as defined in TS 38.141-2, annex A "Reference measurement channels".

Table 9-70 shows the supported FRCs for receiver tests.

Table 9-70: Supported FRC

FRC	Description
G-FR1-A1-1 to G-FR1-A1-9	FRC for FR1 OTA sensitivity, OTA reference sensitivity level, OTA ACS, OTA in-band blocking, OTA out-of-band blocking, OTA receiver intermodulation and OTA in-channel selectivity (QPSK, R=1/3)
G-FR2-A1-1 to G-FR2-A1-5	FRC for FR2 OTA sensitivity, OTA reference sensitivity level, OTA ACS, OTA in-band blocking, OTA out-of-band blocking, OTA receiver intermodulation and OTA in-channel selectivity (QPSK, R=1/3)
G-FR1-A2-1 to G-FR1-A2-6	FRC for FR1 OTA dynamic range (16QAM, R=2/3)

Channels

According to the TS 38.141-2, the channels to test are located in the bottom (B), middle (M) and the top (T) of the supported frequency range of the base station in a normal test environment. The RF channels to be tested in each requirement are shown in Table 9-71.

Table 9-71: RF channels to test radiated receiver as specified in 38.141-2

Test	RF channel
7.2 OTA sensitivity	M
7.3 OTA reference sensitivity level	B, M, T
7.4 OTA dynamic range	M
7.5.1 OTA adjacent channel selectivity (ACS)	M
7.5.2A OTA in-band general blocking	M
7.5.2B OTA in-band narrowband blocking	M
7.6 OTA out-of-band blocking	M
7.7 OTA receiver spurious emissions ¹⁾	B/T
7.8 OTA receiver intermodulation	M
7.9 OTA in-channel sensitivity	M

¹⁾ No signal generator required

Base station type

The test applicability for each base station type is shown in [Table 9-72](#) as specified in [TS 38.141-2](#).

Table 9-72: Requirement set applicability

Test	Requirement set		
	BS type 1-H	BS type 1-O	BS type 2-O
7.2 OTA sensitivity	✓	✓	x
7.3 OTA reference sensitivity level	x	✓	✓
7.4 OTA dynamic range	x	✓	x
7.5.1 OTA adjacent channel selectivity (ACS)	x	✓	✓
7.5.2A OTA in-band general blocking	x	✓	✓
7.5.2B OTA in-band narrowband blocking	x	✓	✓
7.6 OTA out-of-band blocking	x	✓	✓
7.7 OTA receiver spurious emissions ¹⁾	x	✓	✓
7.8 OTA receiver intermodulation	x	✓	✓
7.9 OTA in-channel sensitivity	x	✓	✓

¹⁾ No signal generator required

✓ Applicable

X Not applicable

Channel bandwidth of the 5G NR interfering signal

For all test cases using an interfering 5G NR signal, the bandwidth of the interfering signal must be the same as the wanted signal.

Equivalent isotropic sensitivity (EIS)

The EIS describes the sensitivity for an isotropic directivity device equivalent to the sensitivity of the DUT exposed to an incoming wave from a defined angle of arrival.

In general, the EIS can be expressed as:

$$\text{EIS}(\theta, \phi) = P_S / G_{X, \text{DUT}}(\theta, \phi)$$

Where:

P_S is the radiated sensitivity of the DUT receiver

$G_{X, \text{DUT}}(\theta, \phi)$ is the relative isotropic gain (in polarization x) of the DUT antenna.

The radiated sensitivity corresponds to the minimum signal power at the radio receiver's input (antenna's output) required to meet the airlink's minimum performance criterion (typically expressed in terms of bit, block or frame error rate).

OTA reference sensitivity ($\text{EIS}_{\text{REFSENS}}$)

The OTA reference sensitivity power level ($\text{EIS}_{\text{REFSENS}}$) is the minimum mean power received at the radiated interface (RIB) at which a reference performance requirement must be met for a specified reference measurement channel. The test purpose is to verify that the BS can meet the minimum throughput requirement for a specified measurement channel at the $\text{EIS}_{\text{REFSENS}}$ level.

Effective isotropic radiated power (EIRP)

The EIRP denotes the absolute output power in a given direction. If no direction is defined, the direction of maximum radiation intensity is implied. The EIRP is the power an ideal isotropic radiator requires as input power to achieve the same power density in the given direction. EIRP is the power accepted by the antenna (P_{in}) multiplied by the antenna gain (G), or radiated power multiplied by the directivity and can be expressed as:

$$\text{EIRP} = P_{\text{in}} G$$

$$\text{EIRP}_{\text{dBm}} = P_{\text{in, dBm}} + G_{\text{dBi}}$$

Total radiated power (TRP)

The TRP or the radiated power is simply the total power radiated by a base station. It is defined as the radiation intensity at each angle in watts per Steradian $I(\theta, \phi)$ integrated over the whole sphere around the antenna.

The power radiated by the antenna P_{rad} is also called the total radiated power (P_{TRP}). It is defined as the radiant intensity $I(\theta, \phi)$ integrated over the whole sphere around the antenna:

9.11.3 General Workflow for Carrying Out a Receiver Test

The following instruction lists the general steps for performing a BS radiated conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the OTA chamber, refer to the corresponding description.

1. Select an antenna test system (OTA chamber) that covers the radiated transmitter requirements for the test that you want to perform.
Note: Several antennas can be required to cover both the NR BS and the whole emission frequency range.
2. Connect the instrument to the selected antenna ports in the OTA chamber as specified for the corresponding test case setup.
 See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.
3. Place the base station at the positioner. Align the coordinate system.
4. Align the base station with the test antenna in the declared direction to be tested.
5. Configure beam peak direction according to the declared reference beam direction pair.
6. Set the BS to transmit beams of the same operational band as the OTA REFSENS RoAoA or OSDD being tested.
7. Configure the test case wizard.
 - a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
 - b) Select a test case, e.g. [TS 38.141-2: "7.4 OTA Dynamic Range"](#).
 - c) Enter additional required parameters, e.g. base station class, OTA declarations, etc.
 - d) Enter the test frequency of the wanted/interfering signal.
 The setting must match with the base station configuration.
 - e) Select "Apply Settings" to activate the settings.
 The signal generator is now ready to start signal generation.
8. Switch on RF output.
9. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.
 See also [Chapter 9.5, "General Considerations"](#), on page 244.
10. Start the measurement for each supported polarization.

a) Send a start trigger impulse from the base station to the signal generator.

The signal generator starts signal generation.

11. Calculate the results.

12. Repeat the measurement for all OSDDs declared for the BS and supported polarizations.

9.11.4 Test Case 7.2: OTA Sensitivity

Test purpose

To verify that the BS can meet the throughput requirement for a specified measurement channel at the EIS level and the range of angles of arrival declared in the OSDD.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

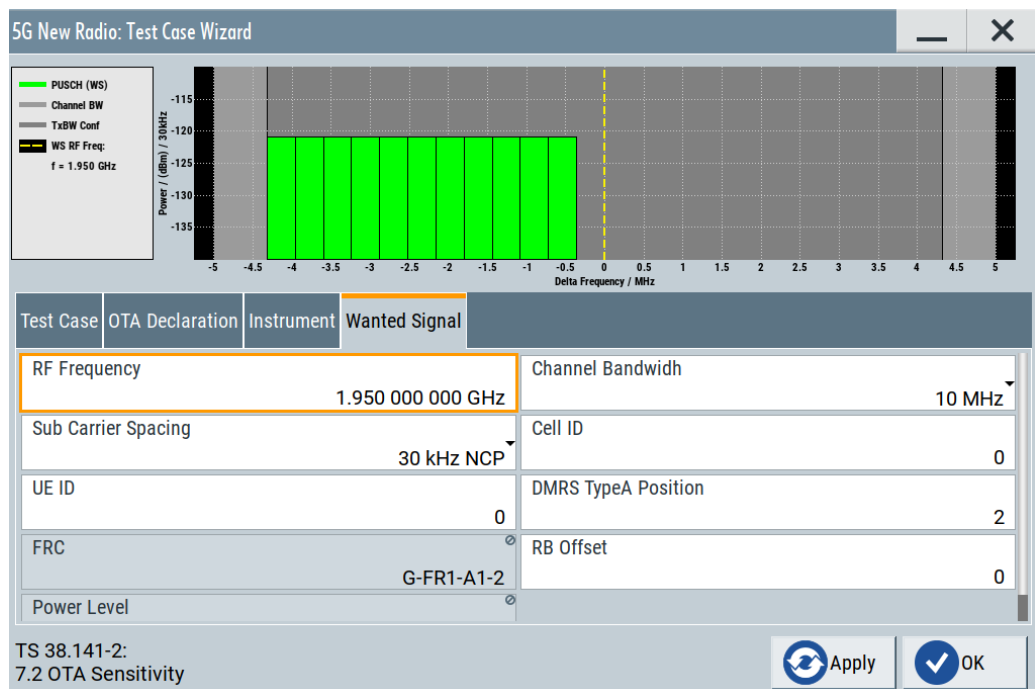
The OTA sensitivity requirement is based on the declaration of one or more OTA sensitivity direction declarations (OSDD).

Perform the test on the channel M as indicated in [Table 9-71](#).

Perform the test on the following directions:

- Directions receiver target reference direction
- Conformance test directions

The selected "Channel Bandwidth" and "Sub Carrier Spacing" determine the used FRC and the "Wanted Signal Power Level". For channels larger than 5 MHz not all RBs are allocated; to adjust the position of the allocated RBs within the selected channel bandwidth, use the parameter "RB Offset".



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA sensitivity for BS type 1-H and BS type 1-O.

The minimum EIS level is a declared figure for each OSDD. The test requirement is calculated from the declared value offset by the EIS test tolerance specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 7.2 OTA sensitivity for more information on the test requirements.

This test is not applicable for BS type 2-O. For a BS type 2-O, the OTA sensitivity is the same as the [Test Case 7.3: OTA Reference Sensitivity Level](#).

9.11.5 Test Case 7.3: OTA Reference Sensitivity Level

Test purpose

To verify that the BS can meet the throughput requirement for a specified measurement channel at the $EIS_{REFSENS}$ level and the range of angles of arrival within the OTA REFSENS RoAoA.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The reference sensitivity level measurement is a test case that aims to verify the noise figure of the receivers. The test case uses FRCs with QPSK modulation.

The OTA reference sensitivity (REFSENS) requirement is a directional requirement and is intended to ensure the minimum OTA reference sensitivity level for a declared OTA REFSENS RoAoA. The OTA reference sensitivity power level $EIS_{REFSENS}$ is the minimum mean power received at the RIB at which a reference performance requirement must be met for a specified reference measurement channel.

The OTA REFSENS EIS level declaration must apply to all supported polarizations, under the assumption of polarization match.

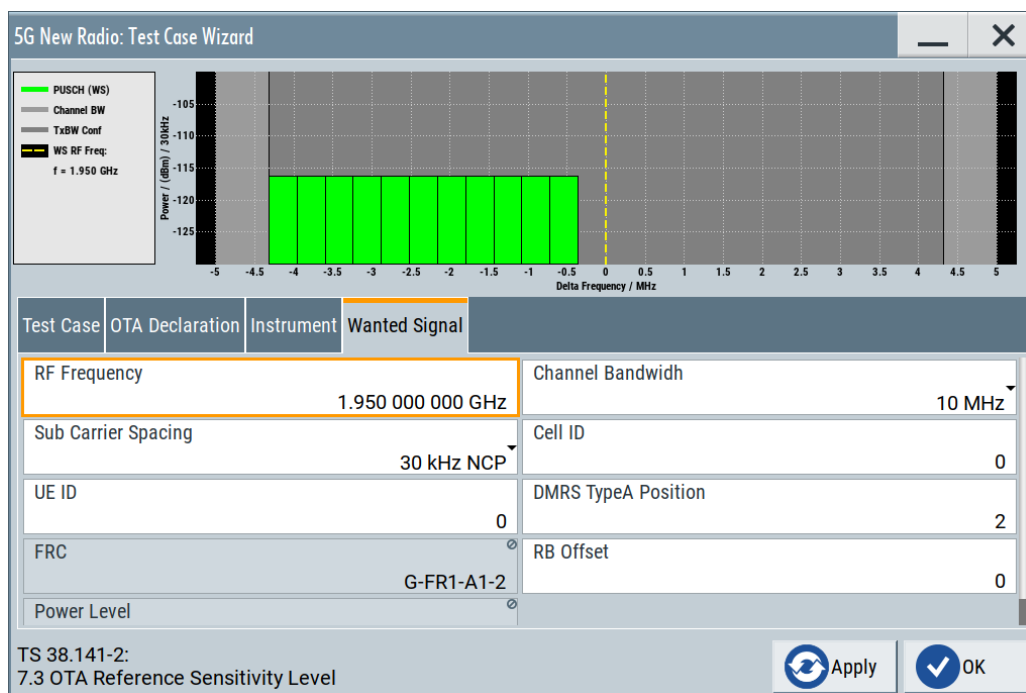
Perform the test on the channels B, M and T as indicated in [Table 9-71](#).

Perform the test on the following directions:

- OTA REFSENS receiver target reference direction
- OTA REFSENS conformance test directions

The selected "Channel Bandwidth" and "Sub Carrier Spacing" determine the used FRC and the "Wanted Signal Power Level". For channels larger than 5 MHz not all RBs are allocated; to adjust the position of the allocated RBs within the selected channel bandwidth, use the parameter "RB Offset".

The test requirements depend on the BS class and type.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA reference sensitivity level for BS type 1-O and BS type 2-O.

For a BS type 1-O, the FR1 $EIS_{REFSENS}$ level is the conducted REFSENS requirement value offset by $\Delta_{OTAREFSENS}$.

For a BS type 2-O, the $EIS_{REFSENS}$ levels are derived from a single declared basis level $EIS_{REFSENS\_50M}$, which is based on a reference measurement channel with 50 MHz BS channel bandwidth.

The test requirement is calculated from the $EIS_{REFSENS}$ level offset by the $EIS_{REFSENS}$ test tolerance specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 7.3 OTA reference sensitivity level for more information on the test requirements.

9.11.6 Test Case 7.4: OTA Dynamic Range

Test purpose

To verify that at the BS receiver dynamic range, the relative throughput fulfills the specified limit.

Required options

- See [Chapter 9.11.1, "Required Options"](#), on page 340.
- Option additive white Gaussian noise AWGN (R&S SMW-K62)

Test setup

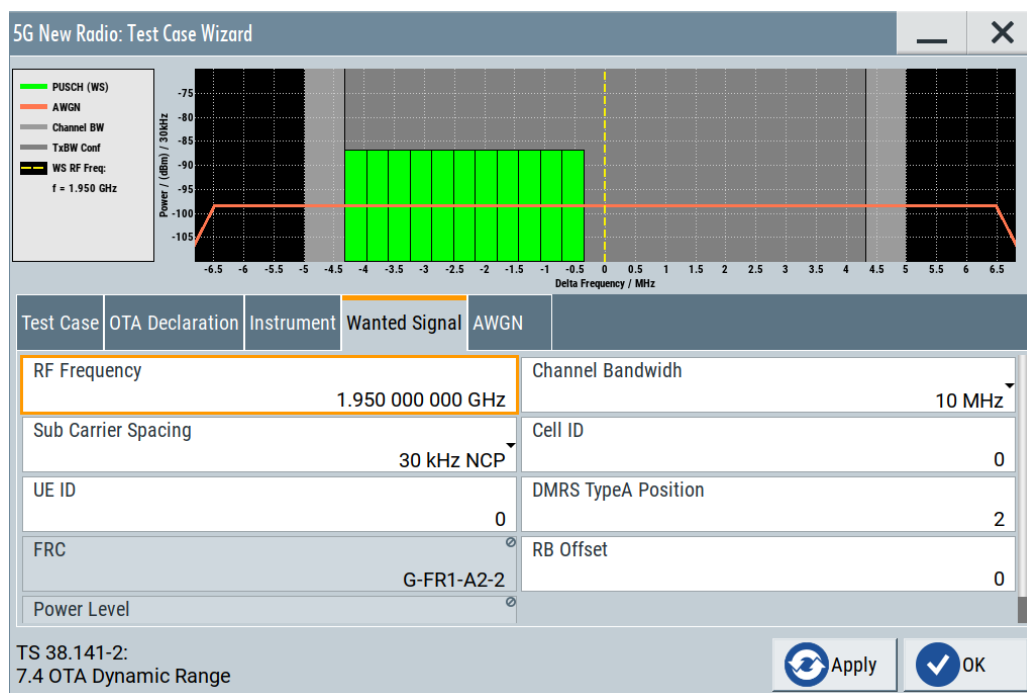
See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The OTA dynamic range is a measure of the capability of the receiver unit to receive a wanted signal in the presence of an interfering signal inside the received BS channel bandwidth. The requirement must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction and are within the OTA REFSENS RoAoA. The test purpose is to verify that at the BS receiver dynamic range, the relative throughput must fulfill the specified limit.

The interfering signal is an AWGN signal.

This test applies for BS type 1-O only. The dynamic range value depends on the BS class.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA dynamic range for BS type 1-O only.

The test requirement is calculated from the OTA wanted signal mean power level offset by the OTA dynamic range test tolerance specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 7.4 OTA dynamic range for more information on the test requirements.

9.11.7 Test Case 7.5.1: OTA Adjacent Channel Selectivity (ACS)

Test purpose

To verify the ability of the BS receiver filter to suppress interfering signals in the channels next to the wanted channel.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

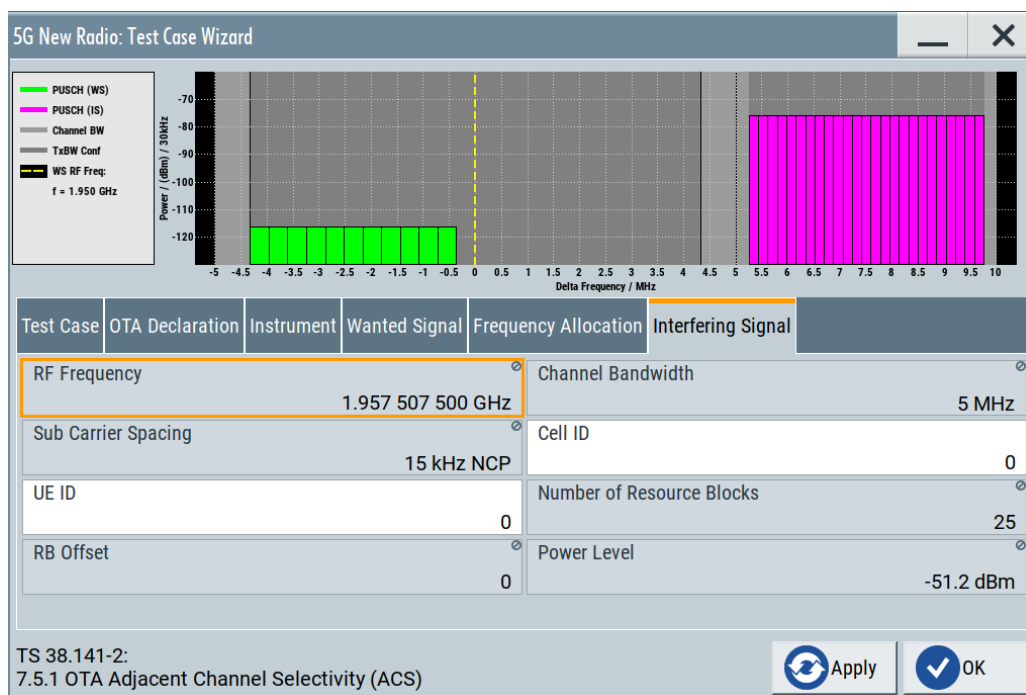
OTA adjacent channel selectivity (ACS) is a measure of the receiver's ability to receive an OTA wanted signal at its assigned channel frequency in the presence of an OTA adjacent channel signal with a specified center frequency offset of the interfering signal to the band edge of a victim system. The wanted and interfering signals apply to all supported polarizations, under the assumption of polarization match. The test purpose is to verify the ability of the BS receiver filter to suppress interfering signals in the channels next to the wanted channel.

Perform the test on the channel M as indicated in [Table 9-71](#).

Perform the test on the following directions:

- For BS type 1-O, receiver target reference direction
- For BS type 2-O, OTA REFSENS receiver target reference direction

This requirement applies to BS type 1-O and BS type 2-O.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Refer to [Chapter 9.6.8, "Interfering Signal Settings"](#), on page 260 for description of the corresponding settings.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA adjacent channel selectivity (ACS) for BS type 1-O and BS type 2-O.

The test requirement is calculated from the OTA wanted signal mean power level offset by the OTA ACS test tolerance specified in [TS 38.141-2](#).

The requirement for BS type 1-O must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction, and the AoA of the incident wave of a received signal and the interfering signal are within the minSENS RoAoA.

The requirement for BS type 2-O must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction and are within the OTA REFSSENS RoAoA.

The wanted and interfering signals apply to each supported polarization, under the assumption of polarization match.

Refer to the specification [TS 38.141-2](#), chapter 7.5.1 OTA adjacent channel selectivity for more information on the test requirements.

9.11.8 Test Case 7.5.2A: OTA In-Band General Blocking

Test purpose

To verify the ability of the BS receiver to withstand high-levels of in-band interference from unwanted signals at specified frequency offsets without undue degradation of its sensitivity.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

The blocking test using a 5G NR interfering signal can be performed with one instrument, see [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243. This setup can also be used for the CW interfering signal up to 3 GHz or 6 GHz carrier, depending on the installed option. For tests with CW with frequency greater than 6 GHz a second signal generator is necessary, e.g. R&S SMF.

Short description

In in-band blocking tests, the NR interfering signal center frequency is swept with a step size of 1 MHz starting from the minimum offset to the channel edge of the wanted signals.

The reference measurement channel for the wanted signal is identified in [Chapter 9.11.5, "Test Case 7.3: OTA Reference Sensitivity Level"](#), on page 347. The interfering signal is a 5G NR QPSK signal (PUSCH) allocated selectable at higher or lower frequencies (see [Figure 9-9](#)).

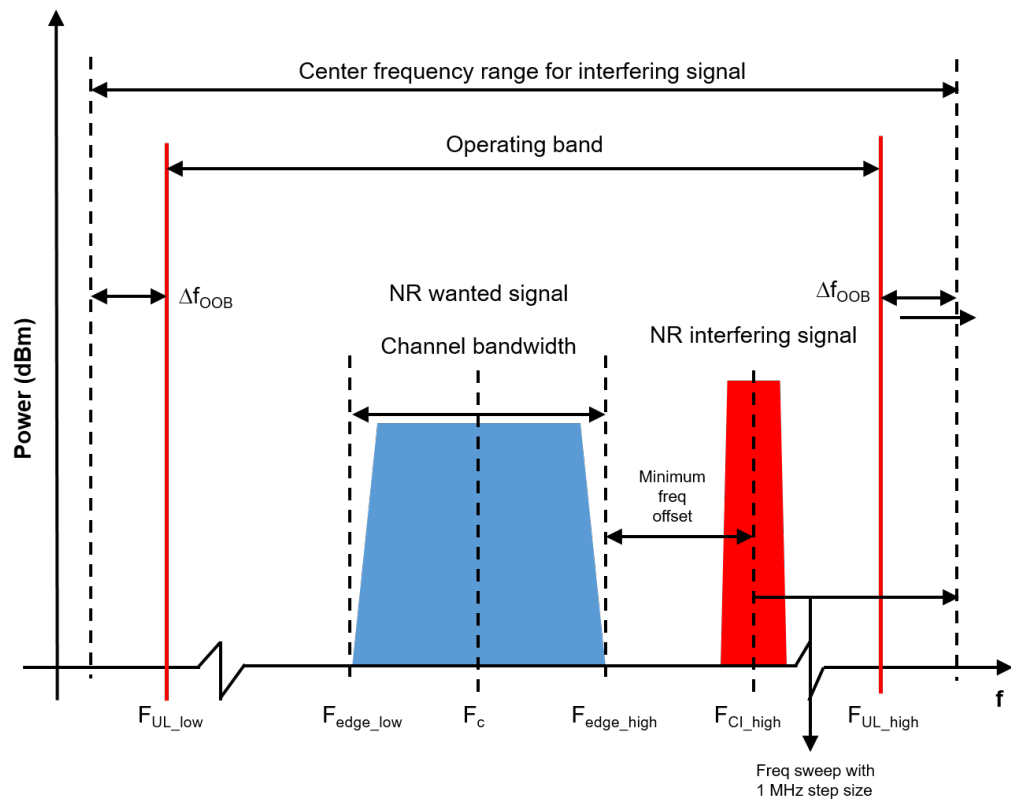


Figure 9-14: Example: OTA band blocking

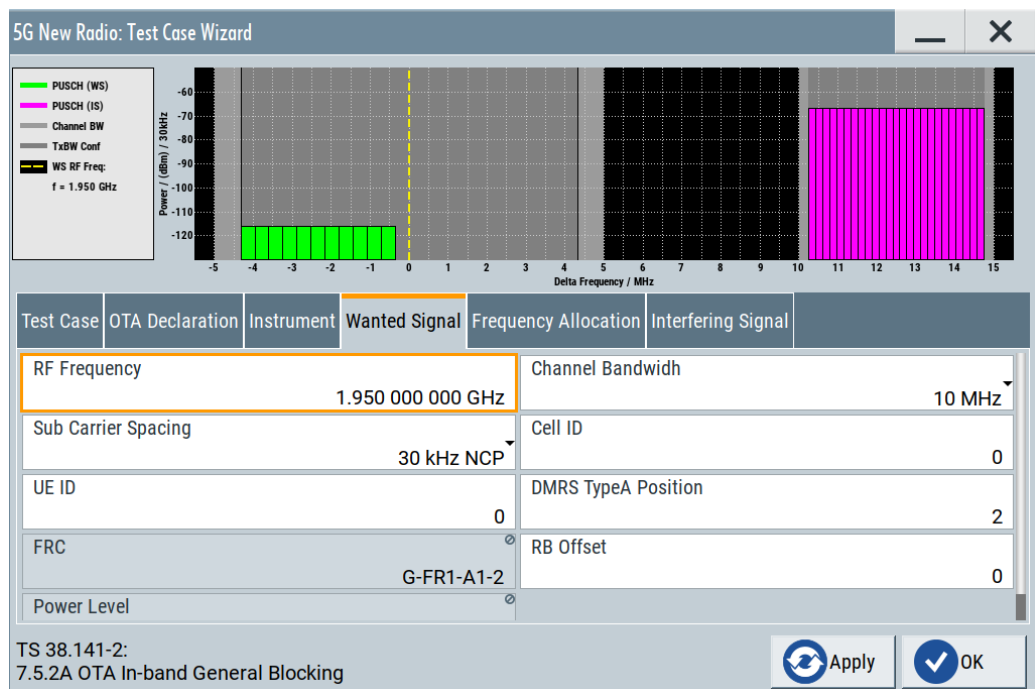
The test of in-band blocking is performed with an 5G NR interfering signal inside one of the operating bands defined in TS 38.104, tables 5.2-1 and 5.2-2, but not next to the wanted signal.

Perform the test on the channel M as indicated in Table 9-71.

This requirement applies to BS type 1-O and BS type 2-O.

Perform the test on the following directions:

- For BS type 1-O:
 - Receiver target reference direction for the minSENS OSDD
 - OTA REFSSENS conformance test directions
- For BS type 2-O:
 - OTA REFSSENS receiver target reference direction
 - OTA REFSSENS conformance test directions



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA in-band general blocking for BS type 1-O and BS type 2-O.

The test requirement is calculated from the OTA wanted signal mean power level offset by the OTA in-band blocking test tolerance specified in [TS 38.141-2](#).

The requirement for BS type 1-O must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction, and also in the following cases:

- If the wanted signal is based on $EIS_{REFSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the OTA REFSENS RoAoA.
- If the wanted signal is based on $EIS_{minSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the minSENS RoAoA.

For BS type 1-O, the OTA in-band blocking requirement must apply in the in-band blocking frequency range, which is defined within frequency range from $F_{UL\_low} - \Delta f_{OOB}$ to $F_{UL\_high} + \Delta f_{OOB}$, excluding the downlink frequency range of the FDD operating band. See [Figure 9-14](#).

The requirement for BS type 2-O must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction and are within the OTA REFSENS RoAoA.

For BS type 2-O, the OTA in-band blocking requirement must apply in the in-band blocking frequency range, which is defined within frequency range from $F_{UL\_low} - \Delta f_{OOB}$ to $F_{UL\_high} + \Delta f_{OOB}$. See [Figure 9-14](#).

The wanted and interfering signals apply to each supported polarization, under the assumption of polarization match.

Refer to the specification [TS 38.141-2](#), chapter 7.5.2 OTA in-band blocking for more information on the test requirements.

9.11.9 Test Case 7.5.2B: OTA In-Band Narrowband Blocking

Test purpose

To verify the ability of the BS receiver filter to suppress interfering signals in the channels next to the wanted channel.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The narrow-band blocking test verifies that a BS receiver is able to demodulate a "weak" useful signal being superimposed by a "strong" narrow-band interfering signal in the adjacent channel.

The interfering signal is a single resource block 5G NR signal in a channel with the same bandwidth as the wanted signal. The interfering signal is at a specified center frequency offset and adjacently to the lower (upper) channel edge of the wanted signal as shown in [Figure 9-15](#).

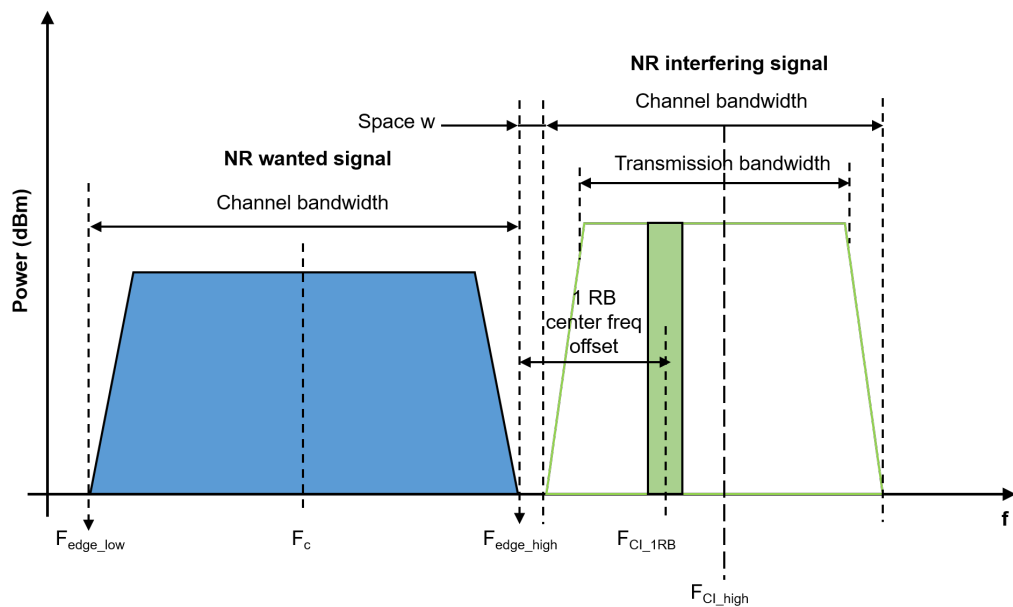
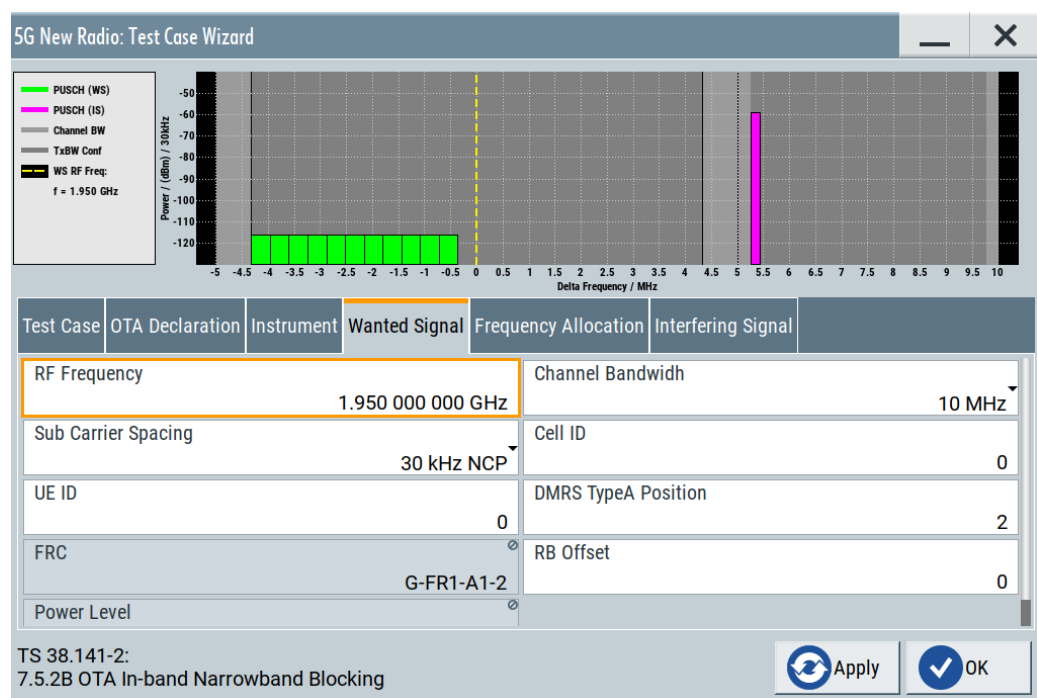


Figure 9-15: Example: OTA narrowband blocking

Perform the test on the channel M as indicated in [Table 9-71](#).

This requirement applies to BS type 1-O only.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Refer to [Chapter 9.6.8, "Interfering Signal Settings"](#), on page 260 for description of the corresponding settings.

Test requirement

The specification [TS 38.141-2](#) defines requirements to test the OTA in-band narrow-band blocking for BS type 1-O only.

The test requirement is calculated from the OTA wanted signal mean power level offset by the OTA in-band blocking test tolerance specified in [TS 38.141-2](#).

The requirement for a BS type 1-O must apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction, and also in the following cases:

- If the wanted signal is based on $EIS_{REFSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the OTA REFSENS RoAoA.
- If the wanted signal is based on $EIS_{minSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the minSENS RoAoA.

The wanted and interfering signals apply to each supported polarization, under the assumption of polarization match.

Refer to the specification [TS 38.141-2](#), chapter 7.5.2 OTA in-band blocking for more information on the test requirements.

9.11.10 Test Case 7.6: OTA Out-of-Band Blocking

Test purpose

The test stresses the ability of the receiver unit associated with the RIB under test to withstand high-level interference from unwanted signals at specified frequency bands, without undue degradation of its sensitivity.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

For tests with CW with frequency greater than 6 GHz a second signal generator is necessary, like R&S SMF for instance.

Short description

The OTA out-of-band blocking characteristics are a measure of the receiver unit ability to receive a wanted signal at the RIB at its assigned channel in the presence of an unwanted interferer.

Test of out-of-band blocking is performed with a CW interfering signal with 30 MHz up to 60 GHz.

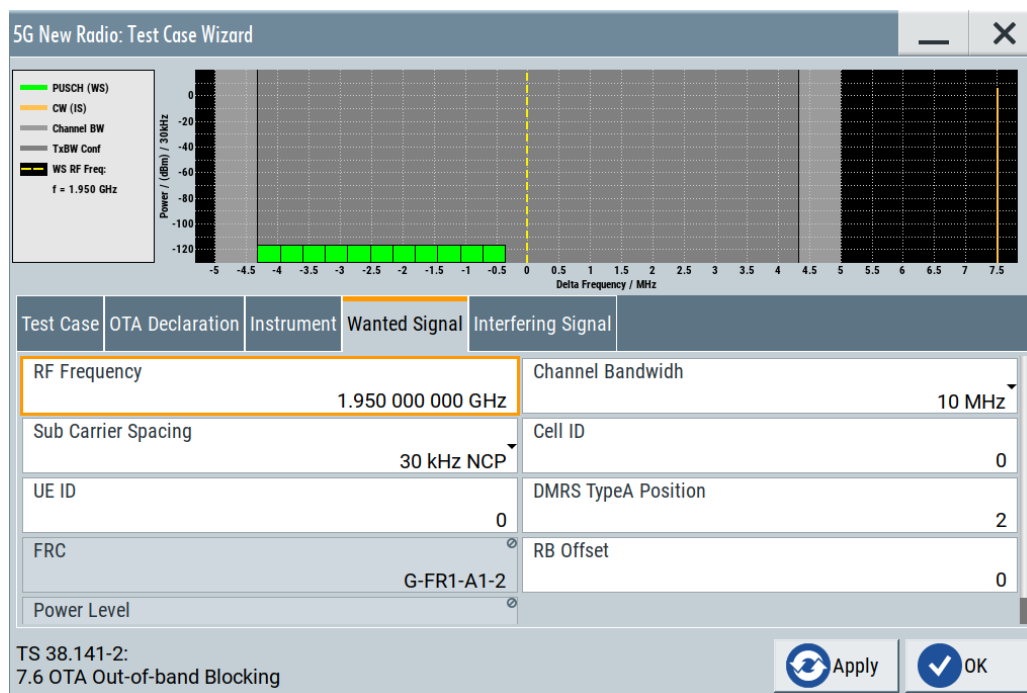
There is an additional (optional) blocking requirement for co-location with other base station.

Perform the test on the channel M as indicated in [Table 9-71](#).

This requirement applies to BS type 1-O and BS type 2-O.

Perform the test on the following directions:

- For BS type 1-O: receiver target reference direction.
- For BS type 2-O: OTA REFSSENS receiver target reference direction.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA out-of-band blocking for BS type 1-O and BS type 2-O.

Refer to the specification [TS 38.141-2](#), chapter 7.6 OTA out-of-band blocking for more information on the test requirements.

9.11.11 Test Case 7.8: OTA Receiver Intermodulation

Test purpose

To verify that the BS receiver dynamic range, the relative throughput must fulfill the specified limit.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

Intermodulation response rejection is a measure of the capability of the receiver unit to receive a wanted signal on its assigned channel frequency in the presence of two interfering signals which have a specific frequency relationship to the wanted signal. Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Interfering signals are a CW signal and a 5G NR signal as shown in [Figure 9-16](#).

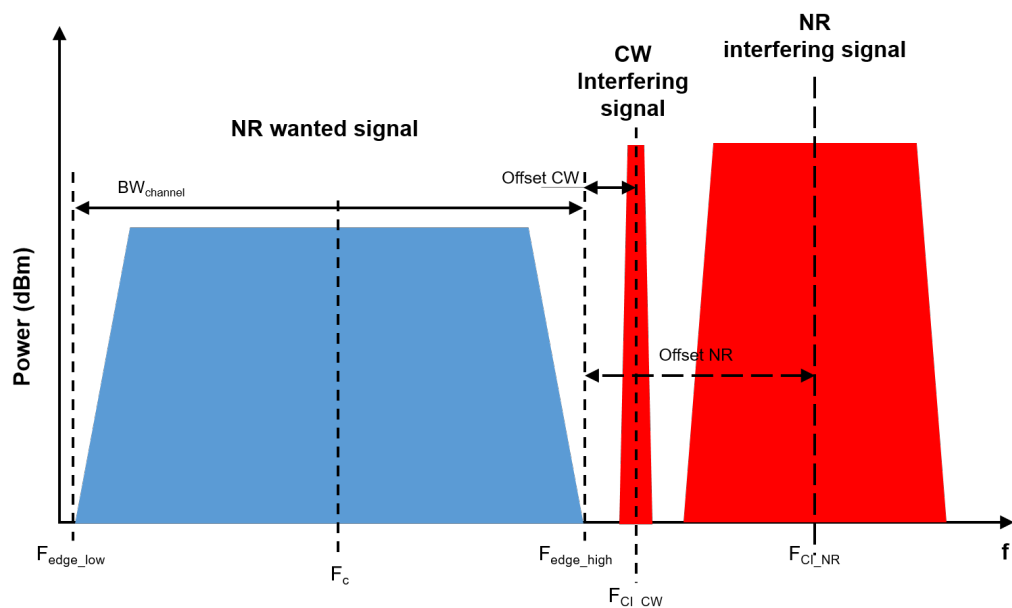


Figure 9-16: General intermodulation

The 5G NR interfering signal is provided through the second channel of the R&S SMW. The CW signal is generated with an additional instrument with the R&S SMW-K62 (additive white Gaussian noise (AWGN) option).

Perform the test on the channel M as indicated in [Table 9-71](#).

This requirement applies to BS type 1-O and BS type 2-O.

Perform the test on the following directions:

- OTA REFSSENS receiver target reference direction
- In addition, for BS type 1-O, receiver target reference direction

The "Test Case Wizard" allows you to perform narrowband intermodulation tests. Set the "Interferer Type" in the "Interfering Signal 1" tab to "Narrowband NR" to set the pre-define settings. [Figure 9-17](#).

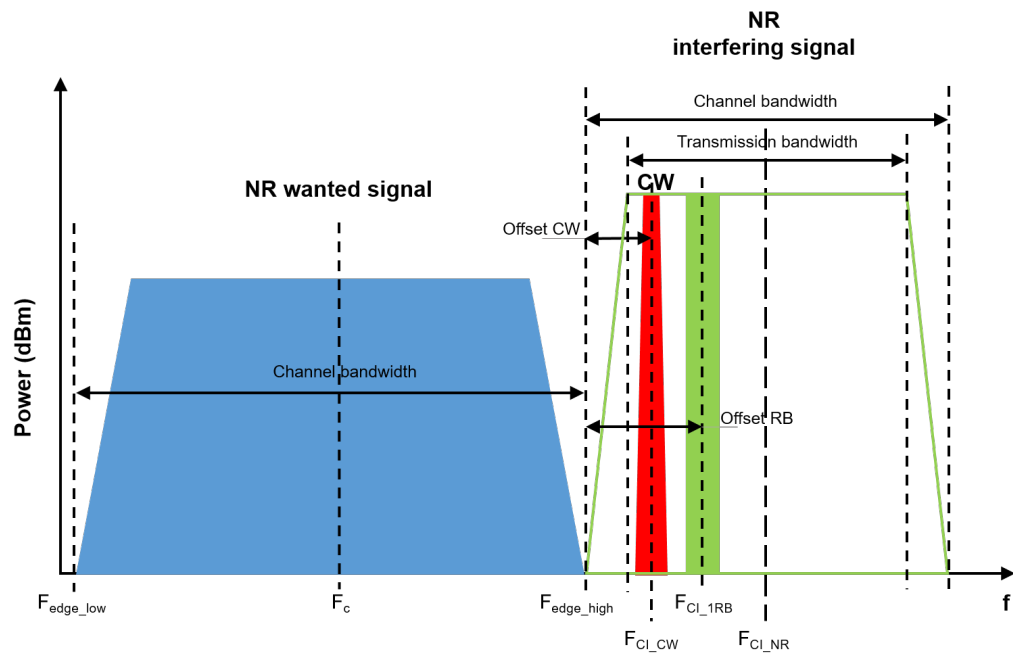
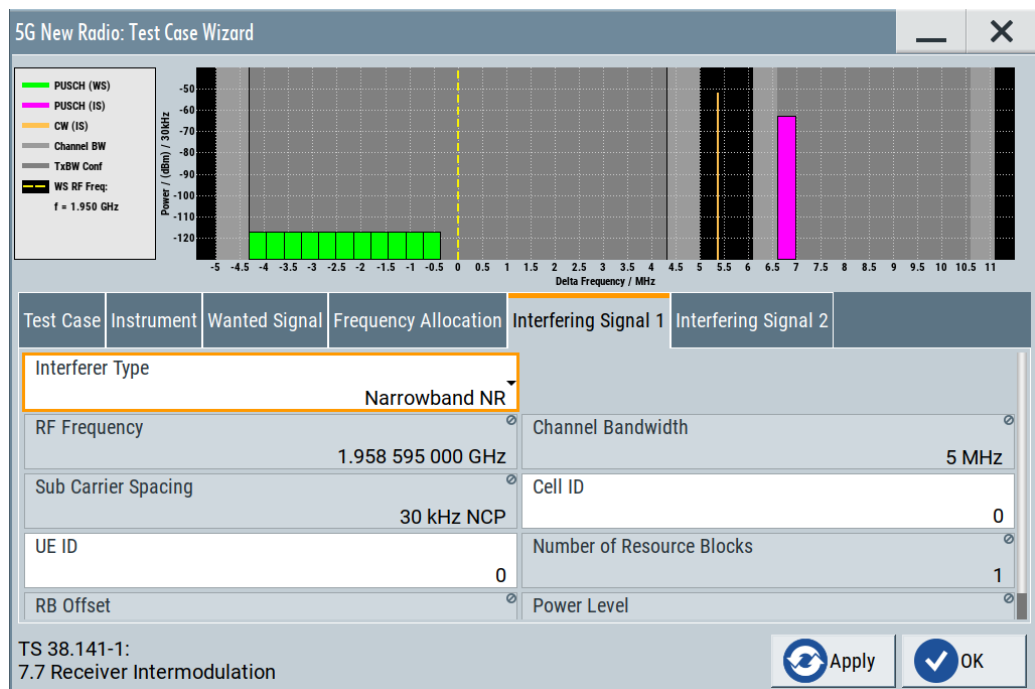


Figure 9-17: Narrowband intermodulation



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

Refer to [Chapter 9.6.8, "Interfering Signal Settings"](#), on page 260 for description of the corresponding settings.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA receiver intermodulation for BS type 1-O and BS type 2-O.

For a BS type 1-O, the requirement applies at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction and in the following cases:

- If the wanted signal is based on $EIS_{REFSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the FR1 OTA REFSENS RoAoA
- If the wanted signal is based on $EIS_{minSENS}$, the AoA of the incident wave of a received signal and the interfering signal are within the minSENS RoAoA.

For a BS type 2-O the throughput must be $\geq 95\%$ of the maximum throughput of the reference measurement channel, with OTA wanted signal at the assigned channel frequency and two OTA interfering signals provided at the RIB as defined in [TS 38.141-2](#). All of the OTA test signals arrive from the same direction, and the requirement is valid if the signals arrive from any direction within the FR2 OTA REFSENS RoAoA.

Refer to the specification [TS 38.141-2](#), chapter 7.8 OTA receiver intermodulation for more information on the test requirements.

9.11.12 Test Case 7.9: OTA In-Channel Selectivity

Test purpose

To verify the BS receiver ability to suppress the IQ leakage.

Required options

See [Chapter 9.11.1, "Required Options"](#), on page 340.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

For two paths measurements, see [Chapter 9.4.2.2, "Exemplary Test Setup - Two Paths"](#), on page 244.

Short description

In-channel selectivity (ICS) is a measure of the receiver ability to receive a "weak" wanted signal at its assigned resource block locations in the presence of a "strong" interfering signal. The interfering signal has to be a 5G NR signal with the same bandwidth as the wanted signal. The wanted and the interfering signal are allocated adjacently around the center frequency. To swap the position of the wanted and interfering signal, use the parameter "Frequency Allocation".

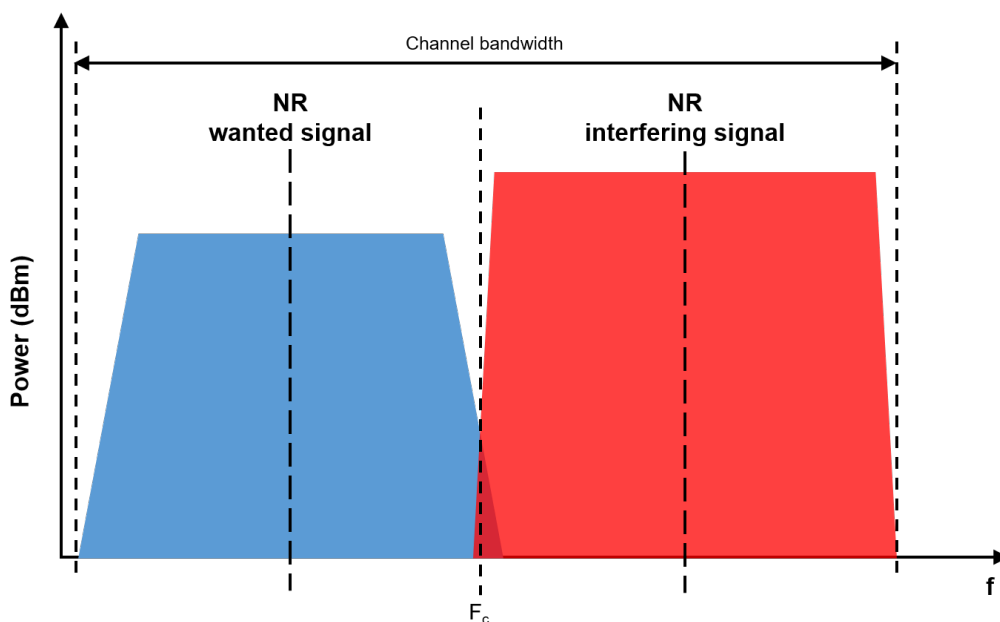


Figure 9-18: OTA in-channel selectivity

In a one-path instrument, the wanted and the interfering 5G NR signals are both generated using the same path. The interfering signal is simulated as an additional user equipment (UE). The level difference between the wanted and the interfering signals is

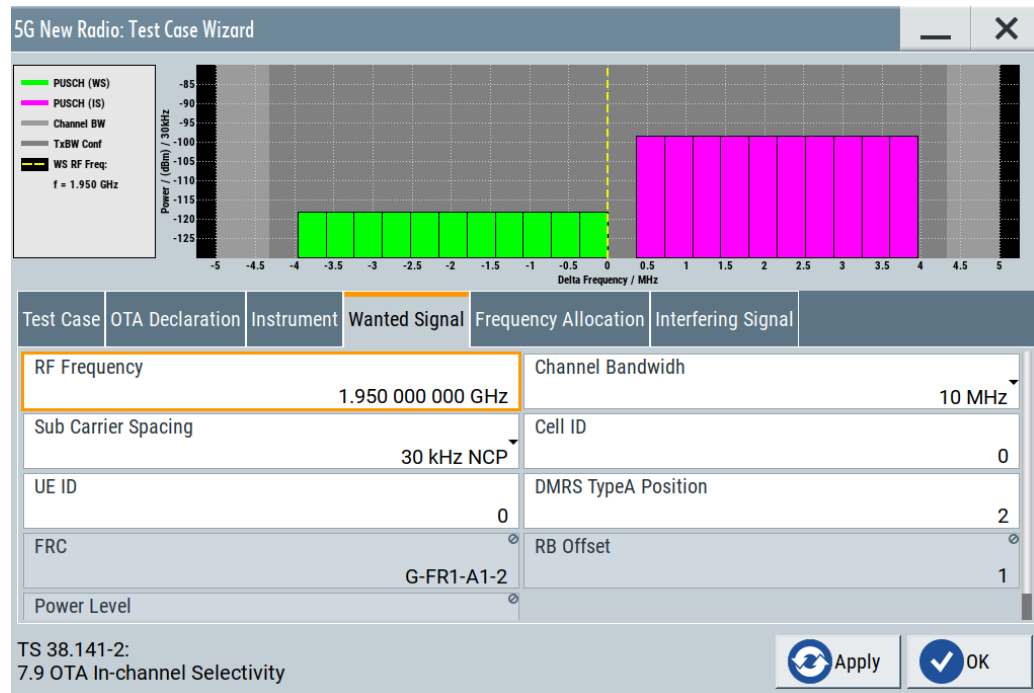
handled in the baseband. As the interferer level is higher, it is used as a reference; the level of the wanted signal is set relatively lower to the interferer.

Perform the test on the channel M as indicated in [Table 9-71](#).

This requirement applies to BS type 1-O and BS type 2-O.

Perform the test on the following directions:

- For BS type 1-O: receiver target reference direction
- For BS type 2-O: OTA REFSSENS receiver target reference direction



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Refer to [Chapter 9.6.8, "Interfering Signal Settings"](#), on page 260 for description of the corresponding settings.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA in-channel selectivity for BS type 1-O and BS type 2-O.

For a BS type 1-O, the requirement applies at the RIB when the AoA of the incident wave of the received signal and the interfering signal are the same direction and are within the minSENS RoAoA.

For a BS type 2-O the throughput must be $\geq 95\%$ of the maximum throughput of the reference measurement channel as defined in [TS 38.141-2](#).

The wanted and interfering signals applies to each supported polarization, under the assumption of polarization match.

Refer to the specification [TS 38.141-2](#), chapter 7.9 OTA in-channel selectivity for more information on the test requirements.

9.12 Radiated Performance Characteristics (TS 38.141-2, Chapter 8)

The wizard supports 3GPP tests [TS 38.141-2](#), chapter 8: Radiated performance characteristics.

Most of the performance tests can be performed with the signal generator only, i.e. without additional measurement equipment.

The performance requirements are divided into the following main categories, intended to:

- Performance requirements for PUSCH:
 - [Test Case 8.2.1: OTA PUSCH Transform Precoding Disabled](#)
 - [Test Case 8.2.2: OTA PUSCH Transform Precoding Enabled](#)
 - [Test Case 8.2.3: OTA UCI Multiplexed on PUSCH](#)
- Performance requirements for PUCCH:
 - [Test Case 8.3.1: OTA Performance Requirements for PUCCH Format 0](#)
 - [Test Case 8.3.2.1: OTA NACK to ACK Detection for PUCCH Format 1](#)
 - [Test Case 8.3.2.2: OTA ACK Missed Detection for PUCCH Format 1](#)
 - [Test Case 8.3.3.1: OTA ACK Missed Detection for PUCCH Format 2](#)
 - [Test Case 8.3.3.2: OTA UCI BLER for PUCCH Format 2](#)
 - [Test Case 8.3.4: OTA Performance Requirements for PUCCH Format 3](#)
 - [Test Case 8.3.5: OTA Performance Requirements for PUCCH Format 4](#)
 - [Test Case 8.3.6.1A: OTA NACK to ACK Detection for Multi-Slot PUCCH Format 1](#)
 - [Test Case 8.3.6.1B: OTA ACK Missed Detection for Multi-Slot PUCCH Format 1](#)
- Performance requirements for PRACH:
 - [Test Case 8.4.1: OTA PRACH False Alarm Probability and Missed Detection](#)

9.12.1 Required Options

[Table 9-73](#) lists the required options for performing the transmitter tests according to 3GPP [TS 38.141-2](#), chapter 8.

Table 9-73: Required options

Chapter in TS 38.141-2		Hardware options				Software options				Remark
		RF path		BB gen- erator	Fading simula- tor	AWG N	MIMO Fad./ Rout	5G NR	CI. loop	
		B1 00x	B2 00x	B9 B10	B15 B14	K62	K74	K144	K145	
8.2.1 OTA PUSCH Transform Precoding Disabled	1 Tx, 2 Rx	1	1	1	2	1		1	1	
	2 Tx, 2 Rx	1	1	2	2	2	1	2	1	Additional RF port with SGS/SGU or additional R&S SMW (SMW-K19)
8.2.2 OTA PUSCH Transform Precoding Enabled	1 Tx, 2 Rx	1	1	1	2	1		1	1	
8.2.3 OTA UCI multi-plexed on PUSCH	1 Tx, 2 Rx	1	1	1	2	1		1		
8.3.1 OTA Perfor- mance requirements for PUCCH Format 0	1 Tx, 2 Rx	1	1	1	2	1				
8.3.2.1 OTA NACK to ACK Detection for PUCCH Format 1	1 Tx, 2 Rx	1	1	1	2	1				
8.3.2.2 OTA ACK Missed Detection for PUCCH Format 1	1 Tx, 2 Rx	1	1	1	2	1				
8.3.3.1 OTA ACK Missed Detection for PUCCH Format 2	1 Tx, 2 Rx	1	1	1	2	1				
8.3.3.2 OTA UCI BLER for PUCCH Format 2	1 Tx, 2 Rx	1	1	1	2	1				
8.3.4 OTA performance requirements for PUCCH Format 3	1 Tx, 2 Rx	1	1	1	2	1				
8.3.5 OTA performance requirements for PUCCH Format 4	1 Tx, 2 Rx	1	1	1	2	1				
8.3.6.1A OTA NACK to ACK Detection for Multi-Slot PUCCH Format 1		1	1	1	2	1				
8.3.6.1B OTA ACK Missed Detection for Multi-Slot PUCCH Format 1		1	1	1	2	1				
8.4.1 OTA PRACH flase alarm propability and missed detection	1 Tx, 2 Rx	1	1	1	2	1				

The following equipment and options are required, for **radiated performance characteristics tests**:

- 2x option baseband generator (R&S SMW-B10 or -B9)
- 1x option frequency (e.g. R&S SMW-B1003)
- 1x option frequency (e.g. R&S SMW-B2003)
- 2x option baseband fading simulator (R&S SMW-B15)
- 2x option additive white Gaussian noise (AWGN) (R&S SMW-K62)
- 2x option digital standard 5G NR (R&S SMW-K144)
- 2x option digital standard 5G NR (R&S SMW-K145)

9.12.2 General

Radiated performance requirements specify the ability of the BS type 1-O or BS type 2-O to correctly demodulate radiated signals in various conditions and configurations. Radiated performance requirements are specified at the RIB.

Radiated performance requirements for the BS are specified for the fixed reference channels and propagation conditions defined in [TS 38.104](#) annex A and annex J, respectively. The requirements only apply to those FRCs that are supported by the base station.

The radiated performance requirements for BS type 1-O and for the BS type 2-O are limited to two OTA demodulations branches.

Conformance requirements can only be tested for 1 or 2 demodulation branches depending on the number of polarizations supported by the BS, with the required SNR applied separately per polarization.

Unless stated differently, radiated performance requirements apply for a single carrier only. Radiated performance requirements for a base station supporting carrier aggregation are defined in terms of single carrier requirements.

For BS type 1-O in FDD operation, the requirements in [TS 38.141-2](#) chapter 8 must be met with the transmitter units associated with the RIB in the operating band turned ON.

In tests performed with signal generators, a synchronization signal may be provided from the base station to the signal generator, to enable correct timing of the wanted signal.

The SNR is specified based on a single carrier and defined as follows:

$$\text{SNR} = S / N.$$

Where:

S = the total signal energy in a slot on a RIB.

N = the noise energy in a bandwidth corresponding to the transmission bandwidth over the duration of a slot.

OTA demodulation branches

Radiated performance requirements are only specified for up to 2 demodulation branches.

If the BS type 1-O or the BS type 2-O uses polarization diversity and can maintain isolation between the signals for each of the demodulation branches, then radiated performance requirements can be tested for up to two demodulation branches, i.e. 1Rx or 2Rx test setups.

When tested for two demodulation branches, each demodulation branch maps to one polarization. If the base station does not use polarization diversity, then radiated performance requirements can only be tested for only a single demodulation branch, i.e. 1Rx test setup.

9.12.3 General Workflow for Carrying Out a Radiated Performance Test

The following instruction lists the general steps for performing a BS radiated conformance test with the help of "Test Case Wizard". Specific requirements are described together with the individual test case.



For detailed description about the configuration of the OTA chamber, refer to the corresponding description.

1. Select an antenna test system (OTA chamber) that covers the radiated transmitter requirements for the test that you want to perform.
Note: Several antennas can be required to cover both the NR BS and the whole emission frequency range.
2. Connect the instrument to the selected antenna ports in the OTA chamber as specified for the corresponding test case setup.
See also [Chapter 9.4, "Exemplary Test Setups"](#), on page 241.
3. Place the base station at the positioner. Align the coordinate system.
4. Align the base station with the test antenna in the declared direction to be tested.
5. Configure beam peak direction according to the declared reference beam direction pair.
6. Set the BS to transmit beams of the same operational band as the OTA REFSENS RoAoA or OSDD being tested.
7. Configure the test case wizard.
 - a) Select "Baseband Block > 5G NR > General > Test Case Wizard".
 - b) Select a test case, e.g. [TS 38.141-2: "8.2.2 OTA PUSCH Transform Precoding Disabled"](#).
 - c) Enter additional required parameters, e.g. base station class, OTA declarations, etc.

- d) Enter the test frequency of the wanted/interfering signal.
The setting must match with the base station configuration.
- e) Select "Apply Settings" to activate the settings.
The signal generator is now ready.
- 8. Switch on RF output.
- 9. If necessary, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings.
See also [Chapter 9.5, "General Considerations"](#), on page 244.
- 10. Start the measurement for each supported polarization.
 - a) Send a start trigger impulse from the base station to the signal generator.
The signal generator starts signal generation.
- 11. Calculate the results.
- 12. Repeat the measurement for all OSDDs declared for the BS and supported polarizations.

9.12.4 Test Case 8.2.1: OTA PUSCH Transform Precoding Disabled

The performance requirement of PUSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in [TS 38.141-2](#). The performance requirements assume HARQ retransmissions. Transform precoding is disabled.

Test purpose

To verify the ability of the receiver to achieve throughput under multipath fading propagation conditions for a given SNR.

Required options

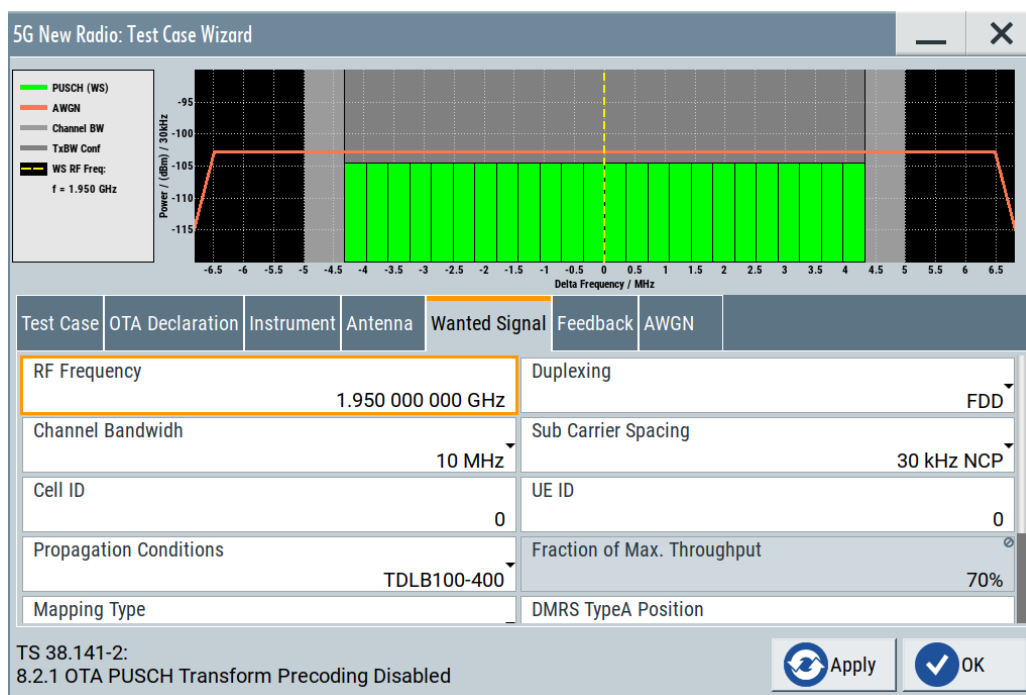
See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

For a given SNR, the receiver must achieve a certain throughput under multipath fading propagation conditions. Transform precoding is disabled.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirements

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for PUSCH with transform precoding disabled for BS type 1-O and BS type 2-O.

The measured throughput must not be below the limits for the SNR levels specified in [TS 38.141-2](#) for 1Tx and 2Tx two layer spatial multiplexing transmission.

Refer to the specification [TS 38.141-2](#), chapter 8.2 OTA performance requirements for PUSCH for more information on the test requirements.

9.12.5 Test Case 8.2.2: OTA PUSCH Transform Precoding Enabled

The performance requirement of PUSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in [TS 38.141-2](#) annex A. The performance requirements assume HARQ retransmissions. Transform precoding is enabled.

Test purpose

To verify the ability of the receiver to achieve throughput under multipath fading propagation conditions for a given SNR.

Required options

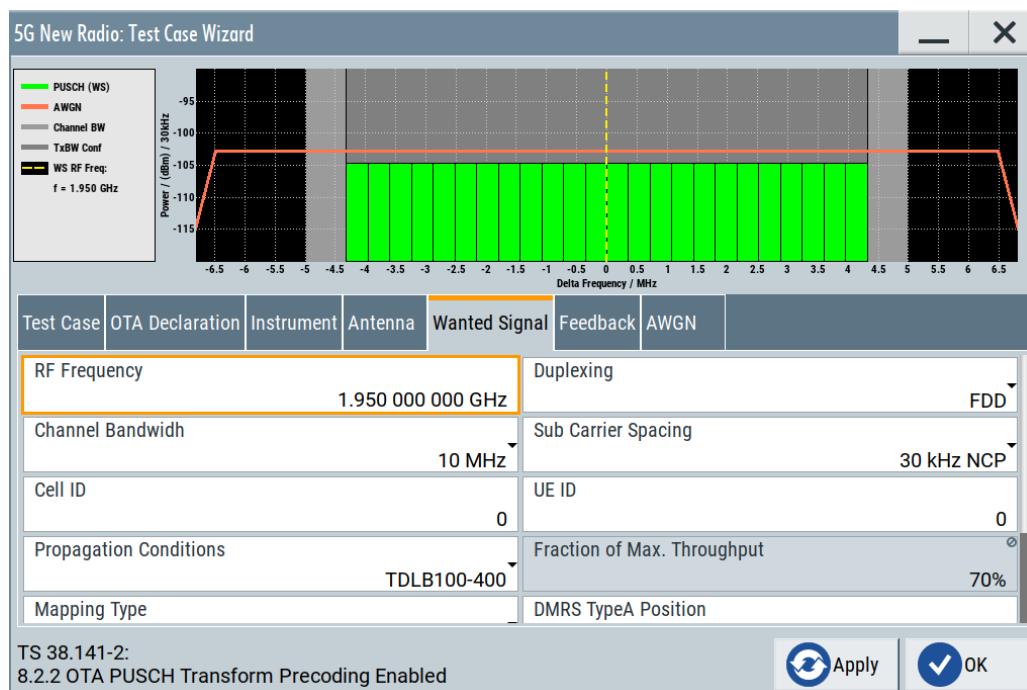
See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

For a given SNR, the receiver must achieve a certain throughput under multipath fading propagation conditions. Transform precoding is enabled.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirements

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for PUSCH with transform precoding enabled for BS type 1-O and BS type 2-O.

The measured throughput must not be below the limits for the SNR levels specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.2 OTA performance requirements for PUSCH for more information on the test requirements.

9.12.6 Test Case 8.2.3: OTA UCI Multiplexed on PUSCH

Test purpose

To verify the ability of the receiver to detect UCI with CSI part 1 and CSI part 2 bits multiplexed on PUSCH under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of UCI multiplexed on PUSCH is determined by the following two parameters:

- Block error probability (BLER) of CSI part 1
- Block error probability of CSI part 2.

The performance is measured by the required SNR at block error probability of CSI part 1 not exceeding 0.1 %. Also the required SNR at block error probability not exceeding 1 %.

The CSI part 1 BLER is defined as the probability of incorrectly decoding the CSI part 1 information when the CSI part 1 information is sent.

The CSI part 2 BLER is defined as the probability of incorrectly decoding the CSI part 2 information when the CSI part2 information is sent.

In the test of UCI multiplexed on PUSCH, the UCI information only contains CSI part 1 and CSI part 2 information. There is no HACK/ACK information transmitted.

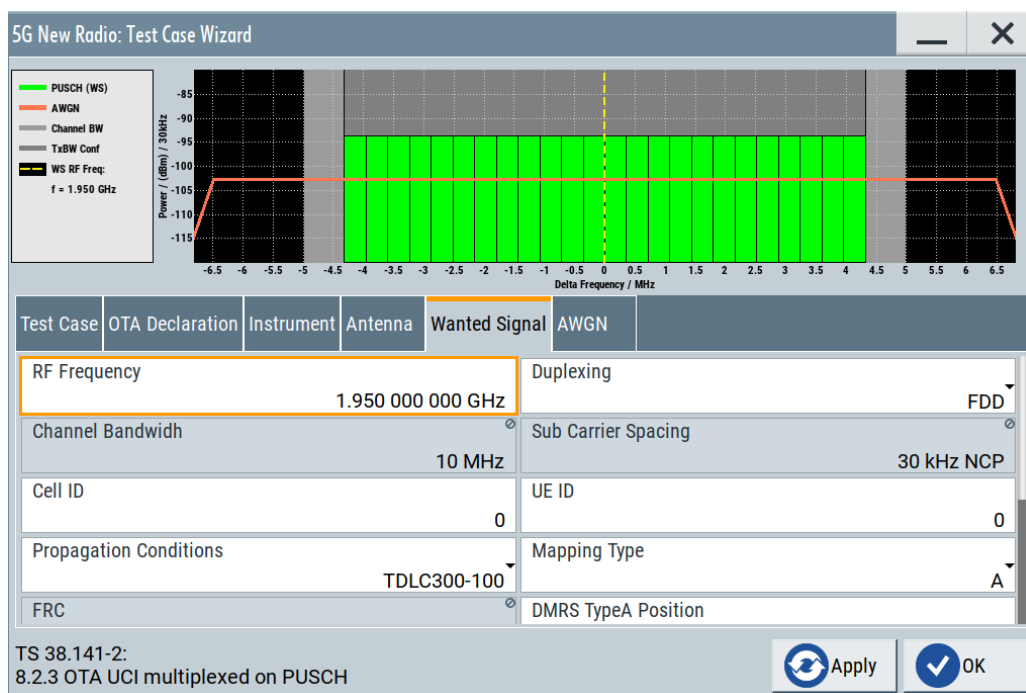
The number of UCI information bit payloads per slot is defined for two cases as follows:

- 7 bits UCI
 - CSI part 1: 5 bits
 - CSI part 2: 2 bits
- 40 bits UCI
 - CSI part 1: 20 bits
 - CSI part 2: 20 bits

The 7 bits UCI information case is further defined with the bitmap [c0 c1 c2 c3 c4] = [0 1 0 1 0] for CSI part 1 information, where c0 is mapping to the RI information, and with the bitmap [c0 c1] = [1 0] for CSI part 2 information.

The 40 bits UCI information case is assumed random information bit selection.

In both tests, PUSCH data, CSI part 1 and CSI part 2 are transmitted simultaneously.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for UCI multiplexed on PUSCH for BS type 1-O and BS type 2-O.

The fraction of incorrectly decoded UCI with CSI part 1 must be less than 0.1 % and less than 1% for the UCI with CSI part 2 for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.2 OTA performance requirements for PUSCH for more information on the test requirements.

9.12.7 Test Case 8.3.1: OTA Performance Requirements for PUCCH Format 0

Test purpose

To verify the ability of the receiver to detect ACK under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of single user PUCCH format 0 for ACK missed detection is determined by the following parameters:

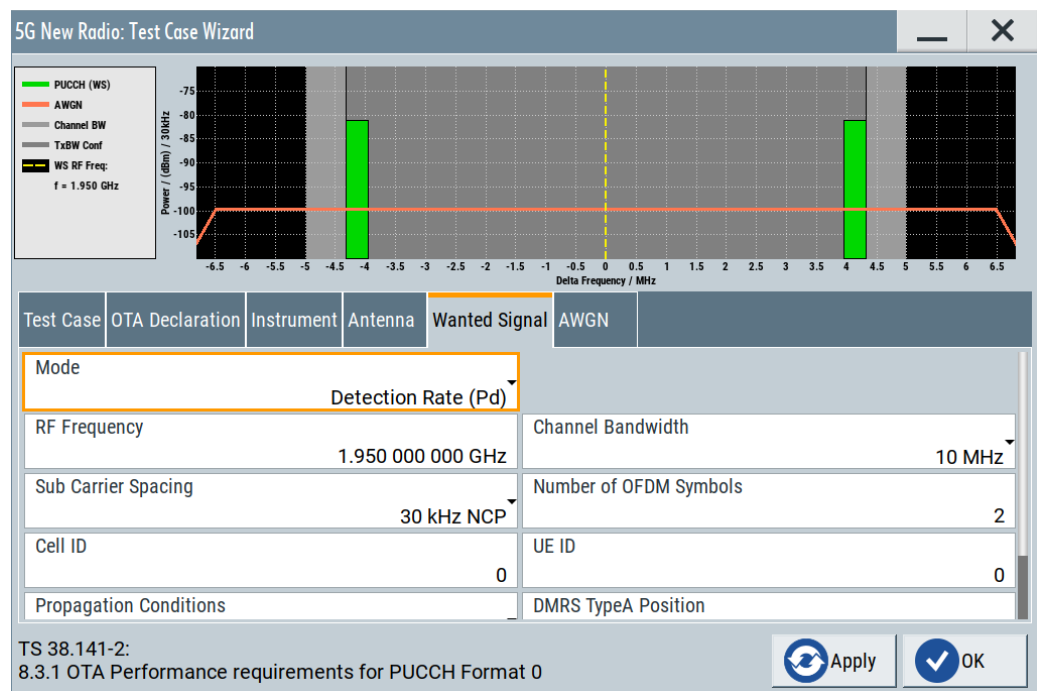
- Probability of false detection of the ACK
- Probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

The transient period is not considered for performance requirement testing, where the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for PUCCH format 0 for BS type 1-O and BS type 2-O.

The fraction of falsely detected ACKs must be less than 1% and the fraction of correctly detected ACKs must larger than 99% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.8 Test Case 8.3.2.1: OTA NACK to ACK Detection for PUCCH Format 1**Test purpose**

To verify the ability of the receiver to distinguish between ACK bits and NACK bits. NACK bits have to be not detected as ACK bits under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of PUCCH format 1 for NACK to ACK detection is determined by the following parameters:

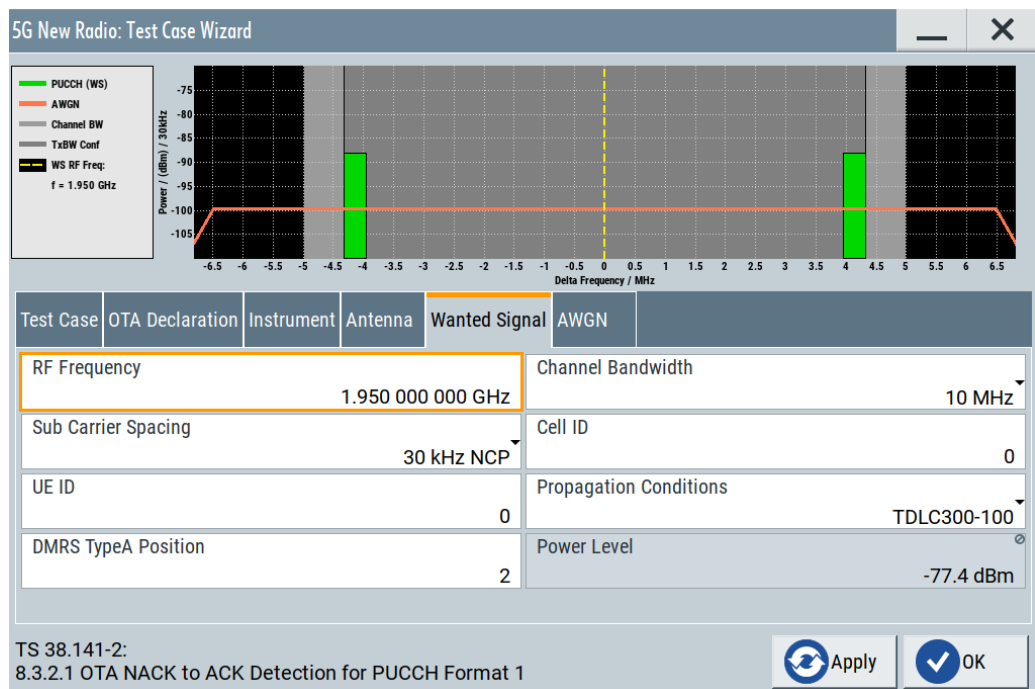
- Probability of false detection of the ACK
- NACK to ACK detection probability.

The performance is measured by the required SNR at probability of the NACK to ACK detection equal to 0.1% or less. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK at particular bit position when input is only noise. Each false bit detection is counted as one error.

The NACK to ACK detection probability is the probability of detecting an ACK bit when an NACK bit was sent on particular bit position. Each NACK bit erroneously detected as ACK bit is counted as one error. Erroneously detected NACK bits in the definition do not contain the NACK bits which are mapped from DTX, i.e. NACK bits received when DTX sent is not considered.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA NACK to ACK detection for PUCCH format 1 for BS type 1-O and BS type 2-O.

The fraction of falsely detected ACK bits must be less than 1% and the fraction of NACK bits falsely detected as ACK must be less than 0.1% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.9 Test Case 8.3.2.2: OTA ACK Missed Detection for PUCCH Format 1

Test purpose

To verify the ability of the receiver to detect ACK bits under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of PUCCH format 1 for ACK missed detection is determined by the two parameters:

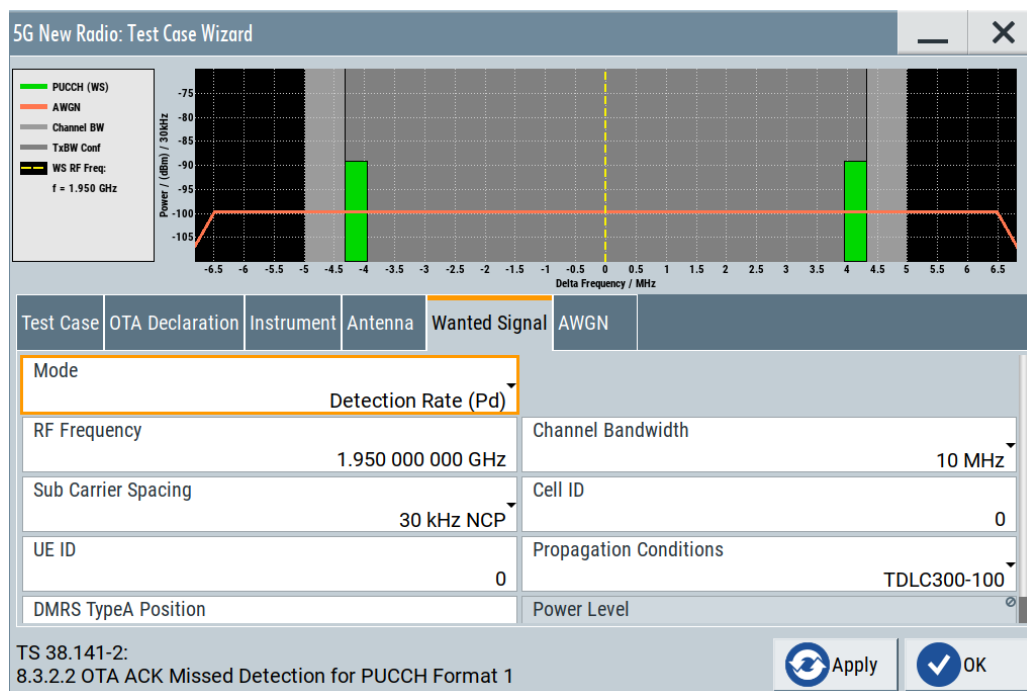
- Probability of false detection of the ACK
- Probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA ACK missed detection for PUCCH format 1 for BS type 1-O and BS type 2-O.

The fraction of falsely detected ACK bits must be less than 1% and the fraction of correctly detected ACK bits must be larger than 99% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.10 Test Case 8.3.3.1: OTA ACK Missed Detection for PUCCH Format 2**Test purpose**

To verify the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of PUCCH format 2 for ACK missed detection is determined by the following parameters:

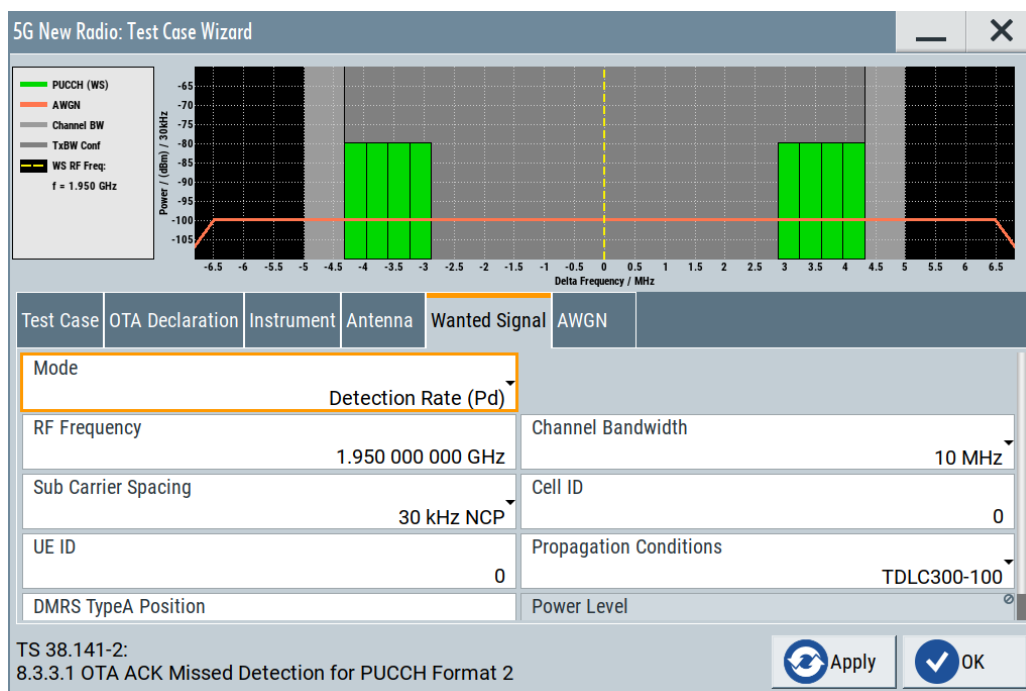
- Probability of false detection of the ACK
- Probability of detection of ACK

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as probability of detection of the ACK when the signal is present.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA ACK missed detection for PUCCH format 2 for BS type 1-O and BS type 2-O.

The fraction of falsely detected ACK bits must be less than 1% and the fraction of correctly detected ACK bits must be larger than 99% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.11 Test Case 8.3.3.2: OTA UCI BLER for PUCCH Format 2

Test purpose

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

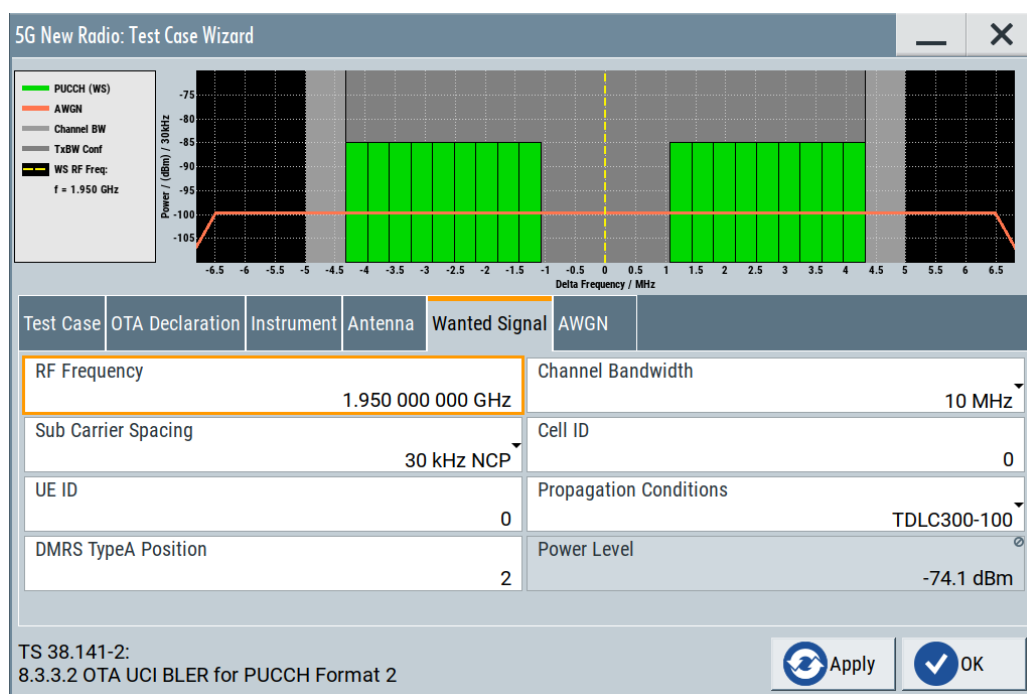
See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

To verify the receiver's ability to detect ACK bits under multipath fading propagation conditions for a given SNR.

The UCI block error probability is defined as the probability of incorrectly decoding the UCI information when the UCI information is sent. The UCI information does not contain CSI part 2.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA UCI BLER for PUCCH format 2 for BS type 1-O and BS type 2-O.

The fraction of incorrectly decoded UCI must be less than 1% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.12 Test Case 8.3.4: OTA Performance Requirements for PUCCH Format 3

Test purpose

To verify the receiver's ability to detect UCI under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

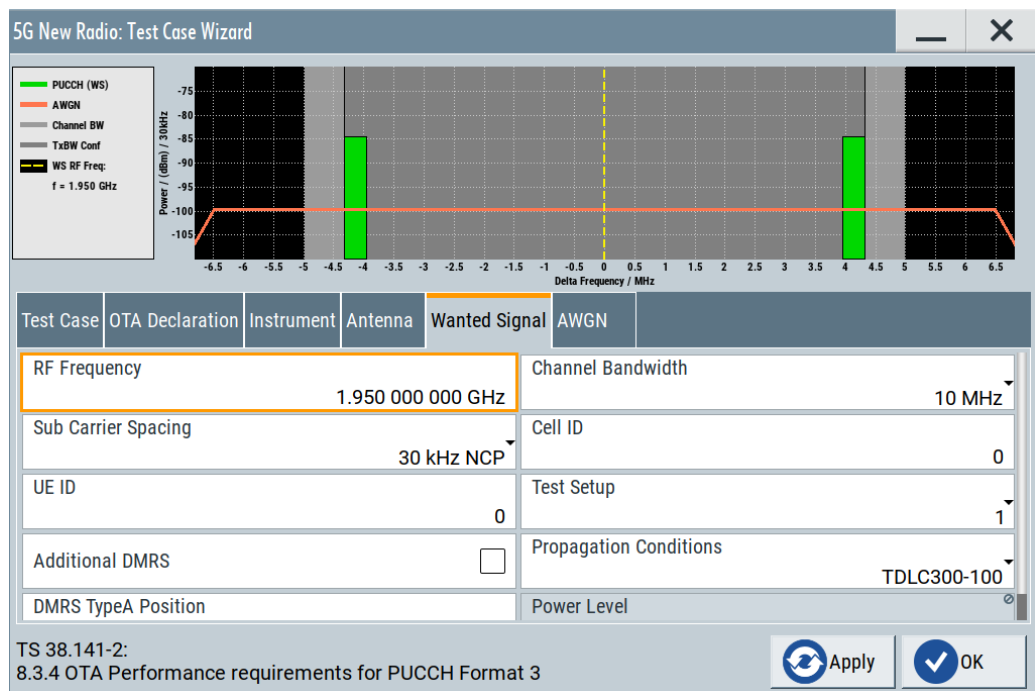
See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance is measured by the required SNR at UCI block error probability not exceeding 1%.

The UCI block error probability is defined as the conditional probability of incorrectly decoding the UCI information when the UCI information is sent. The CSI part 2 is not contained in the UCI information.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for PUCCH format 3 for BS type 1-O and BS type 2-O.

The fraction of incorrectly decoded UCI must be less than 1% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.13 Test Case 8.3.5: OTA Performance Requirements for PUCCH Format 4

Test purpose

To verify the ability of the receiver to detect UCI under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

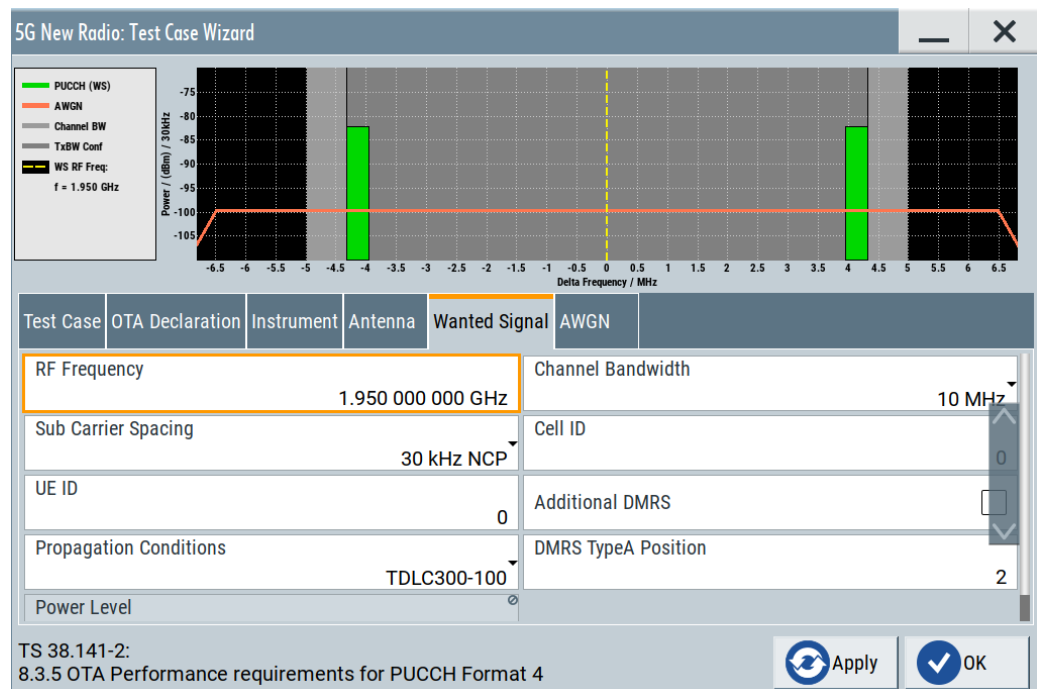
See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance is measured by the required SNR at UCI block error probability must not exceed 1%.

The UCI block error probability is defined as the conditional probability of incorrectly decoding the UCI information when the UCI information is sent. The CSI part 2 is not contained in the UCI information.

When the RB hopping is symmetric to the CC center, i.e. intra-slot frequency hopping is enabled, the transient period is not considered for performance requirement testing.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA performance requirements for PUCCH format 4 for BS type 1-O and BS type 2-O.

The fraction of incorrectly decoded UCI must be less than 1% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.14 Test Case 8.3.6.1A: OTA NACK to ACK Detection for Multi-Slot PUCCH Format 1

Test purpose

To verify the ability of the receiver not to falsely detect NACK bits as ACK bits under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The OTA performance requirement of PUCCH format 1 for NACK to ACK detection is determined by the following parameters:

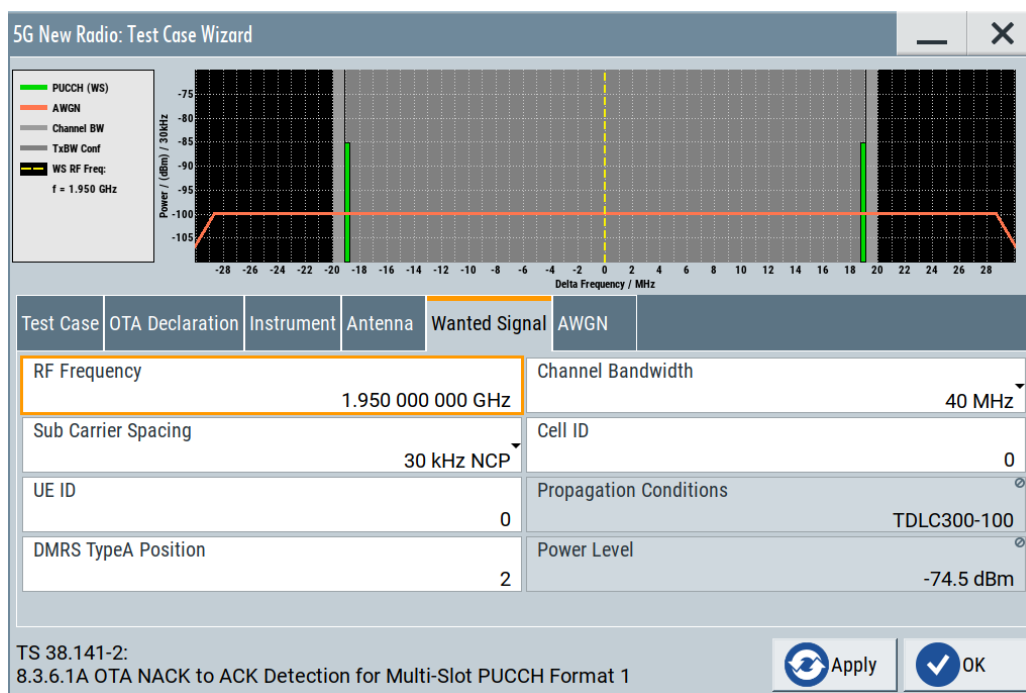
- Probability of false detection of the ACK
- The NACK to ACK detection probability.

The performance is measured by the required SNR at probability of the NACK to ACK detection must be equal to 0.1% or less.

The probability of false detection of the ACK must be 0.01 or less. The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK at particular bit position when input is only noise. Each false bit detection is counted as one error.

The NACK to ACK detection probability is the probability of detecting an ACK bit when an NACK bit was sent on particular bit position. Each NACK bit erroneously detected as ACK bit is counted as one error. Erroneously detected NACK bits in the definition do not contain the NACK bits which are mapped from DTX, i.e. NACK bits received when DTX is sent, are not considered.

This test applies for BS type 1-O only.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA NACK to ACK detection for multi-slot PUCCH format 1 for BS type 1-O only.

The fraction of falsely detected ACK bits must be less than 1% and the fraction of NACK bits falsely detected as ACK must be less than 0.1% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.15 Test Case 8.3.6.1B: OTA ACK Missed Detection for Multi-Slot PUCCH Format 1

Test purpose

To the ability of the receiver to detect ACK bits under multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of PUCCH format 1 for ACK missed detection is determined by the following parameters:

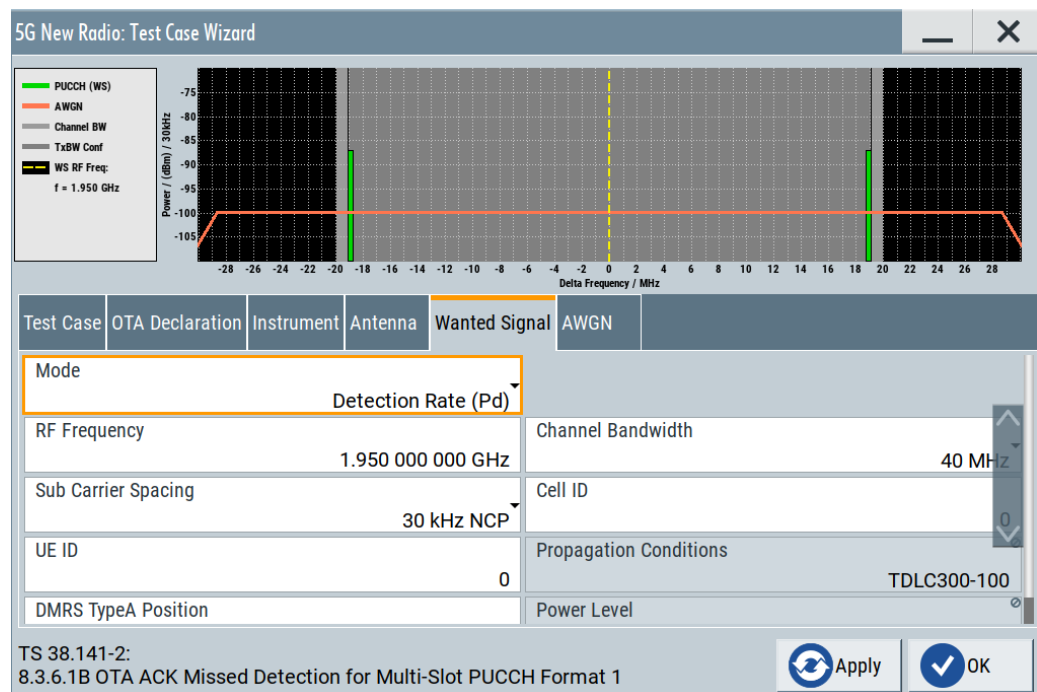
- Probability of false detection of the ACK
- The probability of detection of ACK.

The performance is measured by the required SNR at probability of detection equal to 0.99. The probability of false detection of the ACK must be 0.01 or less.

The probability of false detection of the ACK is defined as a conditional probability of erroneous detection of the ACK when input is only noise.

The probability of detection of ACK is defined as conditional probability of detection of the ACK when the signal is present.

This test applies only for BS type 1-O.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification [TS 38.141-2](#) defines the requirement to test the OTA ACK missed detection for multi-slot PUCCH format 1 for BS type 1-O only.

The fraction of falsely detected ACK bits must be less than 1% and the fraction of correctly detected ACK bits must be larger than 99% for the SNR specified in [TS 38.141-2](#).

Refer to the specification [TS 38.141-2](#), chapter 8.3 OTA performance requirements for PUCCH for more information on the test requirements.

9.12.16 Test Case 8.4.1: OTA PRACH False Alarm Probability and Missed Detection**Test purpose**

To verify the ability of the receiver to detect PRACH preamble under static conditions and multipath fading propagation conditions for a given SNR.

Required options

See [Chapter 9.12.1, "Required Options"](#), on page 365.

Test setup

See [Chapter 9.4.2, "Exemplary Test Setups for Radiated \(OTA\) Tests \(TS 38.141-2\)"](#), on page 243.

Short description

The performance requirement of PRACH for preamble detection is determined by the following parameters:

- Total probability of false detection of the preamble (P_{fa})
- The probability of detection of preamble (P_d)

The performance is measured by the required SNR at probability of detection, the P_d must be 99% or better. P_{fa} must be 0.1% or less.

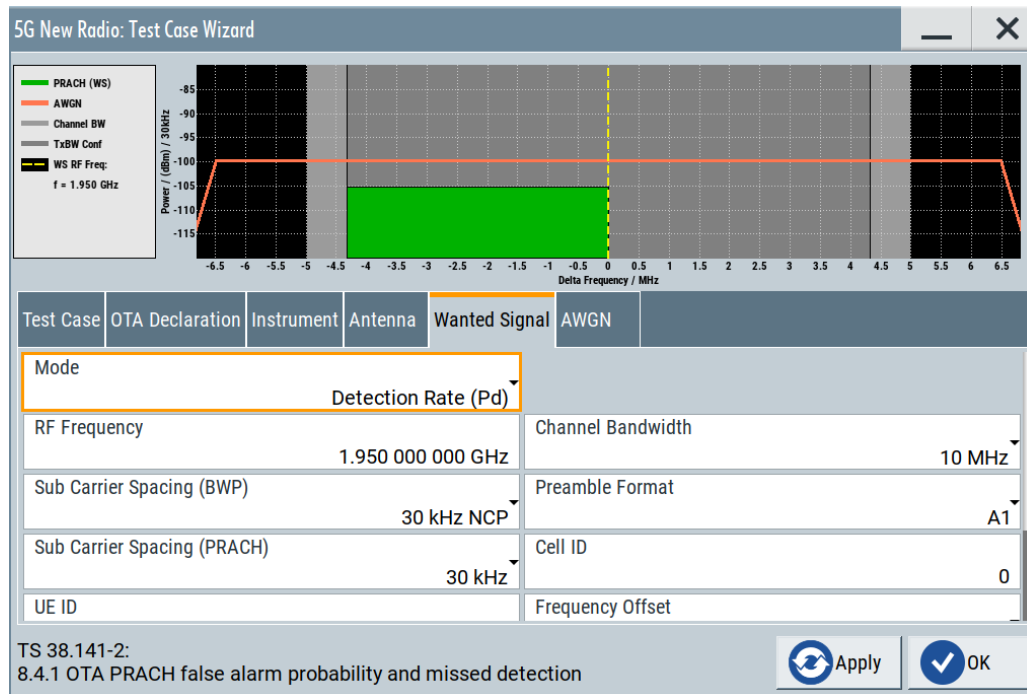
P_{fa} is defined as a conditional total probability of erroneous detection of the preamble (i.e. erroneous detection from any detector) when input is only noise.

P_d is defined as conditional probability of detection of the preamble when the signal is present.

The erroneous detection consists of the following error cases:

- Detecting only different preambles than the one that was sent
- Not detecting any preamble at all
- Detecting the correct preamble but with the out-of-bounds timing estimation value

For AWGN, TDLC300-100 and TDLA30-300, a timing estimation error occurs if the estimation error of the timing of the strongest path is larger than the time error tolerance values given in TS 38.141-2.



The general and instrument-related settings are described in [Chapter 9.6, "User Interface"](#), on page 247.

The settings of the wanted signal are described in [Chapter 9.6.6, "Wanted Signal Settings"](#), on page 254.

Test requirement

The specification TS 38.141-2 defines the requirement to test the OTA PRACH false alarm probability and missed detection for BS type 1-O and BS type 2-O.

The Pfa must not exceed 0.1% and the Pd must be 99% or higher for the SNRs specified in TS 38.141-2.

Refer to the specification TS 38.141-2, chapter 8.4 OTA performance requirements for PRACH for more information on the test requirements.

10 Real-time Feedback for Closed Loop BS Tests

Some test scenarios, like for example the performance test cases specified in [TS 38.141-1](#), require a feedback line. With R&S SMW equipped with the following options, you can perform closed loop performance tests with feedback.

Required options

Option:

- Standard or wideband baseband generator (R&S SMW-B10/-B9)
- Baseband main module (R&S SMW-B13) or wideband baseband main module (R&S SMW-B13XT)
- Option 5G new radio R&S SMW-K144, per signal path
- Optional, option 5G NR Release 16 R&S SMW-K148, per signal path
- Option real-time feedback R&S SMW-K145, per signal path
- Further options, like R&S SMW-K62 or R&S SMW-B14/-B15/-K71/-K72/-K73/-K74

Real-time feedback principle in the context of 5G New Radio testing

The real-time feedback functionality in 5G New Radio case is similar to the one for the LTE/LTE-A and eMTC/NB-IoT testing. Consider, however, the following differences:

- Supported is serial transmission, with 16 data bits per feedback command
See [Chapter 10.2.1, "Serial Modes"](#), on page 392.
- Real-time feedback is enabled:
 - In LxMxN configurations, if coupled mode is used
 - In single-carrier configurations.
- Timing adjustment feedback is supported
- R&S SMW does not send new transport layer data for new transmissions as a UE would do. Hence, feedback of new data indicators or HARQ process indices is not required.
The feedback mode is suitable for BLER tests, like the performance tests specified in [TS 38.141-1](#). The goal of these tests is checking the CRC rather than the actual transport data.
- PUSCH transmission properties other than redundancy version are not signaled
DCI 0_0 or 0_1 grants cannot be signaled. Specify the time and frequency scheduling, transport block size and spatial layer configuration by the corresponding parameters.
- Redundancy version (RV) signaling
HARQ ACK/NACK messages are not transmitted over the feedback line. The DUT merely sends feedback signal carrying the **redundancy version (RV)** to be applied for the subsequent PUSCH transmission.
- Asynchronous HARQ
Signaling only the RV is necessary, because the 5G New Radio relies on an **asynchronous HARQ**.

- HPN mode
If your test situation requires it, you can set the HARQ process number to a specific value.
- Feedback timing
The feedback timing reference point is derived from the uplink transmission.
If your test situation requires it, you can set a [Feedback Delay](#) and a [Processing Delay](#).
See [Chapter 10.3, "Timing Aspects"](#), on page 395.

10.1 Exemplary Testing Scenario

The test specifications in TS 38.141-1 define the test setups. For example, the test "Performance requirements for PUSCH" can be setup according to the [Figure 10-1](#) and [Figure 10-2](#).

One single instrument is sufficient.

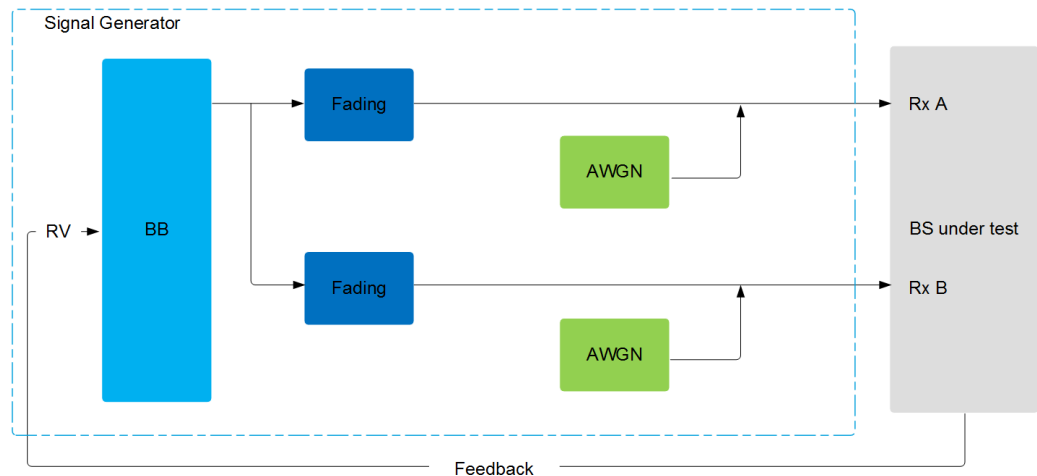


Figure 10-1: Exemplary test scenario (1x1x2 system configuration)

Signal generator = R&S SMW equipped with two baseband paths, see ["Required options"](#) on page 389

RV = Redundancy version

BB = Baseband

Fading = Fading simulator (i.e. channel simulator)

AWGN = Additive white Gaussian noise generator

BS = Base station

Feedback = HARQ feedback signal for PUSCH only

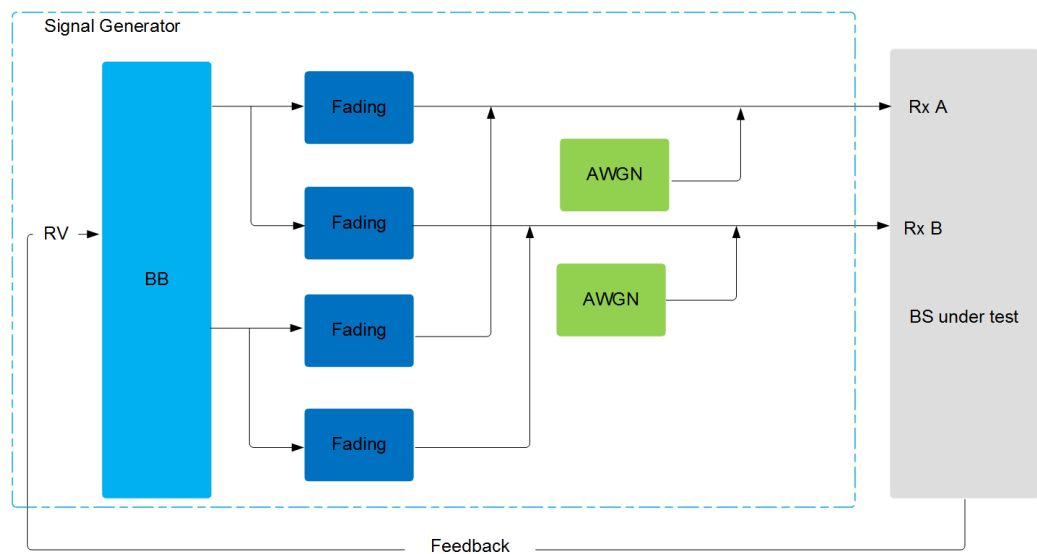


Figure 10-2: Exemplary test scenario (1x2x2 system configuration)

Signal generator = R&S SMW equipped with two baseband paths, see "Required options" on page 389

RV = Redundancy version

BB = Baseband

Fading = Fading simulator (i.e. channel simulator)

AWGN = Additive white Gaussian noise generator

BS = Base station

Feedback = HARQ feedback signal for PUSCH only

If your instrument is equipped with internal fading and AWGN generators, no more test equipment is required to perform the performance requirement tests. The simulation of the propagation conditions according to the specified test scenarios is achieved by selecting the required fading profiles and an additive white Gaussian noise.

For information on the available fading profiles and how to work with the fading simulator:

See user manual R&S®SMW-B14/-K71/-K72/-K73/-K74/-K75/-K820/-K821/-K822 Fading Simulation.

10.2 Feedback Modes

Some test setups, like for example the performance verification tests, require a feedback line from the DUT (base station) to the signal source.

Input connectors

The R&S SMW expects the feedback signal at one of the input connectors:

- Option: R&S SMW-B10
 - "T/M 3"
 - "T/M 6"

- Option: R&S SMW-B9
 - "T/M 2"
 - "T/M 4"

How to route and enable feedback signal

The R&S SMW uses a flexible signal-to-connector mapping concept. In the default instrument state, the local "T/M x" connector is not configured as inputs of the feedback and the baseband feedback signal.

1. Select "Feedback > Connector" = "Local".
2. If R&S SMW-B10 is available, configure the connectors as follows:
 - a) "Local Connectors > Connector > T/M 3 > Direction > Input".
 - b) "Local Connectors > Connector > T/M 3 > Signal > Feedback".
3. If R&S SMW-B9 is available, configure the connectors as follows:
 - a) "Local Connectors > Connector > T/M 2 > Direction > Input".
 - b) "Local Connectors > Connector > T/M 2 > Signal > Feedback".
4. Connect the feedback line to the configured connector.

10.2.1 Serial Modes

The serial line uses a serial protocol that is similar but not identical to the RS232.

It carries information in form of serial commands that are transmitted as a sequence of 1-bit long symbols. Symbols are interpreted as 1, if the signal voltage level exceeds a certain threshold, or as 0, if the voltage level is below this threshold.

The input impedance of the input connectors for the feedback line and the low/high threshold voltage are configurable parameters. Use the [Local and Global Connector Settings](#) dialog and adjust the parameters "Threshold Clock/Trigger Input" and "Impedance Clock/Trigger Input" as required.

Symbol rate

The serial feedback commands can be transmitted with a symbol rate of 115.2 kbps, 1.6 Mbps or 1.92 Mbps.

See ["Serial Rate"](#) on page 398.

The R&S SMW starts the sampling process at middle of the start bit. It then samples the subsequent received bits according to the selected sampling rate. Deviations between the selected sampling rate and the actual sampling rate are tolerated, if the used sampling point for each of the bits is within the stable bit duration.

For test cases with high subcarrier spacing (SCS) and short slot duration, a serial rate of 115.2 kbps is insufficient. We recommend that you use higher serial rate so that at least one feedback command per slot is received.

Structure

Serial commands consist of 16 data bits (D0 to D15). These commands can be transmitted in **serial** or **serial 3x8** modes. Serial commands start with one low-level start bit and ends with one high-level stop bit. Between two consecutive commands (or packets) or before the first command, the line has to be held on high level (idle). Parity bit are not used. The least significant bit (LSB) is transmitted first.



Figure 10-3: Structure of a serial command (Serial mode)

Idle = Always high
 SB = Start bit, always low
 EB = Stop bit, always high
 D0 to D15 = Data bits, LBS first; see [Chapter 10.2.2, "Structure of a Serial and 3x8 Serial Feedback Command"](#), on page 393
 D0 = LSB (least significant bit)
 D15 = MSB (most significant bit)

In the serial 3x8 mode, a command does not consist of one singular serial packet, but is distributed over *three serial packets*, see [Figure 10-4](#).



Figure 10-4: Structure of one feedback command in Serial 3x8 mode

Idle = Always high
 SB = Start bit, always low
 EB = Stop bit, always high
 L, H = Low/high bits, used for synchronization purposes
 D0 to D15 = Data bits, LSB first; see [Chapter 10.2.2, "Structure of a Serial and 3x8 Serial Feedback Command"](#), on page 393
 D0 = LSB (least significant bit)
 D15 = MSB (most significant bit)

The structure illustrated on [Figure 10-4](#) is mandatory. The 16 data bits (D0 to D15) are distributed among the three 8-bits long packets. The remaining serial bits must comply with the specified low or high levels for synchronization purposes.

10.2.2 Structure of a Serial and 3x8 Serial Feedback Command

[Table 10-1](#) shows the structure and the meaning of the 16 data bits (D0 to D15) in a feedback command; the LSB is D0, the MSB - D15.

Table 10-1: Structure of one feedback command

D15 to D14	D13 to D11	D10 to D0
BB selector	Message type selector	Message bits

Meaning of the bits

- **Main BB selector (D15 to D14)**
 Determines for which of the baseband blocks the feedback command is for.

Up to two baseband blocks in one R&S SMW can process feedback commands; each baseband processes only the feedback commands that are labeled with its BB selector.

You can send (i.e. multiplex) different feedback commands to different baseband blocks over the same shared feedback line. To provide the feedback signal to all related basebands, use a T connector to split the feedback line from the DUT and feed the signals to the corresponding T/M connectors simultaneously.

Alternatively, several baseband blocks that use the same BB selector can share the feedback commands, even if these baseband blocks are in different instruments connected to the same feedback line.

To set the BB selector per baseband, use the parameter [Baseband Selector](#).

To set the secondary BB selector, use the message bits D5-D4.

- **Message type selector (D13 to D11)**

Determines the message type and the command that is signaled.

Have the following meaning:

- 1: HARQ feedback with RV request
- 2: TA feedback with timing adjustment command for the main BB selector
- 4: HARQ feedback with RV request combined with TA feedback with timing adjustment command for the main BB selector.
- 5: HARQ feedback with RV request for main and secondary BB selectors
- 0, 3, 6, 7: Reserved

- **Message bits (D10 to D0)**

If *Message type selector* = 1:

- D10 to D2: Reserved
- D1 to D0: Requested redundancy version

If *Message type selector* = 2:

- D10 to D5: Requested TA command for the baseband configured with the *main BB selector*
- D4 to D0: Reserved

If *Message type selector* = 4:

- D10 to D5: Requested TA command for the baseband configured with the *main BB selector*
- D4 to D2: Reserved
- D1 to D0: Requested redundancy version for the baseband configured with the *main BB selector*

If *Message type selector* = 5:

- D10 to D8: Reserved
- D7 to D6: Requested redundancy version for the baseband configured with the *secondary BB selector*
- D5 to D4: Secondary BB selector
- D3 to D2: Reserved
- D1 to D0: Requested redundancy version for the baseband configured with the *main BB selector*

The message type 1 requested redundancy version signaling resembles the asynchronous HARQ feedback signaling of an air interface feedback to a real UE, where the BS signals the redundancy version via the DCI 0_0 and 0_1 to the UE. A simple ACK/NACK is not sufficient; signal the requested redundancy version via the feedback command.

10.3 Timing Aspects

You can send zero, one or several feedback messages per slot over the serial or the serial 3x8 line.

Depending on the time a serial feedback command arrives at the instrument, it is associated with a specific PUSCH transmission. The received redundancy version is then applied for this PUSCH transmission, see [Figure 10-5](#).

Example:

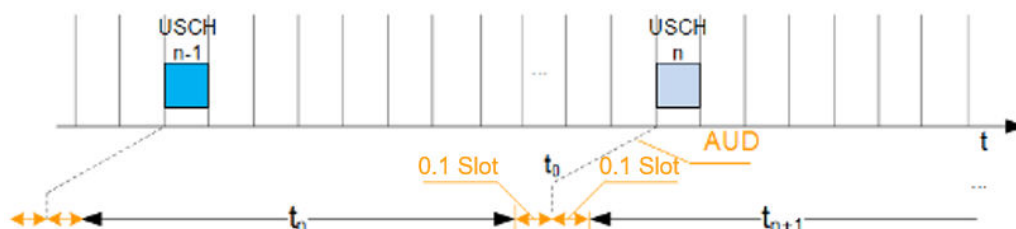


Figure 10-5: Feedback timing for PUSCH transmissions (example)

t	= Uplink timing (slots)
USCH n-1 and n	= PUSCH transmission
t ₀	= Slot border
t _n , t _{n+1}	= Time periods during which an arrived serial command is applied to USCH n and n+1 respectively
AUD (additional user delay)	= "Feedback Delay" for HARQ feedback / "Processing Delay" for TA feedback. Negative values shift the feedback timing back in time
0.1 Slot	= Fixed guard period before and after slot border
	= Feedback commands should not arrive in the time period (t ₀ - 0.1 Slot) to (t ₀ + 0.1 Slot)

As shown on [Figure 10-5](#), the UL feedback timing t_0 depends on the UL transmission. You can, however, use the parameters "Feedback Delay" and "Processing Delay" to shift the feedback timing, if it is required in your particular test situation. The starting point of the modified PUSCH is $t_0 + \text{abs}(\text{AUD})$.

Example:

See [Figure 10-6](#) for another example of feedback timing for PUSCH transmission.

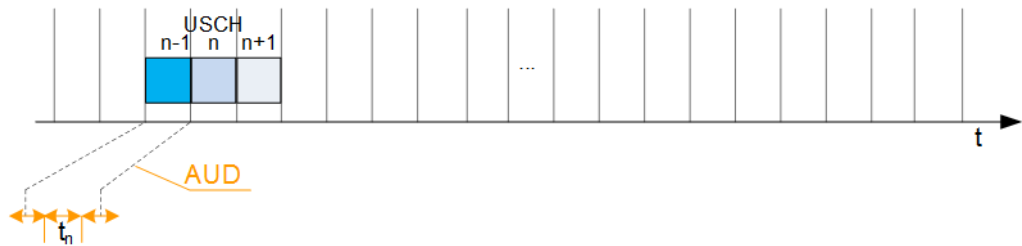


Figure 10-6: Feedback timing for PUSCH transmissions (second example)

t	= Uplink timing (slots)
USCH $n-1, n, n+1$	= PUSCH transmissions
AUD (additional user delay)	= "Feedback Delay" for HARQ feedback / "Processing Delay" for TA feedback. Negative values shift the feedback timing back in time
t_n	= Time periods during which an arrived serial command is applied to USCH n

Rules for processing of feedback commands

The R&S SMW expects and uses one feedback command per PUSCH transmission. The following applies, if there is a deviation:

- If no feedback command is received, an RV = 0 is assumed.
The time and frequency scheduling of the transmissions cannot be changed by feedback commands; they remain as set with the corresponding parameters.
See also ["Real-time feedback principle in the context of 5G New Radio testing"](#) on page 389.
- If more than one feedback commands are received, evaluated is the last one; i.e. applied is the RV signaled by the last feedback command.

10.4 Real-Time Feedback Configuration Settings

Option: see ["Required options"](#) on page 389.

Interdependencies: see ["Real-time feedback principle in the context of 5G New Radio testing"](#) on page 389.

Access:

1. Select "System Configuration > Fading/Baseband Configuration > Mode > Advanced".
2. Enable 1x2x2 configuration. Set "BB Source Config > Coupled Sources".
3. Select "General > Link Direction" > **"Uplink"**.
4. Select "Node > Feedback".
5. To configure the input connectors to receive the feedback signal, if R&S SMW-B10 is available:

- a) Select "Connector > Local".
 - b) Select "Local Connectors A > T/M 3 > Direction > Input".
 - c) Select "Local Connectors A > T/M 3 > Signal > Feedback".
 - d) Set "Local Connectors B > T/M 6 > Direction > Input" and "Signal > Feedback".
6. To enable the real-time feedback, set the "Realtime Feedback Mode" to a value different than "Off".

5G New Radio A: Node Settings

Feedback Carriers TxBW Cell 0 System Information Cell 0 Dummy REs Cell 0 Carrier Mapping

Closed Loop Feedback Mode Off Serial Rate 1.92 Mbps

Connector Local Local Connectors ...

Baseband Selector 0

HARQ

HPN Mode 0 Feedback Delay -2.00 Slots

Timing Adjustment

TA State 0 Processing Delay -2.00 Slots

Logging

Logging State 0 Output Path ...

You can enable real-time feedback once per baseband block.

For background information, see [Chapter 10, "Real-time Feedback for Closed Loop BS Tests"](#), on page 389.

The remote commands required to define these settings are described in [Chapter 12.24, "Real-time Feedback"](#), on page 636.

Settings:

Closed Loop Feedback Mode	397
Serial Rate	398
Connector	398
Local Connectors	398
Baseband Selector	398
HPN Mode	399
Feedback Delay	399
TA State	399
Processing Delay	400
Logging State	400
Output Path	400

Closed Loop Feedback Mode

Enables real-time feedback and determines the mode of the feedback line.

"Off" Real-time feedback is disabled.

"Serial/Serial 3x8"

The feedback is implemented by a serial protocol.

In "Serial 3x8" mode, a serial command consists of three serial packets.

See [Chapter 10.2.1, "Serial Modes"](#), on page 392.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:HFB:MODE` on page 638

Serial Rate

Sets the bit rate of the serial transmission. Possible rates are 115.2 kbps, 1.6 Mbps and 1.92 Mbps.

For test cases with high subcarrier spacing (SCS) and short slot duration, a serial rate of 115.2 kbps is insufficient. We recommend that you use higher serial rate so that at least one feedback command per slot is received.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:HFB:SRATE` on page 639

Connector

Sets the feedback line connector.

Per default, the connectors are not configured to receive feedback signal. Configure connector direction and the signal-to-connector mapping first.

See ["How to route and enable feedback signal"](#) on page 392.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:HFB:CONNeCtor` on page 638

Local Connectors

Provides a quick access to the related connector settings.

Some configuration requires two basebands, some just one. Sometimes you need to configure two separate input connectors for the feedback signal, in other - just one.

The displayed settings always reflect the required configuration, for example:

- If standard system configuration is enabled, you access the connectors settings for both basebands via the dedicated dialogs.
- If 2x2x2 advanced system configuration with coupled sources is enabled, you need to configure the input connector only in the first baseband.

For more information, refer to the description R&S SMW user manual, section "Local and Global Connector Settings".

Baseband Selector

In "Serial/Serial 3x8" mode, this parameter is required for multiplexing serial commands for different baseband units to one feedback line.

Configuring different baseband selectors for the different basebands enables you to send different feedback commands to the basebands. Even if they share a common feedback line (i.e. the same physical cable) the different feedback is possible. A baseband receives only the feedback commands that contain the same baseband selector as configured in its dialog (with the parameter "Baseband Selector"). A baseband ignores all feedback commands with different baseband selectors.

Example: Configuring the "Baseband Selector" for the 2 Tx antenna ports test cases

To perform the 2 Tx antenna ports test cases according to [TS 38.141](#), the two basebands simulating the signals have to receive the same feedback signal, as they generate the two different DMRS antenna ports of the same TTI. In this case, configure the **same baseband selector in both baseband**. For example, set "Baseband A > ... > Baseband Selector = 0" and also "Baseband B > ... > Baseband Selector = 0".

Other way to achieve the same result is to enable coupled baseband sources ("System Config > Fading/Baseband Config > Mode = Advanced" and "BB Sources = Coupled"). In this mode, there is one dialog where you configure the settings and the "Baseband Selector" value. This value applies to both basebands and hence to both Tx channels that receive the same feedback signal.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:BASeband on page 639

HPN Mode

Enables or disables the HARQ process number (HPN) mode.

If the "HPN Mode" is enabled, the feedback delay value is set to -1.00 and cannot be modified. Additionally, the [HARQ Process Number](#) parameter appears in the PUSCH dialog.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:HPNMode on page 638

Feedback Delay

Defines the point in time when the feedback can be sent to the instrument.

See [Chapter 10.3, "Timing Aspects"](#), on page 395.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:DELaY on page 638

TA State

Option: R&S SMW-K148.

Enables timing advance (TA) adjustment for the selected feedback mode.

The TA adjustment enables you to set the [Processing Delay](#) to define a new timing advance value (N_{TA_New}) for advancing or delaying the UL transmission.

N_{TA_New} is defined by the equation:

$$N_{TA\_New} = N_{TA\_Old} + (T_A - 31) * 16 * 64 / 2^\mu$$

Where:

N_{TA_New} = New timing advance

N_{TA_Old} = Previous timing advance

T_A = Timing adjustment command

μ = index given by the configured SCS value ($2^\mu * 15$ kHz)

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:TAMode on page 639

Processing Delay

Option: R&S SMW-K148.

Sets a delay to the slot to which the timing adjustment command (T_A) is applied.

For example, if "Processing Delay" is set to -2.00 and the T_A is received in slot number 6, after processing, the T_A is transmitted in slot number 8.

If **TA State** is disabled, the value set for **Feedback Delay** is used for "Processing Delay".

See [Chapter 10.3, "Timing Aspects"](#), on page 395.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:PDElay on page 640

Logging State

Enables the R&S SMW to create and store debug reports, i.e. log files with detailed information on the real-time feedback.

The instrument generates two types of reports:

- Transmission report
 - This file contains information about what is *sent* (e.g. redundancy versions) during the first 100 slots after triggering.
 - File is created after the 100 slots are sent.
- Reception report
 - This file contains information about the first 100 *received* serial commands.
 - File is created after 100 commands are successfully received.

The transmission and reception reports are divided in columns containing the following information:

- Absolute slot of message
- HARQ message payload
- HARQ message type
- HARQ primary baseband selector
- HARQ primary redundancy version
- HARQ secondary baseband selector
- HARQ secondary redundancy version
- HARQ associated HARQ process number
- TA message payload
- TA message type
- TA primary baseband selector
- TA primary timing adjustment command

The location of the log files is selected by the [Output Path](#) folder selection dialog.

Use these debug files for troubleshooting of complex real-time feedback tests.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:LOGState on page 637

Output Path

Enables you to define the output folder on the device for the log files. It opens the folder selection dialog.

Remote command:

[:SOURce<hw>] :BB:NR5G:HFB:LOGPath on page 637

11 Generating Logfiles for Design Cross-Verification

If equipped with the option R&S SMW-K81, your R&S SMW can create logfiles for exchanging intermediate results of different logging points in the signal processing chain.

Analyzing the content of the logfiles can help you to verify the signal processing chain in both the DL and UL direction. The intermediate results provide a basis for enhanced debugging. By loading the coded bitstream from the instrument into an Rx software module for offline analysis in a simulation environment, the FEC implementation in DUT is verified. You can also compare the coded stream to the bitstreams from a Tx software module. The logfiles generation functionality can also be remote controlled, so that the design flow can be optimized and the process automated.

11.1 Required Options

The generation of logfiles requires:

- Standard or wideband baseband generator (R&S SMW-B10/-B9)
- Baseband main module (R&S SMW-B13) or wideband baseband main module (R&S SMW-B13XT)
- Option 5G New Radio (R&S SMW-K144) (per signal path)
- Option log files generation (R&S SMW-K81)
Two options R&S SMW-K81 are required if system configuration with baseband blocks with more than one output is used.
For example, as it is in configuration with coupled or coupled per entity baseband sources.

11.2 Output Files

Logfiles are generated after each step of signal processing chain defined in [TS 38.212](#).

The R&S SMW saves the output logfiles in a user-defined network directory, selected with the parameter [Output Path](#). A folder structure is automatically created according to the number of configured users, BWPs, channels, etc. The logfiles are named according to the naming convention described in ["File format and filenames"](#) on page 401.

File format and filenames

The log files are files in json format and are named according to the following naming structure `after_<SignalProcessingStep>.json`. See [Table 11-1](#) for an overview of the signal processing steps and the filenames per channel.

Table 11-1: Log files

File name (signal processing step)	PxSCH (per codeword)	CORESET (PDCCH/DCI)	PUCCH (Format 2, 3, 4)	PRACH	SSPBCH (MIB)
transport_block	x	-	-	-	-
after_block_segmentation	-	0*	-	-	-
after_code_block_crc_attachment	-	0*	-	-	-
after_interleaving	-	0*	-	-	-
after_crc_attachment	0*	-	-	-	-
after_code_block_segmentation	0*	-	-	-	-
after_channel_coding	0*	0*	-	-	-
after_rate_matching	0*	0*	-	-	-
after_code_block_concatenation	x	0*	-	-	-
after_encoding	x	x	x		x
after_scrambling	x	x	x		x

0* = if channel coding is enabled.

11.3 How to Generate Logfiles

The R&S SMW generates logfiles depending on the current configuration, like active channels, users, BWPs, codewords, channel coding.

Activating the logfile generation does not affect the content of the generated 5G NR signal and does not cause a recalculation of the signal. The generation of new logfiles is triggered by changing of a relevant 5G NR parameter or by enabling/disabling the generation of 6G NR signal.



Activation of logfile generation slows down the calculation speed of the instrument. Enable this function only if logfiles are explicitly requested.

General workflow

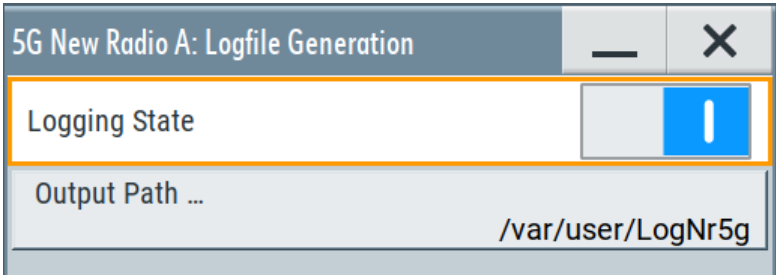
To enable the generation of logfiles, proceed as follows:

1. Select "5G New Radio > Logfile Generation > Output Path".
Set the logfile storage path to, e.g. `/var/user/logfiles`.
Note: Select an empty directory. Existing logfiles are overwritten.
2. Select "Logging State > On".
3. Adjust the 5G NR settings as required.
4. Set "5G New Radio > State > On".

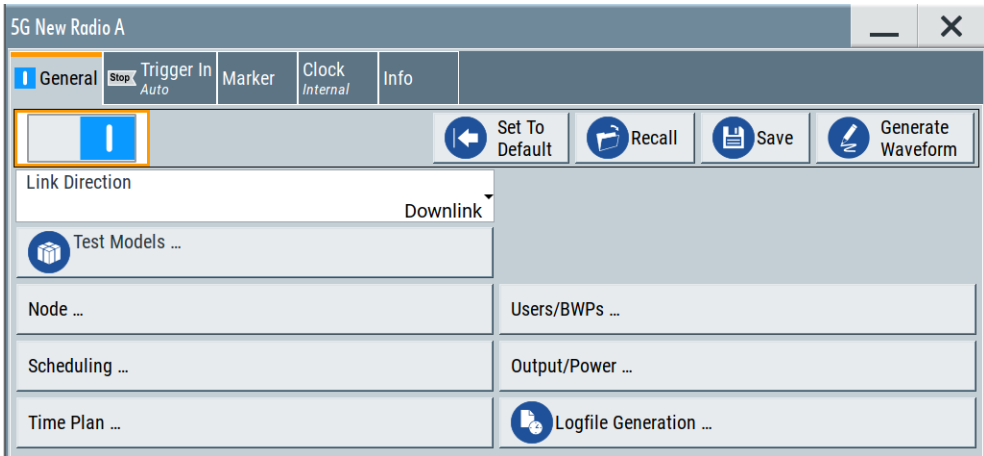
11.4 Logfile Generation Settings

Access:

1. Select "5G New Radio > General > Logfile Generation".
2. To enable log file generations, set "Logging State > On".



3. To start generation and logging, set "5G New Radio > State > On".



Logging State.....	403
Output Path.....	403

Logging State

Enables/disables logfile generation.

Note: Activation of logfile generation slows down the calculation speed of the instrument.

Enable this function only if logfiles are explicitly requested.

See also [Chapter 11.3, "How to Generate Logfiles"](#), on page 402.

Remote command:

`[ :SOURce<hw> ] :BB:NR5G:LOGGen:STAtE` on page 640

Output Path

Selects the network directory the logged files are saved in.

Per default, files are saved in the user directory of the instrument.

Remote command:

[:SOURce<hw>] :BB:NR5G:LOGGen:OUTPut on page 641

12 Remote-Control Commands

The following commands are required to perform signal generation with the option R&S SMW-K144 in a remote environment. We assume that the R&S SMW has already been set up for remote operation in a network as described in the R&S SMW documentation. A knowledge about the remote control operation and the SCPI command syntax is assumed.



Conventions used in SCPI command descriptions

For a description of the conventions used in the remote command descriptions, see section "Remote Control Commands" in the R&S SMW user manual.

Common suffixes

The following common suffixes are used in the remote commands:

Suffix	Value range	Description
ENTity<ch>	1 to 4	Entity in a multiple entity configuration with separate baseband sources ENTity3 4 require option R&S SMW-K76
SOURce<hw>	[1] to 4	Available baseband signals Only SOURce1 possible, if the keyword ENTity is used
OUTPut<ch>	1 to 3	Available markers
USER<ch>	0 to 9	Available users
ALLoc<ch0>	0 to 15	Number of allocations per user/BWP section
SUBF<st0>	0 to 100	Configurable subframes
CW<s2us0>	0 to 1	Codeword
SET<gr0>	0 to 15	SRS resource sets
RES<user0>	0 to 63	SRS resources within a resource set
RSET<st0>	0 to 7	PRS resource sets
RES<dir0>	0 to 63	PRS resources within a resource set
TD<gr>	0 to 64	PDSCH time domain allocations



Using SCPI command aliases for advanced mode with multiple entities

You can address multiple entities configurations by using the SCPI commands starting with the keyword `SOURce` or the alias commands starting with the keyword `ENTity`.

Note that the meaning of the keyword `SOURce<hw>` changes in the second case.

For details, see section "SCPI Command Aliases for Advanced Mode with Multiple Entities" in the R&S SMW user manual.

The following commands specific to the R&S SMW-K144 option are described here:

• Programming Examples.....	406
• General Commands.....	432
• Quick Settings Command.....	437
• Carrier Commands.....	444
• TxBW Commands.....	448
• System Information Commands.....	451
• LTE-CRS Coexistence Commands.....	452
• SS/PBCH Commands.....	454
• PRS Commands.....	465
• Dummy Resource Elements Commands.....	471
• Carrier Mapping Commands.....	473
• User Commands.....	474
• DL/UL BWP Commands.....	479
• BWP Configuration Commands.....	485
• Scheduling Commands.....	541
• PDSCH/PUSCH Commands.....	551
• CORESET Commands.....	571
• PUCCH Commands.....	609
• PRACH Commands.....	613
• Output Commands.....	616
• Trigger Commands.....	625
• Marker Commands.....	630
• Clock Commands.....	635
• Real-time Feedback.....	636
• Logging Commands.....	640
• Test Case Wizard Remote-Control Commands.....	641

12.1 Programming Examples

This description provides simple programming examples. The purpose of the examples is to present **all** commands for a given task. In real applications, one would rather reduce the examples to an appropriate subset of commands.

The programming examples have been tested with a software tool which provides an environment for the development and execution of remote tests. To keep the example as simple as possible, only the "clean" SCPI syntax elements are reported. Non-executable command lines (e.g. comments) start with two // characters.

At the beginning of the most remote control program, an instrument (p) reset is recommended to set the instrument to a definite state. The commands `*RST` and `SYSTEM:PRESet` are equivalent for this purpose. `*CLS` also resets the status registers and clears the output buffer.

Example: Storing current configuration

```

SOURcel:BB:NR5G:SETTing:STORe "/var/user/my_nr"
*RST
SOURcel:BB:NR5G:SETTing:CATalog?
// my_nr, 5gnr
SOURcel:BB:NR5G:SETTing:LOAD "/var/user/5gnr"
SOURcel:BB:NR5G:STATe 1
SOURcel:BB:NR5G:NODE:NCARrier?
// 1
SOURcel:BB:NR5G:SETTing:DEL "my_nr"

SOURcel:BB:NR5G:WAVEform:CREate "/var/user/my_nr_wv"

```

Example: Loading predefined test signals

```

SOURcel:BB:NR5G:LINK DOWN
SOURcel:BB:NR5G:SETTing:TMODe1:DL:CATalog?
// NR-FR1-TM1_1__FDD_100MHz_30kHz,
// NR-FR1-TM1_1__FDD_100MHz_60kHz,
// NR-FR1-TM1_1__FDD_10MHz_15kHz,
// ...
SOURcel:BB:NR5G:SETTing:TMODe1:DL "NR-FR1-TM1_1__FDD_100MHz_30kHz"

SOURcel:BB:NR5G:STATe 1
SOURcel:BB:NR5G:PRESet

```

Example: Filtering and loading predefined test signals

```

SOURcel:BB:NR5G:LINK DOWN
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:TMODe1 TM1_1
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:DUPLexing FDD
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:FREQ FR1
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:BW F100
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:SCS 30
SOURcel:BB:NR5G:SETTing:TMODe1:FILTer:CATalog?
// NR-FR1-TM1_1__FDD_100MHz_30kHz
SOURcel:BB:NR5G:SETTing:TMODe1:DL "NR-FR1-TM1_1__FDD_100MHz_30kHz"

SOURcel:BB:NR5G:STATe 1
SOURcel:BB:NR5G:PRESet

```

Example: Using the quick settings

```
SOURce1:BB:NR5G:QCKSet:GENeral:CARDeplY LT3
SOURce1:BB:NR5G:QCKSet:GENeral:DUPLexing TDD
SOURce1:BB:NR5G:QCKSet:GENeral:CBW BW100
SOURce1:BB:NR5G:QCKSet:GENeral:CHRaster R15
SOURce1:BB:NR5G:QCKSet:GENeral:CHSPacing 49980000
SOURce1:BB:NR5G:QCKSet:GENeral:SCSPacing N30
SOURce1:BB:NR5G:QCKSet:GENeral:ES:MOD QAM16
SOURce1:BB:NR5G:QCKSet:GENeral:ES:CS:STATe 1
SOURce1:BB:NR5G:QCKSet:GENeral:ES:CSLength 2
SOURce1:BB:NR5G:QCKSet:FRMFormat:SLENgth S10
SOURce1:BB:NR5G:QCKSet:FRMFormat:NDLSlots 8
SOURce1:BB:NR5G:QCKSet:FRMFormat:NSSLots?
// 1
SOURce1:BB:NR5G:QCKSet:FRMFormat:NULSlots?
// 1
SOURce1:BB:NR5G:QCKSet:FRMFormat:SSC:SLFMt 1
SOURce1:BB:NR5G:QCKSet:FRMFormat:SSC:NDLSymbols?
// 0
SOURce1:BB:NR5G:QCKSet:FRMFormat:SSC:NGSYmbols?
// 0
SOURce1:BB:NR5G:QCKSet:FRMFormat:SSC:NUSymbols?
// 14
SOURce1:BB:NR5G:QCKSet:GENeral:NCARier 1
SOURce1:BB:NR5G:QCKSet:GENeral:ES:TP:STATe?
// 1
SOURce1:BB:NR5G:QCKSet:GENeral:ES:RBOffset?
// 0
SOURce1:BB:NR5G:QCKSet:GENeral:ES:RBNumber 273
SOURce1:BB:NR5G:QCKSet:GENeral:ES:RBConfig MAN
SOURce1:BB:NR5G:QCKSet:GENeral:ECPState?
// 0
SOURce1:BB:NR5G:QCKSet:APPLy
```

Example: Configuring the carrier

```
SOURcel:BB:NR5G:NODE:NCARrier 1
SOURcel:BB:NR5G:NODE:RFPHase:MODE AUTO
SOURcel:BB:NR5G:NODE:CELL0:CINDicator 1
SOURcel:BB:NR5G:NODE:CELL0:CELLid 1
SOURcel:BB:NR5G:NODE:CELL0:CIF 1
SOURcel:BB:NR5G:NODE:CELL0:SCHBy?
// 0
SOURcel:BB:NR5G:NODE:CELL0:CIFPresent?
// 0
SOURcel:BB:NR5G:NODE:CELL0:N1ID?
// 0
SOURcel:BB:NR5G:NODE:CELL0:N2ID?
// 1
SOURcel:BB:NR5G:NODE:CELL0:CARDepty FR1LT3
SOURcel:BB:NR5G:NODE:CELL0:CBW BW50
SOURcel:BB:NR5G:NODE:CELL0:TAPos 2
SOURcel:BB:NR5G:NODE:CELL0:PCFReq 1000000000
SOURcel:BB:NR5G:NODE:CELL0:TAPos 2
SOURcel:BB:NR5G:NODE:CELL0:RPOW?
// 0
SOURcel:BB:NR5G:NODE:CELL0:DFReq 0

// Setting the timing advance offset for UL/DL synchronization
// SOURcel:BB:NR5G:NODE:CELL0:TAOffset N25600
```

Example: Configuring the TxBWs

```
// enable 15 kHz SCS
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S15K:USE 1
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S15K:NRB?
// 270
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S15K:OFFSet 0
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S15K:KOMU?
// -1700

// enable 30 kHz SCS
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:USE 1
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:NRB?
// 133
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:OFFSet?
// 0
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:KOMU?
// -840
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:POINTa?
// -49140000
// both k_0_u values are not allowed values

SOURCE1:BB:NR5G:NODE:CELL0:TXBW:CONFLICT?
// 1
// execute resolve conflicts to obtain valid values
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:RESolve
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:OFFSet?
// 1
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S30K:KOMU?
// 0
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:POINTa?
// -24300000
```

Example: System Information

```
SOURCE1:BB:NR5G:NODE:CELL1:SYINfo:SFOffset 1
SOURCE1:BB:NR5G:NODE:CELL1:SYINfo:HACBook DYN
SOURCE1:BB:NR5G:NODE:CELL1:SYINfo:SUL:STATe 1
```

Example: LTE-CRS Coexistence

```
SOURCE1:BB:NR5G:NODE:CELL0:CBW BW50
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S15K:USE 1
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:RESolve

SOURCE1:BB:NR5G:NODE:CELL0:LTE:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:LTE:POINTa 100
SOURCE1:BB:NR5G:NODE:CELL0:LTE:CBW N25
SOURCE1:BB:NR5G:NODE:CELL0:LTE:VSHift 2
SOURCE1:BB:NR5G:NODE:CELL0:LTE:NAP AP2
```

Example: Configuring the SS/PBCH

```

SOURCE1:BB:NR5G:NODE:CELL0:NSSPBch 1
SOURCE1:BB:NR5G:NODE:CELL0:OFFSet TXBW
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:STATe 1

SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:SCSPacing N15
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:RBOffset 125
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:SCOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:DFReq?
// -540000
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:CASE A
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:L L4
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POSition:PATtern #HF,4
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:BSPeriodicty BS10
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:HFRMidx 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:PSSPow 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:SSSPow 0

// PBCH configuration
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POWer 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:CCODing:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:CCODing:DATA PN9

SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:STATe 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SCSC N15_60
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:ASOF:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SCOffset?
// 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SFOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:CSZero 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SSZero 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:CBARred NBAR
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:IFRResel ALWD
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SPARe:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:TAPos?
// 2
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:MIB:SCOffset?
// 0

// AP configuration
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POSition:APMap0:COL0:ROW0:REAL 1
SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POSition:APMap0:COL0:ROW0:IMAGinary 0.7
// SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POSition:APMap0:COL0:ROW0:MAGNitude 0.7
// SOURCE1:BB:NR5G:NODE:CELL0:SSPBch0:POSition:APMap0:COL0:ROW0:PHASe 270

// Setting full SFN counting
SOURCE1:BB:NR5G:SCHeduling:SFN:STATe 1

```

Example: Configuring PRS resources

```

SOURCE1:BB:NR5G:NODE:CELL0:PRS:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:PRS:SCSPacing N30
SOURCE1:BB:NR5G:NODE:CELL0:PRS:NRSetS 1
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:PER SL4
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:SLOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:REPFactor REP1
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RBNumber 132
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:CMBSIZE C2
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:NRESources 1
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:REOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:SLOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:NSYMBOL S4
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:SYOffset 0
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:SQID 0
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:POWER -10
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:APMap:COL0:ROW0:REAL 1
SOURCE1:BB:NR5G:NODE:CELL0:PRS:RSET0:RES0:APMap:COL0:ROW0:IMAGinary 0

```

Example: Filling in the frame with dummy REs

```

SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:STATe 1
SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:POWER 0
SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:MODulation QPSK
SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:SCSPacing N15

// load a data list from the default directory; the file must exist
SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:DATA DLIS
SOURCE1:BB:NR5G:NODE:CELL0:DUMRes:DSElect "/var/user/dummyRE"

```

Example: Mapping the carriers to the outputs

```

SCONfiguration:MODE STAN
SCONfiguration:APPLY

SOURCE1:BB:NR5G:NODE:NCARrier 1
SOURCE1:BB:NR5G:NODE:CARMapping:CELL:ROW0 0

// automatical mapping if advanced system configuration is used
SCONfiguration:MODE ADV
SCONfiguration:FADing SISO8X1X1
SCONfiguration:BASEband:SOURce COUP
SCONfiguration:APPLY

SOURCE1:BB:NR5G:NODE:NCARrier?
// 8
ENTity1:SOURCE1:BB:NR5G:NODE:CARMapping:ROW0:CELL?
// 0
...
ENTity1:SOURCE1:BB:NR5G:NODE:CARMapping:ROW7:CELL?
// 7

```


Example: Configuring the users and the BWPs

```
// enable 2 users
SOURCE1:BB:NR5G:UBWP:NUSeR 2
SOURCE1:BB:NR5G:UBWP:REStArT COAL
SOURCE1:BB:NR5G:UBWP:USER0:UEID 10
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:CS 1
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:MCSC 1
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:SPCSI 1
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:RA 1
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:SFI 1
SOURCE1:BB:NR5G:UBWP:USER0:NUMSfi 1
SOURCE1:BB:NR5G:UBWP:USER0:RNTI:TC 1
SOURCE1:BB:NR5G:UBWP:USER0:DSCH:CCODing:STATe 0
SOURCE1:BB:NR5G:UBWP:USER0:DSCH:DATA PN9
SOURCE1:BB:NR5G:UBWP:USER0:DSCH:INITpatterN 10
// SOURCE1:BB:NR5G:UBWP:USER0:DSCH:DATA PATT
// SOURCE1:BB:NR5G:UBWP:USER0:DSCH:PATtern #H1E15,14
SOURCE1:BB:NR5G:UBWP:USER1:UEID 20
SOURCE1:BB:NR5G:UBWP:USER1:DSCH:DATA DLIS
SOURCE1:BB:NR5G:UBWP:USER1:DSCH:DLISt "/var/user/user"
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SRS:GTYPe A
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SRS:BD23 4

// configure the BWPs per user
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:NBWParts 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:INDicator 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SCSPacing N30
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RBNumber 100
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RBOffset 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PRBOffset?
// 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:DFReq?
// -2340000
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:NBWParts 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:INDicator 0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SCSPacing N30
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:RBNumber 11
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:RBOffset 11
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:DFReq?
// -18000000

SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:NBWParts 2
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP0:INDicator 1
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP0:RBNumber 110
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP0:RBOffset 20
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP0:DFReq?
// 3060000
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP1:INDicator 2
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP1:RBNumber 120
SOURCE1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP1:RBOffset 10
```

```
SOURce1:BB:NR5G:UBWP:USER1:CELL0:DL:BWP1:DFReq?
// 1260000
```

Example: Fixed reference channels

```
SOURce1:BB:NR5G:LINK UP
SOURce1:BB:NR5G:UBWP:USER0:USCH:CCODing:STAtE 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:STAtE 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:TYPE FR1A15
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:SCS?
// N30
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:ALRB?
// 51
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:MODulation?
// QPSK
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:PASize?
// 4352
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:RBOffset 10

SOURce1:BB:NR5G:NODE:CELL0:CARDePLY GT6
SOURce1:BB:NR5G:UBWP:USER0:USCH:CCODing:STAtE 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:STAtE 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:TYPE FR2A58
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:FRC:PTRS:STAtE?
// 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:MAPTYPE?
// B
```

Example: Configuring the configurable allocations in the users and BWPs groups

```
SOURce1:BB:NR5G:LINK DOWN
SOURce1:BB:NR5G:SCHeduling:MODE MANual

SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:NALLoc 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:CONTent PDSch
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:SLOT 1

SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:SYMNumber 14
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:SYMoffset 0
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:RBNumber 20
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:RBOffset 100
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:POWer 0
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:STAtE 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP0:ALLoc0:REPetitions SUBF

SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP1:NALLoc 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP1:ALLoc0:CONTent COR
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP1:ALLoc0:RBNumber 30
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWP1:ALLoc0:RBOffset 100
```

```
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:REPetitions FRAM
```

```
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:COpyto:SLOT 2
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:COpyto:SUBF 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:COpyto:APPLY
```

Example: Configuring the PDSCH incl. PTRS and Precoding settings

```
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:CTYPE T1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:APIndex 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:MLENgtH 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:SID0 10
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:SID1 20
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:CTYPE T2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:APIndex 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:MLENgtH 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:SID0 100
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:SID1 200

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:SCRambling:STATe 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DSID 100
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:MCWDci 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:MCSTable QAM256
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:RESalloc?
// T1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:VPINter?
// VPN
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:RESalloc T0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:RBGSize C1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:MCBGroups DIS
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:CBGF:STATe 0

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:OI11 1

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:BSAMe 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:STATe 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:REOF RE01
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:EPRE RAT1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:MCS1 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:MCS2 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:MCS3 3
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:RB0 10
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTA:PTRS:RB1 100

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSC:DMTB:PTRS:STATe 0

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CONTeNt PDSC
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SLOT 0
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:MAPType A
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SYMNumber 7
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SYMoffset 1
```

```

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:RBNumber 273
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:REPetitions SLOt

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:TYPE?
// F11
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:NCW?
// 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PATGrp N
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:MOD QAM16
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PHYSbits?
// 61488
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:SEQGen CELL
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:NSID 0
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:APSelect AP1000

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:LENGth 2
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:SLTSymbols?
// "2,3"
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:DMRS:POWEr 0
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:TXScheme:NLAYer?
// 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:TXScheme:CDMData 2
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:TXScheme:INTervp?
// 0

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:APSelect0?
// AP1000
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:APMap:AP0:ROW0:REAL 0.7
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:APMap:AP0:ROW0:IMAGinary 0.7

SOURce1:BB:NR5G:UBWP:USER0:USCH:CCODing:STATe 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PDSch:CCODing:IMCS 5
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PDSch:CCODing:TCRate?
// 0.369140625
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PDSch:CCODing:TBSIZE?
// 22536
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PDSch:CCODing:RVIndex 1

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:MODE MAN
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:STATe 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:TMDen TD1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:REOF RE01
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:FRQDen FD2
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PTRS:EPRE RAT1

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PREC:STATe 1
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSch:PREC:BTYPe DYN
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSch:PREC:BBSet1 N4
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSch:PREC:BBSet2 N4

```

```

SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:PREC:BTYPe STAT
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:PREC:BSZIE N4

SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:PREC:STATE 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:PRECG N2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:BMAid 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSI:RTSize 0

```

Example: Configuring PDSCH time domain scheduling with PDSCH time domain allocation list

```

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TDANum 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD0:KNULl 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD0:MAPPing A
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD0:START 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD0:LENGth 3
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD0:SLIV?
// 28

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD1:KNULl 10
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD1:MAPPing B
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD1:START 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD1:LENGth 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:TD1:SLIV?
// 14

```

Example: Scheduling PxSCH type 0 allocation

```

// PDSCH
SOURce1:BB:NR5G:LINK DOWN
SOURce1:BB:NR5G:SCHeduling:MODE MAN

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDsch:RESalloc DS
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:RESalloc T0
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PDsch:RESalloc:PATtern #H3FFFF,18

// PUSCH
SOURce1:BB:NR5G:LINK UP

SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSch:RESalloc DS
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSch:RBGSize C1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PUSch:RESalloc T0
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc1:PUSch:RESalloc:PATtern #H3FFFF,18

```

Example: Configuring the CSI-RS settings

```
// periodic ZP CSI-RS
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:STATE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:NRESources 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:PER 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:OFFSET 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:RBNumber 273
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:SRBNumber 0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:ROW 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:BITMap #HAF,12
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:IO 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:ZP:SET0:RES0:I1 2

// periodic NZP CSI-RS
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:STATE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:NRESources 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:PER 4
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:OFFSET 0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:RBNumber 100
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:SRBNumber 50
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:ROW 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:BITMap #HF,4
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:IO 0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:I1 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:SCID 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:PWR 3

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:APMap:AP3000:ROW0:REAL 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CSIRs:NZP:SET0:RES0:APMap:AP3000:ROW0:IMAGinary 0.7
```

Example: Antenna port settings

```
SCONfiguration:MODE ADV
SCONfiguration:FADing MIMO2X4X4
SCONfiguration:BASEband:SOURCE CPEN
SCONfiguration:APPLY

ENTITY1:SOURCE1:BB:NR5G:LINK DOWN
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL0:ROW0:REAL 1
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL0:ROW0:IMAGinary?
// 0
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL1:ROW1:REAL 1
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL2:ROW2:REAL 1
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL3:ROW3:REAL 1

ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL0:ROW0:MAGNitude 1
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL0:ROW0:PHASe 360
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL1:ROW1:MAGNitude 0
ENTITY1:SOURCE1:BB:NR5G:SCHED:CELL0:SUBF0:USER0:BWPpart0:ALLOc1:APMap:COL1:ROW1:PHASe 270
```

Example: Configuring one SRS resource set

```

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:NRSets 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RSType PER
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:TXConfig NCB
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:USAGe?
// NCB

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:NRESources 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:PER SL10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:OFFSet 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:SPOS 3
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:SYMNumber SYM2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:FPOS 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:FQShift 20
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:BSRS 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:CSRS 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:BHOP 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:REFactor?
// REP1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:TRTComb TC4
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:COFFset 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:SEQ:CYCShift 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:SEQ:ID 10
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:POWEr 3
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:NAPort AP1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:PTRS P0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:APMap:AP1000:ROW0:MAGNitude 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:APMap:AP1000:ROW0:PHASe 0
// SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:APMap:AP1000:ROW0:REAL?
// SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:RES0:APMap:AP1000:ROW0:IMAGinary?

SOURCE1:BB:NR5G:LINK UP
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLOc0:STATE 0
// open the timeplan and observe the SRS allocations

```

Example: Configuring the DL BWP rate match settings

```

SOURCE1:BB:NR5G:LINK DOWN

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:STATE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:GRPNumber 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:NRESources 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:GRID G1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:SLTPatt #H1001,14
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:PER 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:PERPatt #H2,2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:RBDList "/var/user/dl"
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS0:RBPatt?

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS1:SLOT 2

```

```

SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS1:PER 4
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS1:PERPatt #H5,4
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RATM:RS1:SLTPatt #H8888888,28
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSCH:PATGrp G1

```

Example: Search space configuration

For example on how the CORESET is configured, see [Example "Configuring the CORESET settings"](#) on page 420.

```

SOURcel:BB:NR5G:SCHeDuling:MODE MAN
SOURcel:BB:NR5G:SCHeDuling:RSSPace 1

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe0:AGGLeveL?
// AL1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe0:MAXCandidate 2
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe1:AGGLeveL?
// AL2
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe1:MAXCandidate 2
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe2:AGGLeveL?
// AL4
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe2:MAXCandidate 4
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe3:AGGLeveL?
// AL8
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe3:MAXCandidate 6
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe4:AGGLeveL?
// AL16
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SPACe4:MAXCandidate 8

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:AGGLeveL AL1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:CANDidate 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DCI0:INDex?
// 22

```

Example: Configuring the CORESET settings

For example of how the search space is configured, see [Example "Search space configuration"](#) on page 420.

```

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CONTent COR

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:PREGran REG
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:ID 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SCRam:STATe 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DMRS:SCRam:ID 0

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:IL:STATe 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:IL:BUNSize 6
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:IL:SHIDx 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:IL:SIZE IS6

```



```

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCCes:StAtE 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCCes:DATA DLIS
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCCes:DLISt "/var/user/dl"
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCCes:DATA PATtern
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCCes:PATtern #H9,4

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DMRS:SCRam:StAtE 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DMRS:SCRam:ID 10
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:AULBwp?

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:NDCI 5

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USAGe?
// C
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:RNTI?
// 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:FMT F00
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:SSP USS
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:AGGLeveL AL1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:CANDidate 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DCI0:INDex?
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:FRDRes 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:FRHFlag 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TB1:MCS 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TB1:NDI 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TB1:RV 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:HAPRoc 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TPUSch 2
// 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USINd 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:HBTS?
// #H00000434600,44
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:SRSResind 4
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:PRECinfo 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:CSIRequest 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:BOINd 0

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:MOFFs 1

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:USAGe?
// C
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:RNTI?
// 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DCI1:AGGLeveL AL2
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DCI1:INDex 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:FMT F10
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:SSP CSS3
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:FRDRes 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TIDRes 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:VTPRb?
// 0

```

```

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TB1:MCS 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TB1:NDI 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TB1:RV 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:HAPRoc 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:DAI1 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TPUCch 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:PUCResind 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:PDSHarq 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:HBTS?
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:CPDSch 1

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:USAGe?
// C
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:FMT F01
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:ANTPorts 15
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:SRSRequest 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:TPState 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:DMSQinit 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:MRANK 2
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI2:PTDMrs 1
...

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:USAGe SI
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:RNTI?
// 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:FMT F10
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:SSP CSS0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:AGGLevel AL1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:CANDidate 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart1:ALLoc0:CS:DCI3:INDex?
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:FRDRes 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:TIDRes 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI1:VTPRb 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:TB1:MCS 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:TB1:RV 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:SIInd 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:RESVed?
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:HBTS?
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI3:CPDSch 1

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USAGe TSRS
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:SR1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TP1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USAGe TPUC
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:CL1?
// 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TP1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USAGe INT
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:PE1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:USAGe SFI
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:SI1 0

```

```

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:TBScaLin 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:CAINd 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:SI16 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:SR1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:CL22 0

```

Example: Custom DCI

```

SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:FMT CUSToM
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:STATe 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:DATA PATTeRn
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:BITLength 12
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:PATTeRn #HCA3,12
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:DATA DLISt
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:DLISt "var/user/nr_dl"
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:DATA PN9
// SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:INITpattern 16

```

Example: DCI format 2_0, 2_1 and 2_2

Listed are only the related commands:

```

SOURcel:BB:NR5G:UBWP:USER0:UEID 0

// DCI format 2_0
SOURcel:BB:NR5G:UBWP:USER0:RNTI:SFI 1
SOURcel:BB:NR5G:UBWP:USER0:NUMSfi 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:USAGe SFI
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:FMT F20
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:SI1 100

// DCI format 2_1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:IN 10
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDCCCh:NUMPreempt 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI1:USAGe INT
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI1:FMT F21
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI1:PE1 200

// DCI format 2_2
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:PUSCh 20
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:PUCCh 1
// SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:SRS 100
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PUSCh:TPAS 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PUSCh:BD22 2
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PUCCh:TPAS 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PUCCh:BD22 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI2:USAGe TPUS
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI3:USAGe TPUC
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI2:FMT F22
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI3:FMT F22
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI2:CL1 1
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI2:TP1 0
SOURcel:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI2:TP2 1

```

```
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI3:TP1 3
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI3:CL1 1
```

Example: DCI format 2_4

Listed are only the related commands:

```
SOURce1:BB:NR5G:UBWP:USER0:UEID 0

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:CIRNti 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:CILength 4
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:NCINd 2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:USAGe CI
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:FMT F24
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:CI1 #HE,4
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:CI2 #H3,4
```

Example: DCI format 2_6

Listed are only the related commands:

```
SOURce1:BB:NR5G:UBWP:USER0:UEID 0

SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:RNTI:PSRNti 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SRS:NB26 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SRS:NSCG 2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:USAGe PS
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:WA1 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:DI1 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWP0:ALLoc0:CS:DCI0:RESVed #HF,4
```

Example: Configuring the PUSCH settings

```
SOURce1:BB:NR5G:LINK UP

SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:BSAME 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:CTYPE T1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:APINdex 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:MLENgtH 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PUID 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:SID0 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:SID1 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:CTYPE T2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:APINdex 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:MLENgtH 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:PUID 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:SID0 10
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTB:SID1 10
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:TPState 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:MRANK 2
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:TXConfig
// CB
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:MCSTable QAM256
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:MTTPrecoding QAM256
```

```

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:CBSubset FPNC
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:SCRambling:STATE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DSID 100
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:MCBGroups G0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOP INTER
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOffsets:NOFFsets 4
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOffsets:OFFSet0 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOffsets:OFFSet1 2
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOffsets:OFFSet2 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:FHOffsets:OFFSet3 2

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:OI01 1

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:HPRNumber 4

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:STATE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:MODE UCI
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:MODE UCLS
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:ALPHA A0_8
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:ALPHA A1_0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:HARQ:OFF1 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:HARQ:OFF2 5
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:CSI:OF10 0
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:CSI:OF11 5
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:CSI:OF20 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:UCI:CSI:OF21 10

SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:SLOT 0
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:MAPType A
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:SYMNumber 14
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:RBNumber 273
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:POWer 0
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:REPetitions SLOT

SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUSCh:TYPE?
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:MOD QAM64
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CW0:PHYSbits?
// 196560
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMR:NIDSel CID
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMR:SEQHopping GRP
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMRS:LENGth 2
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMRS:SLTSymbols?
// "2,3,10,11"
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMRS:POWer -3
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUSCh:TXScheme:NLAYer?
// 1
SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:TXScheme:CDMData 2

SOURCE1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:TXScheme:TPMidx 1

// enable at least one SRS resource set with at least one SRS resource
// SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:NRSets 1

```

```
// SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:SRS:RS:SET0:NRESources 1
// ... configure the SRS
// SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:TXScheme:SRI 1

SOURcel:BB:NR5G:UBWP:USER0:USCH:CCODing:STATe 1
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:CCODing:IMCS 11
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CW0:PUSCh:CCODing:TCRate?
// 0.455078125
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CW0:PUSCh:CCODing:TBSIZE?
// 90176
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:CCODing:RVIndex 1

SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:ACK:BITS 4
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:ACK:PATtern #HC,4
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:CSI1:BITS 5
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:CSI1:PATtern #H15,5
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:CSI2:PATtern #H0,1
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:CSI2:BITS 3
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:UCI:CSI2:PATtern #H2,3

SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:FHOP:STATe 1
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:FHOI 0
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:DMRS:APSelect0 AP0
```

Example: Configuring the PUSCH PTRS with enabled transform precoding

```
SOURcel:BB:NR5G:LINK UP

SOURcel:BB:NR5G:UBWP:USER0:USCH:CCODing:STATe 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:TPSTATe 1

SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:STATe 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:TMDensity TD2
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:SCID CID
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:RB0 1
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:RB1 270
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:RB2 275
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:RB3 276
SOURcel:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:DMTA:PTRS:TP:RB4?
// 276

SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CONTent PUSC
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:MODE MAN
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:STATe 1
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:TMDensity TD2
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:NGRPs G4
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:SCID PUID
SOURcel:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:TP:SPPG S4
```

Example: Configuring the PUCCH settings

```

SOURCE1:BB:NR5G:LINK UP

SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:ADMRs:STATe 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:BPSK:STATe 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:HACK:STATe?
// 0

SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:NALLoc 2
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:CONTent PUCc
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SLOT 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:FMT F4
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SYMNumber 4
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:SYMoffset 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:RBNumber 10
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:RBOffset 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:POWer 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:REPetitions SUBF

SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:GRPHopping ENA
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:HOPid 100
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:ISFHopping 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:SHOPping 20
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:FS:OCCLength L4
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:FS:OCCindex 1
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCChPL:SRCcount?
// 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:PL:UCI:BITS 3
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:PL:UCI:PATtern #H5,3
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:PL:ACK:BITS?
// 0
SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PUCCh:PL:ACK:PATtern?
// #H0,0

//Setting a PUCCH allocation as burst refence for the burst power mode
//SOURCE1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSCb:BMAid 1

```

Example: Configuring the PRACH settings

```

SOURCE1:BB:NR5G:LINK UP
SOURCE1:BB:NR5G:NODE:CELL0:CARDePLY GT6
SOURCE1:BB:NR5G:NODE:CELL0:TXBW:S120K:USE 1
SOURCE1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:SCSPacing N120

SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:NALLoc 2
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:CONTent PRAC
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:SCSPacing N120
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:FORMat FA1
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:RSET URES
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:RSEQuence 1
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:ZCZone 1
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:PRINdex 1
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:TOFFset 0
SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:RBNumber?
// 12

//Setting a PRACH allocation as burst refence for the burst power mode
//SOURCE1:BB:NR5G:SCHEd:CELL0:SUBF0:USER0:BWPpart0:ALLoc1:PRACH:BMAid 1

```

Example: Time domain windowing

```

SOURCE1:BB:NR5G:TDWind:STATe?
// 0
SOURCE1:BB:NR5G:OUTPut:TDWind:TRTime:S15K:TRTime 5
...
SOURCE1:BB:NR5G:OUTPut:TDWind:TRTime:S240K:TRTime 5
SOURCE1:BB:NR5G:OUTPut:TDWind:TRTime:S240K:TRTSamples?
// 11

```


Example: Output settings

```
SOURce1:BB:NR5G:OUTPut:SEQLen 10
SOURce1:BB:NR5G:OUTPut:SSOC:STATe 0
SOURce1:BB:NR5G:OUTPut:OUTPut:FMODE CBW
SOURce1:BB:NR5G:OUTPut:SAMRmode FFt
SOURce1:BB:NR5G:OUTPut:BBConf:ROW0:SRAtE?
// 122880000
SOURce1:BB:NR5G:OUTPut:BBConf:ROW0:CONFLict?
// 0
SOURce1:BB:NR5G:OUTPut:BBConf:ROW0:PBRate?
// 122880000
SOURce1:BB:NR5G:OUTPut:BBConf:ROW0:VARiation 0

SOURce1:BB:NR5G:OUTPut:CLeVel 80
SOURce1:BB:NR5G:OUTPut:CMODE VECT

SOURce1:BB:NR5G:OUTPut:CFReduction:STATe 1
SOURce1:BB:NR5G:OUTPut:CFReduction:ALGorithm?
// CLF
SOURce1:BB:NR5G:OUTPut:CFReduction:TCRFactor 10
SOURce1:BB:NR5G:OUTPut:CFReduction:ITERations 5
SOURce1:BB:NR5G:OUTPut:CFReduction:OCFactor?
// 0
SOURce1:BB:NR5G:OUTPut:CFReduction:RCFactor?
// 0

SOURce1:BB:NR5G:OUTPut:POWer:BBConf:ROW0:AVRL?
// 0
SOURce1:BB:NR5G:OUTPut:POWer:BWRef:ACRL?
// 0
SOURce1:BB:NR5G:OUTPut:POWer:S240K:ACRL?
// 0

SOURce1:BB:NR5G:OUTPut:BBConf:CONFLict?
// 0
```

Example: Configure and enable triggering

```

SOURce:BB:NR5G:TRIGger:SEQuence SINGle
SOURce:BB:NR5G:TRIGger:SLENgth 200

// the first 200 samples of the current waveform will be output after
// the next trigger event
// SOURce:BB:NR5G:TRIGger:SEQuence ARETrigger
// SOURce:BB:NR5G:TRIGger:SOURce EGT1
// external trigger signal must be provided at the USER connector
// SOURce:BB:NR5G:TRIGger:EXternal:SYNChronize:OUTPut ON
// SOURce:BB:NR5G:TRIGger:EXternal:DELay 200
// SOURce:BB:NR5G:TRIGger:EXternal:INHibit 100

SOURce:BB:NR5G:TRIGger:SEQuence AAUTO
SOURce:BB:NR5G:TRIGger:SOURce INTernal
SOURce:BB:NR5G:STAT ON
SOURce:BB:NR5G:TRIGger:EXEC

// SOURce:BB:NR5G:TRIGger:SOURce INTB
// the internal trigger signal from the other path must be used
// SOURce:BB:NR5G:TRIGger:OBASeband:DELay 25
// SOURce:BB:NR5G:TRIGger:OBASeband:INHibit 10

```

Example: Specifying delay and inhibit values in time units

```

SOURce1:BB:NR5G:CLOCK 1000000
SOURce1:BB:NR5G:TRIGger:SEQuence AAUT
SOURce1:BB:NR5G:TRIGger:SOURce EGT1
SOURce1:BB:NR5G:TRIGger:DELay:UNIT SAMP
SOURce1:BB:NR5G:TRIGger:EXternal:DELay 100
SOURce1:BB:NR5G:TRIGger:EXternal:RDELay?
// Response: 100

SOURce1:BB:NR5G:TRIGger:DELay:UNIT TIME
SOURce1:BB:NR5G:TRIGger:EXternal:TDELay 0.00001
SOURce1:BB:NR5G:TRIGger:EXternal:RDELay?
// Response: 0.00001

SOURce1:BB:NR5G:TRIGger:DELay:UNIT SAMP
SOURce1:BB:NR5G:TRIGger:EXternal:DELay 10

```

Example: Configure and enable standard marker signals

```
SOURce:BB:NR5G:TRIGger:OUTPut1:MODE RAT
SOURce:BB:NR5G:TRIGger:OUTPut1:ONTime 10
SOURce:BB:NR5G:TRIGger:OUTPut1:OFFTime 20
```

```
SOURce:BB:NR5G:TRIGger:OUTPut2:MODE?
// REStart
SOURce:BB:NR5G:TRIGger:OUTPut2:FOFFset 10
SOURce:BB:NR5G:TRIGger:OUTPut2:ROFFset 20
```

```
SOURce:BB:NR5G:TRIGger:OUTPut2:DElay 16
```

```
SOURce:BB:NR5G:TRIGger:OUTPut3:MODE PER
SOURce:BB:NR5G:TRIGger:OUTPut3:PERiod 30
```

Example: Configure and enable an UL/DL marker

```
SOURce1:BB:NR5G:TRIGger:OUTPut1:MODE ULDL
SOURce1:BB:NR5G:TRIGger:OUTPut1:DUPLexing TDD
SOURce1:BB:NR5G:TRIGger:OUTPut1:SCSPacing SCS60
SOURce1:BB:NR5G:TRIGger:OUTPut1:ECPState 1
SOURce1:BB:NR5G:TRIGger:OUTPut1:SLENgth 10
SOURce1:BB:NR5G:TRIGger:OUTPut1:NDLSlots 5
SOURce1:BB:NR5G:TRIGger:OUTPut1:NSSlots?
//1
SOURce1:BB:NR5G:TRIGger:OUTPut1:NULSlots 4
SOURce1:BB:NR5G:TRIGger:OUTPut1:SSC:SLFMt 0
SOURce1:BB:NR5G:TRIGger:OUTPut1:SSC:NDLSymbols?
//14
SOURce1:BB:NR5G:TRIGger:OUTPut1:SSC:NGSYmbols?
//0
SOURce1:BB:NR5G:TRIGger:OUTPut1:SSC:NULSYmbols?
//0
```

Example: Clock settings

```
SOURce:BB:NR5G:CLOCK:SOURce ELCL
SOURce:BB:NR5G:CLOCK:MODE SAMP
CLOCK:INPUt:FREQuency?
```

Example: Configuring the HARQ-ACK in DCI1_0 and 0_1 settings

```
SOURce1:BB:NR5G:NODE:NCARrier 2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPpart0:ALLoc0:CS:NDCI 2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPpart0:ALLoc0:CS:FMT F10
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPpart0:ALLoc0:CS:FMT F01
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPpart0:ALLoc0:CS:DAI1 1
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:BWPpart0:ALLoc0:CS:HAPRoc 1
```

Example: Reconfiguring a 2x1x1 coupled system for MIMO usage

```

SCONfiguration:MODE ADV
SCONfiguration:FADing FAAFBB
SCONfiguration:BASeband:SOURce COUP
SCONfiguration:APPLy
ENTity1:SOURce1:BB:NR5G:NODE:NCARrier 1

```

12.2 General Commands

[SOURce<hw>]:BB:NR5G:PRESet.....	432
[SOURce<hw>]:BB:NR5G:LINK.....	432
[SOURce<hw>]:BB:NR5G:SETTing:CATalog?.....	433
[SOURce<hw>]:BB:NR5G:SETTing:STORe.....	433
[SOURce<hw>]:BB:NR5G:SETTing:LOAD.....	433
[SOURce<hw>]:BB:NR5G:SETTing:DEL.....	433
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL:CATalog?.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL:CATalog?.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:TMODeL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:FREQ.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:DUPLexing.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:BW.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:SCS.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.....	436
[SOURce<hw>]:BB:NR5G:STATe.....	436
[SOURce<hw>]:BB:NR5G:WAVeform:CREate.....	436
[SOURce]:BB:NR5G:VERSion?.....	436
[SOURce]:BB:NR5G:PLVersion?.....	437

[SOURce<hw>]:BB:NR5G:PRESet

Sets the parameters of the digital standard to their default values (*RST values specified for the commands).

Not affected is the state set with the command `SOURce<hw>:BB:NR5G:STATe`.

Example: See [Example "Storing current configuration"](#) on page 407.

Usage: Event

Manual operation: See ["Set to Default"](#) on page 38

[SOURce<hw>]:BB:NR5G:LINK <LinkDir>

Selects the transmission direction.

Parameters:

<LinkDir> DOWN | UP
 *RST: DOWN

Example: See [Example "Loading predefined test signals"](#) on page 407.

Manual operation: See ["Link Direction"](#) on page 40

[:SOURce<hw>]:BB:NR5G:SETTing:CATalog?

Queries the files with settings in the default directory. Listed are files with the file extension *.nr5g.

Return values:

<FileNames> <filename1>,<filename2>,...
 Returns a string of filenames separated by commas.

Example: See [Example "Storing current configuration"](#) on page 407.

Usage: Query only

Manual operation: See ["Save/Recall"](#) on page 38

[:SOURce<hw>]:BB:NR5G:SETTing:STORe <Filename>

Saves the current settings into the selected file; the file extension (*.nr5g) is assigned automatically.

Parameters:

<Filename> "<filename>"
 Filename or complete file path

Example: See [Example "Storing current configuration"](#) on page 407.

Manual operation: See ["Save/Recall"](#) on page 38

[:SOURce<hw>]:BB:NR5G:SETTing:LOAD <Filename>

Loads the selected file from the default or the specified directory. Loaded are files with extension *.nr5g.

Parameters:

<Filename> "<filename>"
 Filename or complete file path; file extension can be omitted

Example: See [Example "Storing current configuration"](#) on page 407.

Manual operation: See ["Save/Recall"](#) on page 38

[:SOURce<hw>]:BB:NR5G:SETTing:DEL <Filename>

Deletes the selected file from the default or the specified directory. Deleted are files with extension *.nr5g.

Parameters:

<Filename> "<filename>"
 Filename or complete file path; file extension can be omitted

Example: See [Example "Storing current configuration"](#) on page 407.

Manual operation: See ["Save/Recall"](#) on page 38

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL <TmodUp>

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL <TmodDn>

Loads a test model file with predefined settings.

Parameters:

<TmodDn> "<filename>"
 Filename as queried with one of the following commands:
[\[:SOURce<hw>\]:BB:NR5G:SETTing:TMODeL:UL:CATalog?](#)
[\[:SOURce<hw>\]:BB:NR5G:SETTing:TMODeL:DL:CATalog?](#)
[\[:SOURce<hw>\]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog](#)

Example: See [Example "Loading predefined test signals"](#) on page 407.

Manual operation: See ["Select"](#) on page 42

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL:CATalog?

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL:CATalog?

Queries the filenames of predefined files with test signals in the default directory.

Return values:

<FileNames> <filename1>,<filename2>,...
 Returns a string of filenames separated by commas.

Example: See [Example "Loading predefined test signals"](#) on page 407.

Usage: Query only

Manual operation: See ["User Files"](#) on page 40

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:TMODeL <FilterTestModel>

Applies a test model filter to narrow down the files returned by the query [\[:SOURce<hw>\]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog](#).

Parameters:

<FilterTestModel> ALL | TM1_1 | TM1_2 | TM2 | TM2a | TM3_1 | TM3_1A |
 TM3_2 | TM3_3
 *RST: ALL

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Test Models"](#) on page 41

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:FREQ <FilterFreqRange>

Applies a frequency range filter to narrow down the files returned by the query [:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.

Parameters:

<FilterFreqRange> ALL | FR1 | FR2
*RST: ALL

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Frequency Range"](#) on page 42

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:DUPLexing <FilterDuplexing>

Applies a duplexing filter to narrow down the files returned by the query [:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.

Parameters:

<FilterDuplexing> ALL | FDD | TDD
*RST: ALL

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Duplexing"](#) on page 42

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:BW <FilterBandwidth>

Applies a bandwidth filter to narrow down the files returned by the query [:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.

Parameters:

<FilterBandwidth> ALL | F5 | F10 | F15 | F20 | F25 | F30 | F40 | F50 | F60 | F70 | F80 | F90 | F100 | F200 | F400
*RST: ALL

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Bandwidth"](#) on page 42

[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:SCS <FilterScs>

Applies a subcarrier spacing filter to narrow down the files returned by the query [:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.

Parameters:

<FilterScs> ALL | F15 | F30 | F60 | F120
 *RST: ALL

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Subcarrier Spacing"](#) on page 42

[[:SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FiLTeR:CATalog

Queries the filenames of predefined test signal files in the default directory after applying a filter.

Return values:

<FileNames> <filename1>,<filename2>,...
 Returns a string of filenames separated by commas.

Example: See [Example "Filtering and loading predefined test signals"](#) on page 407.

Manual operation: See ["Filter Test Models"](#) on page 41

[[:SOURce<hw>]:BB:NR5G:STATe <State>

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Storing current configuration"](#) on page 407.

Manual operation: See ["State"](#) on page 38

[[:SOURce<hw>]:BB:NR5G:WAVEform:CREate <Filename>

Stores the current settings as an ARB signal in a waveform file (* .wv).

Parameters:

<Filename> string
 Filename or complete file path; file extension is assigned automatically

Example: See [Example "Storing current configuration"](#) on page 407.

Manual operation: See ["Generate Waveform File"](#) on page 39

[[:SOURce]:BB:NR5G:VERSion?

Queries the version of the 3GPP standard underlying the definitions.

Return values:

<Version> string

Example:

SOURce1:BB:NR5G:VERsion?

Usage:

Query only

Manual operation: See ["3GPP Specification Table"](#) on page 30**[[:SOURce]:BB:NR5G:PLVersion?**

Queries the installed version of the 5G New Radio application.

Return values:

<PluginVersion> string

Example:

SOURce1:BB:NR5G:PLVersion?

Usage:

Query only

Manual operation: See ["5G NR Application Version"](#) on page 30

12.3 Quick Settings Command

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CARDepl	438
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CBW	438
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHRaster	438
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHSPacing	438
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:SCSPacing	439
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ECPState	439
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:DUPLexing	439
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:NCARier	439
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:MOD	440
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CS:STATe	440
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CSLength	440
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBConfig	440
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBNumber	441
[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBOffset	441
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SLENgth	441
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NDLSlots	441
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NSSLots?	442
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NULSlots	442
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:SLFMt	442
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NDLSymbols	442
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NGSYmbols	443
[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NULSymbols	443
[:SOURce<hw>]:BB:NR5G:QCKSet:APPLY	443
[:SOURce<hw>]:BB:NR5G:QCKSet:DISCard	443

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CARDepl <QckSetCarDepl>

Selects one of the frequency ranges, specified for 5G NR transmission.

Parameters:

<QckSetCarDepl> FR1LT3 | FR1GT3 | FR2
*RST: LT3

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Deployment"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CBW <QckSetChannelBW>

Selects the bandwidth of the node carrier.

Parameters:

<QckSetChannelBW> BW5 | BW10 | BW15 | BW20 | BW25 | BW40 | BW50 | BW60 |
BW100 | BW80 | BW400 | BW200 | BW30 | BW70 | BW90
*RST: BW100

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Channel Bandwidth"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHRaster <ChannelRaster>

Sets the "Channel Raster" based on the set "Deployment".

If "Deployment" is set to "FR1 ≤ 3GHz" or "FR1 > 3GHz" the "Channel Raster" can be set to 15 kHz or 100 kHz.

If "Deployment" is set to "FR2" the "Channel Raster" is set to 60 kHz.

"Channel Raster" is not displayed when the "Number of Carriers" is shown inactive.

Parameters:

<ChannelRaster> R15 | R60 | R100
*RST: R100

Example: See [Example "Using the quick settings"](#) on page 408

Manual operation: See ["Channel Raster"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHSPacing <ChannelSpacing>

Queries or sets the value for the "Channel Spacing". It is by default automatically calculated by the set "Channel Raster" and the set "Channel Bandwidth".

The value can be manually adjusted, but is recalculated if the "Channel Raster" or the "Channel Bandwidth" is adjusted.

"Channel Spacing" is not displayed when the "Number of Carriers" is shown inactive. In this case, it is used like "Carrier Spacing" equals 0.

Parameters:

<ChannelSpacing> integer
 Range: 0 to 400E6
 *RST: 0

Example: See [Example "Using the quick settings"](#) on page 408

Manual operation: See ["Channel Spacing"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:SCSPacing <QckSetSCS>

Sets the subcarrier spacing.

Parameters:

<QckSetSCS> SCS15 | SCS30 | SCS60 | SCS120 | SCS240
 *RST: SCS30

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Subcarrier Spacing"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ECPState <QSScsEcpState>

Show if the extended cyclic prefix is enabled or disabled.

Parameters:

<QSScsEcpState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Use Extended Cyclic Prefix"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:DUPLexing <QckSetDuplexing>

Selects the duplexing mode.

Parameters:

<QckSetDuplexing> TDD | FDD
 *RST: FDD

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Duplexing"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:NCARier <QckSetNumCarrie>

Selects the number of carriers. Needed for carrier aggregation.

Parameters:

<QckSetNumCarrie> integer
 Range: 1 to 16
 *RST: 1

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of Carriers"](#) on page 32

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:MOD <QckSetModType>

Sets the modulation scheme.

Parameters:

<QckSetModType> QPSK | QAM16 | QAM64 | QAM256
*RST: QPSK

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Modulation"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CS:STAtE <QckSetCSSState>

Activate to schedule a CORESET.

Parameters:

<QckSetCSSState> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Use CORESET"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CSLength <QckSetCORSETLen>

Sets the number of symbols in the CORESET.

Parameters:

<QckSetCORSETLen> integer
Range: 1 to 3
*RST: 1

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of CORESET Symbols"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBConfig <QckSetRbConfig>

Sets the configuration mode for the resource block configuration.

Parameters:

<QckSetRbConfig> MAN | EFL | EFR | E1RL | E1RR | OUTF | INNF | I1RL | I1RR
*RST: MAN

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Resource Block Configuration"](#) on page 33

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBNumber <QckSetRBNum>

Sets the number of resource blocks.

Parameters:

<QckSetRBNum> integer
 Range: 1 to 273
 *RST: 273

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of Resource Blocks"](#) on page 34

[:SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBOffset <QckSetRBOffset>

Sets the resource block offset.

Parameters:

<QckSetRBOffset> integer
 Range: 0 to 272
 *RST: 0

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Resource Block Offset"](#) on page 34

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SLEngth <QckSetSlotLen>

Sets the duration of the frame in slots.

Parameters:

<QckSetSlotLen> S5 | S10
 *RST: S10

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Slot Period"](#) on page 35

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NDLSlots <QckSetDLSlots>

Sets the number of DL slots in the frame.

Parameters:

<QckSetDLSlots> integer
 Range: 0 to 10
 *RST: 10

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of DL Slots"](#) on page 35

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NSSLots?

Queries the number of special slots in the frame.

Return values:

<QckSetNoSplSlot> integer
 Range: 0 to 1
 *RST: n.a. (no preset. default: 0)

Example: See [Example "Using the quick settings"](#) on page 408.

Usage: Query only

Manual operation: See ["Number of Special Slots"](#) on page 35

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NULSlots <QckSetULSlots>

Queries the number of UL slots in the frame.

Parameters:

<QckSetULSlots> integer
 Range: 0 to 10
 *RST: 0

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of UL Slots"](#) on page 35

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:SLFMt <QckSetSlotFmt>

Sets the special slot format index.

Parameters:

<QckSetSlotFmt> integer
 Range: 0 to 45
 *RST: 0

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Slot Format Index"](#) on page 36

**[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NDLSymbols
<QckSetSlotDLSym>**

Queries the number of DL symbols.

Parameters:

<QckSetSlotDLSym> integer
 Range: 0 to 14
 *RST: 6

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of DL Symbols"](#) on page 36

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NGSYmbols
<QckSetSGuardSym>

Queries the number of guard symbols.

Parameters:

<QckSetSGuardSym>integer

Range: 0 to 14

*RST: 4

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of Guarded Symbols"](#) on page 36

[:SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NULSymbols
<QckSetSULSlots>

Queries the number of UL symbols.

Parameters:

<QckSetSULSlots> integer

Range: 0 to 14

*RST: 4

Example: See [Example "Using the quick settings"](#) on page 408.

Manual operation: See ["Number of UL Symbols"](#) on page 36

[:SOURce<hw>]:BB:NR5G:QCKSet:APPLY

Adopts the configuration.

Example: See [Example "Using the quick settings"](#) on page 408.

Usage: Event

Manual operation: See ["Apply"](#) on page 34

[:SOURce<hw>]:BB:NR5G:QCKSet:DISCard

Ignores the configuration.

Example: See [Example "Using the quick settings"](#) on page 408.

Usage: Event

Manual operation: See ["Discard"](#) on page 34

12.4 Carrier Commands

<code>[SOURce<hw>]:BB:NR5G:NODE:NCARrier</code>	444
<code>[SOURce<hw>]:BB:NR5G:NODE:RFPHase:MODE</code>	444
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CELLid</code>	445
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIF</code>	445
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIFPresent</code>	445
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CINDicator</code>	446
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N1ID?</code>	446
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N2ID?</code>	446
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CARDepty</code>	446
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CBW</code>	446
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DFReq</code>	447
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch>:MAPPed</code>	447
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PCFReq</code>	447
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SCHBy</code>	447
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAOfset</code>	448
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAPos</code>	448

`[SOURce<hw>]:BB:NR5G:NODE:NCARrier <NumCarrier>`

Sets the number of simulated carriers.

When used in a previously configured system, reconfigures the number of simulated carriers.

Parameters:

<code><NumCarrier></code>	integer
Range:	1 to 16
*RST:	1

Example:

See [Example "Configuring the carrier"](#) on page 409.
See [Example "Reconfiguring a 2x1x1 coupled system for MIMO usage"](#) on page 432.

Manual operation: See ["Number of Carriers"](#) on page 46

`[SOURce<hw>]:BB:NR5G:NODE:RFPHase:MODE <RFPhaseComp>`

Enables the frequency-related phase compensation after each symbol, as specified in [TS 38.211](#).

It uses the parameter [Frequency in GHz](#) to set the carrier frequency to be compensated.

Parameters:

<code><RFPhaseComp></code>	0 OFF MANual 1 AUTO
0 OFF	Disables the frequency-related phase compensation.

MANual

Enables the [Frequency in GHz](#) field for manual input of the carrier frequency value to be compensated.

1|AUTO

Sets automatically the carrier [Frequency in GHz](#) value to be compensated.

*RST: AUTO

Example: See [Example "Configuring the carrier"](#) on page 409

Manual operation: See ["RF Phase Compensation"](#) on page 48

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CELLid <CellId>

Sets the cell identity of the selected cell.

Parameters:

<CellId> integer
 Range: 0 to 1007
 *RST: 0

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Cell ID"](#) on page 48

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIF <Cif>

Queries the value of the carrier indicator field (CIF).

Parameters:

<Cif> 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7
 *RST: 0

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["CIF"](#) on page 49

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIFPresent <CifPresent>

Defines whether the carrier indicator field (CIF) is included in the PDCCH DCI formats transmitted from the corresponding cell.

The CIF is present in each DCI format and identifies the component carrier that carries the PDSCH or PUSCH for the particular PDCCH in the cross-carrier approach.

According to the 5G NR specification, cross-carrier scheduling is enabled by higher-level signaling. To simulate a cross-carrier scheduling in this implementation, enable the "Node > Carriers > CIF Present" per each cell.

Parameters:

<CifPresent> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["CIF Present"](#) on page 49

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CINDicator <CellIndicator>

Sets the cell indicator.

Parameters:

<CellIndicator> integer
Range: 0 to 15

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Cell Indicator"](#) on page 48

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N1ID?

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N2ID?

Queries the physical cell indicator group ($N_{ID}^{(1)}$) and the physical layer identity ($N_{ID}^{(2)}$).

Return values:

<CarrierN2Id> integer
Range: 0 to 2
*RST: 0

Example: See [Example "Configuring the carrier"](#) on page 409.

Usage: Query only

Manual operation: See ["N1 ID/N2 ID"](#) on page 49

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CARDepl <CarrierDepl>

Selects one of the frequency ranges, specified for 5G NR transmission.

Parameters:

<CarrierDepl> FR1LT3 | FR1GT3 | FR2
*RST: LT3

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Deployment"](#) on page 49

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CBW <ChanBandWidth>

Selects the bandwidth of the node carrier.

Parameters:

<ChanBandWidth> BW5 | BW10 | BW15 | BW20 | BW25 | BW40 | BW50 | BW60 |
BW100 | BW80 | BW400 | BW200 | BW30 | BW70 | BW90
*RST: BW100

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Channel Bandwidth"](#) on page 50

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DFReq <DeltaFToDc>

Shifts the signal relative to the center output frequency.

Use different frequency offsets to separate the channels of the configured and enabled cells.

Parameters:

<DeltaFToDc> float
 Range: -40E6 to 40E6
 Increment: 1.0
 *RST: 0.0

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Delta f to Output/MHz"](#) on page 51

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch>:MAPPed <CellMapped>

If enabled, the signal of the selected cell is mapped to the output.

Parameters:

<CellMapped> 0 | 1 | OFF | ON
 *RST: 1

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Cell Mapped"](#) on page 51

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PCFReq <CarrierFreq>

Sets the carrier frequency of the selected carrier at which the frequency phase compensation is applied.

Parameters:

<CarrierFreq> float
 Range: 0 to 44E9
 Increment: 1E2
 *RST: 1E9

Example: See [\[:SOURce<hw>\]:BB:NR5G:NODE:RFPHase:MODE](#) on page 444.

Manual operation: See ["Frequency in GHz"](#) on page 49

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SCHBy <SchedBy>

Displays in which cell coordinates the carrier aggregation, if there is intra-band CA.

Queries the component carrier/cell that signals the UL and DL grants for the selected cell. The signaling cell is determined by its cell index.

According to the 5G NR specification, cross-carrier scheduling has to be enabled per user and per component carrier.

To enable signaling for one particular cell on the primary cell, i.e. cross-carrier scheduling, set the "Scheduled By" to 0.

Parameters:

<SchedBy> 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15
*RST: 0

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["Scheduled By"](#) on page 49

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAOffset <TimingAdjOffset>

Sets an offset ($N_{TA\ offset}$) to the timing advance value for UL/DL switching synchronization as specified in [TS 38.211](#).

The $N_{TA\ offset}$ values can be set as specified in [TS 38.133](#).

Parameters:

<TimingAdjOffset> N0 | N13792 | N25600 | N39936
*RST: N0

Example: See: [Example "Configuring the carrier"](#) on page 409.

Options: R&S SMW-K148

Manual operation: See ["Timing Advance Offset"](#) on page 50

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAPos <DmrsTypeAPos>

Sets the position of the first DMRS symbol within the slot, if mapping type A is used.

Parameters:

<DmrsTypeAPos> integer
Range: 2 to 3
*RST: 2

Example: See [Example "Configuring the carrier"](#) on page 409.

Manual operation: See ["DMRS Type A Position"](#) on page 51

12.5 TxBW Commands

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:POINta	449
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:CONFlct?	449
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:RESolve	449
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:USE	450
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:USE	450
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:USE	450

<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:USE</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:NRB?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:NRB?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:NRB?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:NRB?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:OFFSet</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:OFFSet</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:OFFSet</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:OFFSet</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:KOMU?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:KOMU?</code>	450
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:KOMU?</code>	451
<code>[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:KOMU?</code>	451

`[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:POINta <CarrierPointA>`

Sets the frequency offset between the reference Point A and the center carrier frequency.

Parameters:

`<CarrierPointA>` float
 Range: -50e6 to 0
 Increment: 0.015
 *RST: 49140000

Example: See [Example "Configuring the TxBW"](#) on page 410.

Manual operation: See ["Point A to Carrier Center"](#) on page 52

`[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:CONFLICT?`

Queries whether there is a conflict.

Return values:

`<Conflict>` 0 | 1 | OFF | ON
 *RST: n.a. (no preset. default: 0)

Example: See [Example "Configuring the TxBW"](#) on page 410.

Usage: Query only

`[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:RESolve`

Recalculates the frequency-dependent settings and thus redefines the frequency position of the TxBW.

Example: See [Example "Configuring the TxBW"](#) on page 410.

Usage: Event

Manual operation: See ["Resolve Conflicts"](#) on page 53

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:USE <ScsUse>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:USE <ScsUse>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:USE <ScsUse>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:USE <ScsUse>
```

Enables an SCS in the particular cell.

Parameters:

<ScsUse> 0 | 1 | OFF | ON

Example: See [Example "Configuring the TxBW"](#) on page 410.

Manual operation: See ["Use"](#) on page 53

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:NRB?
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:NRB?
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:NRB?
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:NRB?
```

Queries the number of available resource blocks (N_{RB}).

Return values:

<NRB> integer
 Range: 0 to 273
 *RST: 0

Example: See [Example "Configuring the TxBW"](#) on page 410.

Usage: Query only

Manual operation: See ["N_{RB}"](#) on page 53

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:OFFSet <ScsOffset>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:OFFSet <ScsOffset>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:OFFSet <ScsOffset>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:OFFSet <ScsOffset>
```

Sets the offset between the usable RB and the common RBs.

Parameters:

<ScsOffset> float
 Range: 0 to 9
 Increment: 1
 *RST: 0

Example: See [Example "Configuring the TxBW"](#) on page 410.

Manual operation: See ["TxBW Offset"](#) on page 53

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:KOMU?
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:KOMU?
```

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:KOMU?
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:KOMU?

Queries the value of the parameter $k_0\mu$.

Return values:

<KoMu> integer
 Range: -6; 0; 6 further values indicate conflict
 *RST: 0

Example: See [Example "Configuring the TxBW"](#) on page 410.

Usage: Query only

Manual operation: See "[k0μ](#)" on page 54

12.6 System Information Commands

[\[:SOURce<hw>\]:BB:NR5G:NODE:CELL<ch0>:SYINfo:HACBook.....](#) 451
[\[:SOURce<hw>\]:BB:NR5G:NODE:CELL<ch0>:SYINfo:SFOffset.....](#) 452
[\[:SOURce<hw>\]:BB:NR5G:NODE:CELL<ch0>:SYINfo:SUL:State.....](#) 452

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYINfo:HACBook
<HarqAckCodebook>

Defines the HARQ ACK reporting according to the PDSCH HARQ ACK codebook.

Parameters:

<HarqAckCodebook> SEMistatic | DYNamic

SEMistatic

Sets the HARQ ACK reporting according to the PDSCH HARQ ACK codebook to "Semi-static".

A UE reports HARQ ACK information for a corresponding PDSCH reception or SPS PDSCH release only in a HARQ ACK codebook that the UE transmits in a slot indicated by a value of a PDSCH-to-HARQ feedback timing indicator field in a corresponding DCI format 1_0 or DCI format 1_1.

The UE reports NACK values for HARQ-ACK information bits in an HARQ-ACK codebook that the UE transmits in a slot not indicated by a value of a PDSCH-to-HARQ feedback timing indicator field in a corresponding DCI format 1_0 or DCI format 1_1.

DYNamic

Sets the HARQ ACK reporting according to the PDSCH HARQ ACK codebook to "dynamic".

For a serving cell, an active DL BWP, and an active UL BWP, as described in clause 12, the UE determines a set of occasions for candidate PDSCH receptions for which the UE can transmit corresponding HARQ ACK information in a PUCCH in slot . If serving cell is deactivated, the UE uses as the active DL BWP for determining the set of occasions for candidate PDSCH receptions a DL BWP provided by firstActiveDownlinkBWP-ID.

*RST: SEMistatic

Example: See [Example "System Information"](#) on page 410

Manual operation: See ["PDSCH HARQ ACK Codebook"](#) on page 55

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYInfo:SFOffset <SysFrmNumOff>

Sets an offset value for the system frame number. The first generated frame starts with the given system frame number offset.

Parameters:

<SysFrmNumOff> integer
Range: 0 to 1023
*RST: 0

Example: See [Example "System Information"](#) on page 410

Manual operation: See ["System Frame Number Offset"](#) on page 55

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYInfo:SUL:STATE
<CarrierSULState>**

Defines if the carrier supports supplementary uplink (SUL) or not.

Parameters:

<CarrierSULState> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "System Information"](#) on page 410

Manual operation: See ["SUL"](#) on page 55

12.7 LTE-CRS Coexistence Commands

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:STATE	453
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:POINta	453
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:VShift	453
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:CBW	453
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:NAP	453

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:STATe <LteCrsState>
```

Enable the LTE-CRS.

Parameters:

<LteCrsState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "LTE-CRS Coexistence"](#) on page 410.

Manual operation: See ["State"](#) on page 57

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:POINta <LteOffsToPointA>
```

Sets the LTE carrier center subcarrier location.

Parameters:

<LteOffsToPointA> integer
 Range: 0 to 30300
 *RST: 0

Example: See [Example "LTE-CRS Coexistence"](#) on page 410.

Manual operation: See ["Offset to Point A / 15 kHz SC Spacing"](#) on page 57

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:VSHift <LteVShift>
```

Sets the parameter *v-Shift*.

Parameters:

<LteVShift> integer
 Range: 0 to 5
 *RST: 0

Example: See [Example "LTE-CRS Coexistence"](#) on page 410.

Manual operation: See ["vShift"](#) on page 57

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:CBW <LteCarrierBW>
```

Sets the LTE bandwidth.

Parameters:

<LteCarrierBW> N6 | N15 | N25 | N50 | N75 | N100
 *RST: N6

Example: See [Example "LTE-CRS Coexistence"](#) on page 410.

Manual operation: See ["LTE Bandwidth / RBs"](#) on page 57

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:NAP <LteAntennaPorts>
```

Sets the number of antenna ports used for LTE-CRS.

Parameters:

<LteAntennaPorts> AP1 | AP2 | AP4

*RST: AP1

Example:See [Example "LTE-CRS Coexistence"](#) on page 410.**Manual operation:**See ["LTE Antenna Ports"](#) on page 57

12.8 SS/PBCH Commands

[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:OFFSet.....	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:NSSPBch.....	455
[SOURce<hw>]:BB:NR5G:NODE:CARMapping:AP4000[ROW<ch0>].....	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:STATe.....	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCSPacing.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:RBOffset.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCOFFset.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:DFReq?.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CASE.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:L.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:PATtern.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:BSPeriodicty.....	458
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:HFRMidx.....	458
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POWer.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:PSSPow.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SSSPow.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>: COL<gr0>:ROW<user0>:IMAGinary.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>: COL<gr0>:ROW<user0>:REAL.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>: COL<gr0>:ROW<user0>:MAGNitude.....	460
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>: COL<gr0>:ROW<user0>:PHASe.....	460
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:STATe.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DATA.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DLISt.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:PATtern.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:STATe.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCSC.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:ASOF:STATe.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCOFFset.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SFOffset?.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CSZero.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SSZero.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CBARed.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:IFRResel.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SPARe:STATe.....	464

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:OFFSet <OffsetRelativeT>

Defines the reference point, relative to which the SS/PBCH is allocated in frequency domain.

Parameters:

<OffsetRelativeT> TXBW | POINTa

TXBW

The frequency position of the SS/PBCH is set relative to the usable RBs that apply for the current numerology, i.e. to the start of the TxBW.

POINTa

The frequency position of the SS/PBCH is set relative to the position of point A.

*RST: TXBW

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Offset Relative to"](#) on page 59

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:NSSPbch <NuOfPbchPattern>

Sets the number of SS/PBCH patterns to be configured.

Parameters:

<NuOfPbchPattern> integer

Range: 0 to 4

*RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Number of SS/PBCH Patterns"](#) on page 59

[:SOURce<hw>]:BB:NR5G:NODE:CARMapping:AP4000[:ROW<ch0>] <AP4000>

Sets if the SS/PBCHs are output at the selected output.

Parameters:

<AP4000> 0 | 1 | OFF | ON

*RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Antenna Port"](#) on page 59

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:STATe
<sspbchState>**

Enables the transmission of SS/PBCH.

Parameters:

<sspbchState> 0 | 1 | OFF | ON
 *RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["State"](#) on page 65

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCSPacing
 <SCSPacing>

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

Parameters:

<SCSPacing> N15 | N30 | N60 | X60 | N120 | N240
 *RST: N30

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["SC Spacing/CP"](#) on page 59

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:RBOffset
 <RBOffset>

Sets the start resource block of the selected allocation as offset to the start of usable RBs that apply for the current numerology.

Parameters:

<RBOffset> integer
 Range: 0 to 126
 *RST: 10

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["RB Offset/RB Offset \(15 kHz SCS\)/RB Offset \(60 kHz SCS\)"](#) on page 60

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCOffset
 <SCOffset>

Sets the start subcarrier of the selected allocation within the resource block.

Parameters:

<SCOffset> integer
 The value range depends on the selected RB offset ([\[:SOURce<hw>\]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:RBOffset](#)).
 Range: 0 to 11
 *RST: 6

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["SC Offset/SC Offset \(15 kHz SCS\)/SC Offset \(60 kHz SCS\)"](#) on page 60

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:DFReq?

Queries the frequency offset between the center of the SS/PBCH block to the center of the carrier.

Return values:

<PbchDeltaF> float
 Range: -40E6 to 40E6
 Increment: 1.0
 *RST: 0.0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Usage: Query only

Manual operation: See ["Delta f to Carrier \(Centers\)"](#) on page 61

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CASE <PbschCase>

Selects one of the SS/PBCH cases, as specified in [TS 38.213](#).

Parameters:

<PbschCase> A | B | C | D | E
 *RST: B

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Case"](#) on page 61

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:L <PositionBitLen>

Sets the number of SS/PBCH blocks, transmitted per half-frame.

Parameters:

<PositionBitLen> L4 | L8 | L64
 *RST: L4

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["L"](#) on page 61

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:PATtern
 <Pattern>, <BitCount>**

Sets a bit pattern as a data source.

Parameters:

<Pattern>	64 bits
	An internally generated sequence according to a bit pattern. Each bit applies to one SS/PBCH block. 1: SS/PBCH block is present 0: SS/PBCH transmission is suppressed.
	*RST: #HC
<BitCount>	integer
	Range: 4 to 64
	*RST: 4

Example: See [Example "Configuring the SS/PBCH"](#) on page 411

Manual operation: See ["Positions"](#) on page 62

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:BSPeriodicty
<BurstSetPer>**

Sets the burst set periodicity.

Parameters:

<BurstSetPer>	BS5 BS10 BS20 BS40 BS80 BS160
	*RST: BS10

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Burst Set Periodicity"](#) on page 62

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:HFRMidx
<HalfFrameIdx>**

Defines in which half-frame of the time plan the first SS/PBCH burst occasion is located.

The "Half Frame Index" value depends on the configured "Burst Set Periodicity".

The default value is 0, it locates the first SS/PBCH occasion in the first half-frame. If you set the value to 1, the first SS/PBCH occasion is in the second half-frame and so forth.

Parameters:

<HalfFrameIdx>	integer
	Range: 0 to 31
	*RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Half Frame Index"](#) on page 62

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POWer <PbchPower>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:PSSPow
    <PssPower>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SSSPow
    <SssPower>
```

Sets the power of the SSS/PSS/PBCH allocations relative to the power of the other resource elements.

Parameters:

<SssPower> float
 Range: -80.0 to 10.0
 Increment: 0.01
 *RST: 0.0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["PSS/SSS Power"](#) on page 64

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:
    APMaP<dir0>:COL<gr0>:ROW<user0>:IMAGinary <SSPbchAPImag>
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:
    APMaP<dir0>:COL<gr0>:ROW<user0>:REAL <SSPbchAPReal>
```

Define the mapping of the antenna ports to the physical antennas for the SS/PBCH pattern if Cartesian mapping coordinates are used.

Suffix:

<dir0> Depends on the number of positions defined in the SS/PBCH pattern
 Defines the position of the SS/PBCH pattern to which the AP-mapping configuration is applied

<gr0> Depends on the selected number of layers
 Defines the antenna port (i.e. the column in the antenna port mapping table)

<user0> Depends on the number of basebands outputs currently mapped to a cell
 Available basebands (i.e. rows in the antenna port mapping table)

Parameters:

<SSPbchAPReal> float
 The REAL (magnitude) and IMAGinary (phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:
 $|\text{REAL} + j \cdot \text{IMAGinary}| \leq 1$
 Otherwise, the values are normalized to magnitude = 1.
 Range: -1 to 1
 Increment: 0.001
 *RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411

Manual operation: See ["Mapping table"](#) on page 64

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:
APMap<dir0>:COL<gr0>:ROW<user0>:MAGNitude <SSPbchAPMagn>**

Defines the mapping of the antenna ports to the physical antennas for the SS/PBCH pattern if cylindrical mapping coordinates are used.

Suffix:

<dir0>	Depends on the number of positions defined in the SS/PBCH pattern Defines the position of the SS/PBCH pattern to which the AP mapping configuration is applied
<gr0>	Depends on the selected number of layers Defines the antenna port (i.e. the column in the antenna port mapping table)
<user0>	Depends on the number of basebands outputs currently mapped to a cell Available basebands (i.e. rows in the antenna port mapping table)

Parameters:

<SSPbchAPMagn>	float
Range:	0 to 1
Increment:	0.001
*RST:	0

Example: [Example "Configuring the SS/PBCH"](#) on page 411

Manual operation: See ["Mapping table"](#) on page 64

**[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:
APMap<dir0>:COL<gr0>:ROW<user0>:PHASe <SSPbchAPPhase>**

Defines the mapping of the antenna ports to the physical antennas for the SS/PBCH pattern if cylindrical mapping coordinates are used.

Suffix:

<dir0>	Depends on the number of positions defined in the SS/PBCH pattern Defines the position of the SS/PBCH pattern to which the AP mapping configuration is applied
<gr0>	Depends on the selected number of layers Defines the antenna port (i.e. the column in the antenna port mapping table)

<user0> Depends on the number of basebands outputs currently mapped to a cell
Available basebands (i.e. rows in the antenna port mapping table)

Parameters:

<SSPBchAPPhase> float
Range: 0 to 360
Increment: 0.1
*RST: 0

Example: [Example "Configuring the SS/PBCH"](#) on page 411

Manual operation: See ["Mapping table"](#) on page 64

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:STATe
<PbchChanCoding>

Enables PBCH channel coding.

Parameters:

<PbchChanCoding> 0 | 1 | OFF | ON
*RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Channel Coding"](#) on page 75

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DATA
<PbchDataSource>

Selects the PBCH data source.

Parameters:

<PbchDataSource> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATtern |
 DLISt | ZERO | ONE
 *RST: PN9

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Data Source"](#) on page 75

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DLISt
<DataList>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DataList> string
 Filename incl. file extension or complete file path

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Data Source"](#) on page 75

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:PATtern<Pattern>, <BitCount>

Sets a bit pattern as a data source.

Parameters:

<Pattern> 64 bits
 *RST: #H0

<BitCount> integer
 Range: 1 to 64
 *RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Data Source"](#) on page 75

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:STATe<SSPbchMIBState>

Defines how the MIB is defined.

Parameters:

<SSPbchMIBState> 0 | 1 | OFF | ON

1|ON
 A faster way to define the MIB.
 You can define if channel coding is used or not and select an arbitrary data source; further settings are not required.

0|OFF
 Allows you to configure the MIB content according to [TS 38.331](#).
 *RST: 1

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Dummy Content for MIB"](#) on page 74

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCSC<SSPbchSCSCommon>

Selects the common SCS (subcarrier spacing).

Parameters:

<SSPbchSCSCommon> N15_60 | N30_120
 *RST: N15_60

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["SCS Common"](#) on page 76

**[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:ASOF:STATe
<SSPbchASCOFStat>**

If enabled, the SSPBCH subcarrier offset is set automatically, depending on the selected common subcarrier spacing.

Parameters:

<SSPbchASCOFStat> 0 | 1 | OFF | ON

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Auto Subcarrier Offset"](#) on page 76

**[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCOFFset
<SSPbchCustomSsb>**

Queries the SS/PBCH subcarrier offset.

Parameters:

<SSPbchCustomSsb>float

Range: 0 to 31

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["SSPBCH Subcarrier Offset"](#) on page 77

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SFOFFset?

By default, the counting of the SFN (system frame number) starts with 0. Use this parameter to set a different start SFN value.

Return values:

<SSPbchSFStartOf> integer

Range: 0 to 1023

*RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Usage: Query only

Manual operation: See ["System Frame Number Start Offset"](#) on page 77

**[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CSZero
<SSPbchCSZero>**

Sets the common control resource set (CORESET) of the initial downlink BWP.

Parameters:

<SSPbchCSZero> integer

Range: 0 to 15

*RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["CORESET Zero"](#) on page 77

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SSZero
<SSPbchSSZero>

Sets the common search space of the initial downlink BWP.

Parameters:

<SSPbchSSZero> integer
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Search Space Zero"](#) on page 77

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CBARred
<SSPbchCellBarre>

Cell barring is system information that indicates if UEs can camp on the particular cell NBAR or not BARR.

Parameters:

<SSPbchCellBarre> BARR | NBAR
 *RST: BARR

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Cell Barred"](#) on page 77

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:IFRResel
<SSPbchInFreqSel>

Sets the value of the system information parameter intraFreqReselection.

Parameters:

<SSPbchInFreqSel> ALWD | NALW
 *RST: ALWD

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Intra Freq Reselection"](#) on page 77

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SPARe:STATe
<PbchSpareState>

Sets the system information bit spare, as defined in [TS 38.331](#).

Parameters:

<PbchSpareState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Manual operation: See ["Spare"](#) on page 78

12.9 PRS Commands

Option: R&S SMW-K148

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:NRSets	465
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:CMBSize	466
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:NRESources	466
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:PER	466
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBNumber	466
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBSTart	467
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:REPFactor	467
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap: COL<gr0>:ROW<user0>:IMAGinary	467
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap: COL<gr0>:ROW<user0>:REAL	467
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap: COL<gr0>:ROW<user0>:MAGNitude	468
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap: COL<gr0>:ROW<user0>:PHASe	468
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:NSYMBOL	468
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:POWer	468
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:REOFset	469
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SLOFset	469
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SQID	469
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SYOFset	470
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:SLOFset	470
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:TGAP	470
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:SCSPacing	470
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:STATe	471

[\[:SOURce<hw>\]:BB:NR5G:NODE:CELL<ch0>:PRS:NRSets](#) <NumResSet>

Sets the number of resource sets of the DL PRS frequency layer.

Parameters:

<NumResSet>	integer
	Range: 1 to 8
	*RST: 1

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Number of PRS Resource Sets"](#) on page 66

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:CMBSize
<PrsRSCombSize>

Sets the resource element (RE) spacing in each symbol of a resource within a resource set.

Parameters:

<PrsRSCombSize> C2 | C4 | C6 | C12
 *RST: C2

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Comb Size \(K_comb\)"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:NRESources
<PrsNumRes>

Sets the number of resources included in the resource set.

Parameters:

<PrsNumRes> integer
 Range: 1 to 64
 *RST: 1

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Number of PRS Resources"](#) on page 68

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:PER
<PrsRSPeriod>

Sets the periodicity of the DL PRS allocation in slots for the given resource set.

Parameters:

<PrsRSPeriod> SL10240 | SL5120 | SL2560 | SL1280 | SL640 | SL320 | SL160 |
 SL64 | SL64 | SL40 | SL32 | SL20 | SL16 | SL10 | SL8 | SL5 |
 SL4
 *RST: SL4

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Periodicity \(T_per\)"](#) on page 66

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBNumber
<PrsRSNumRB>

Sets the number of resource blocks (RBs) for all resources in the resource set in multiples of 4 RBs.

Parameters:

<PrsRSNumRB> integer
 Range: 24 to 272
 *RST: 272

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["No. RBs"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBStArt
<PrsRSRBStart>

Sets the starting RB index of the resource set with respect to the reference point A.
 The point A is defined as the absolute frequency of the reference resource block.

Parameters:

<PrsRSRBStart> integer
 Range: 0 to 2176
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Start RB \(to point A\)"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:REPFactor
<PrsRSRepFactor>

Sets the number of repetitions of each resource for a single instance of the resource set.

Parameters:

<PrsRSRepFactor> REP32 | REP16 | REP8 | REP4 | REP1 | REP2
 *RST: REP1

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Repetition Factor \(T_rep\)"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:
APMap:COL<gr0>:ROW<user0>:IMAGinary <PrsAPImag>
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:
APMap:COL<gr0>:ROW<user0>:REAL <PrsAPReal>

Sets the mapping of the antenna ports (AP) for the PRS resource, if Cartesian coordinates are used.

Parameters:

<PrsAPReal>

float

The **REAL** (magnitude) and **IMAGinary** (phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:

$$|\text{REAL} + j * \text{IMAGinary}| \leq 1$$

Otherwise, the values are normalized to Magnitude = 1.

Range: -1 to 1

Increment: 0.001

*RST: 1

Example:

See [Example "Configuring PRS resources"](#) on page 412.

Manual operation:

See ["Mapping table"](#) on page 70

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:
```

```
  APMaP:COL<gr0>:ROW<user0>:MAGNitude <PrsAPMagn>
```

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:
```

```
  APMaP:COL<gr0>:ROW<user0>:PHASe <PrsAPPhase>
```

Sets the mapping of the antenna ports (AP) for the PRS resource, if cylindrical coordinates are used.

Parameters:

<PrsAPPhase>

float

Range: 0 to 360

Increment: 0.1

*RST: 0

Example:

See [Example "Configuring PRS resources"](#) on page 412.

Manual operation:

See ["Mapping table"](#) on page 70

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:
```

```
  NSYMBOL <PrsResNSymb>
```

Sets the number of symbols of the resource within a slot.

Parameters:

<PrsResNSymb>

S12 | S6 | S4 | S2

*RST: S2

Example:

See [Example "Configuring PRS resources"](#) on page 412.

Manual operation:

See ["No. Symbols \(L_PRS\)"](#) on page 68

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:POWer
```

```
  <PrsResPower>
```

Sets the average EPRE (energy per resource element) of the resource used for PRS transmission.

Parameters:

<PrsResPower> float
 Range: -80 to 10
 Increment: 0.01
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Power / dB"](#) on page 69

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:REOffset <PrsResREOff>

Sets the resource element (RE) offset in the frequency domain for the first symbol in a resource.

Parameters:

<PrsResREOff> integer
 Range: 0 to 11
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["RE Offset \(k_off.\)"](#) on page 68

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SLOffset <PrsResSlotOff>

Set the starting slot of the resource with respect to the corresponding resource set [Slot Offset \(T_offset\)](#).

Parameters:

<PrsResSlotOff> integer
 Range: 0 to 10239
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Resource Slot Offset \(k_off.,res\)"](#) on page 68

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SQID <PrsResSeqID>

Sets the resource ID to initialize the c_{init} value for the generation of the DL PRS sequence.

Parameters:

<PrsResSeqID> integer
 Range: 0 to 4095
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Sequence ID"](#) on page 69

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SYOffset <PrsResSymbOff>

Sets the starting symbol of the resource within a slot.

Parameters:

<PrsResSymbOff> integer
 Range: 0 to 12
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Symbol Offset \(I_start\)"](#) on page 69

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:SLOffset <PrsRSSlotOffset>

Sets a slot offset for the resource set with respect to the SFN0 slot 0.

Parameters:

<PrsRSSlotOffset> integer
 Range: 0 to 10239
 *RST: 0

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Slot Offset \(T_offset\)"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:TGAP <PrsRSTimeGap>

Sets an offset in slots between two resources with the same resource ID within a resource set.

The time gap should not exceed the [Periodicity \(T_per\)](#).

Parameters:

<PrsRSTimeGap> TG1 | TG2 | TG4 | TG8 | TG16 | TG32
 *RST: TG1

Example: See [Example "Configuring PRS resources"](#) on page 412.

Manual operation: See ["Time Gap \(T_gap\)"](#) on page 67

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:SCSPacing <PrsNumerology>

Sets the combination of the subcarrier spacing (SCS) and the cyclic prefix (CP) for the DL PRS frequency layer.

Set the value according to the configured [Deployment](#).

Parameters:

<PrsNumerology> N15 | N30 | N60 | N120 | X60

<N|X> <SCS>

N = Normal CP, X = Extended CP, SCS = SCS in kHz

*RST: N30

Example:See [Example "Configuring PRS resources"](#) on page 412.**Manual operation:**See ["SC Spacing / CP"](#) on page 66**[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:STATe <PrsState>**

Enables the DL PRS positioning frequency layer for the given carrier cell.

Parameters:

<PrsState> 0 | 1 | OFF | ON

*RST: 0

Example:See [Example "Configuring PRS resources"](#) on page 412.**Manual operation:**See ["State"](#) on page 66

12.10 Dummy Resource Elements Commands

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:STATe	471
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:POWer	471
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:SCSPacing	472
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:MODulation	472
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:TPSTate	472
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:DATA	473
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:DLISt	473
[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:PATtern	473

[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:STATe <DummyResState>

Enables filling in unallocated resource elements (RE) with dummy data.

Parameters:

<DummyResState> 0 | 1 | OFF | ON

*RST: 0

Example:See [Example "Filling in the frame with dummy REs"](#) on page 412.**Manual operation:**See ["State"](#) on page 71**[[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:POWer <Power>**

Sets the power of the resource elements filled in with dummy data.

Parameters:

<Power> float
 Range: -80 to 10
 Increment: 0.001
 *RST: 0

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See ["Power"](#) on page 71

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:SCSPacing <SCSPacing>

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP), where the available values depend on the "Deployment".

See [Table 3-2](#).

Parameters:

<SCSPacing> N15 | N30 | N60 | X60 | N120 | N240
 *RST: N30

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See ["SC Spacing/CP"](#) on page 71

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:MODulation <Modulation>

Sets the modulation scheme for the dummy REs.

Parameters:

<Modulation> BPSK | BPSK2 | QPSK | QAM16 | QAM64 | QAM256
 *RST: QPSK

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See ["Modulation"](#) on page 71

[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:TPSTate <TrPrecState>

In uplink, enables using the optional DFT-S scheme.

Parameters:

<TrPrecState> 0 | 1 | OFF | ON
 *RST: 0

Example:
 SOURce1:BB:NR5G:LINK UP
 SOURce1:BB:NR5G:NODE:CELL0:DUMRes:TPSTate 1

Manual operation: See ["Transform Precoding"](#) on page 71

[:SOURce]:BB:NR5G:NODE:CELL:DUMRes:DATA <DataSource>

Sets the data source for the dummy REs.

Parameters:

```
<DataSource>      PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATtern |
                   DLISt | ZERO | ONE
                   *RST:      PN9
```

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See "Data Source" on page 72

[:SOURce]:BB:NR5G:NODE:CELL:DUMRes:DLISt <DSelect>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DSelect>	string
	Filename incl. file extension or complete file path

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See "Data Source" on page 72

```
[ :SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:PATtern <Pattern>,  
      <BitCount>
```

Sets a bit pattern as a data source.

Parameters:

<Pattern>	64 bits	
	*RST:	#H0
<BitCount>	integer	
	Range:	1 to 64
	*RST:	1

Example: See [Example "Filling in the frame with dummy REs"](#) on page 412.

Manual operation: See "Data Source" on page 72

12.11 Carrier Mapping Commands

[[:SOURce<hw>]:BB:NR5G:NODE:CARMapping:CELL[:ROW<ch0>].....474

**[:SOURce<hw>]:BB:NR5G:NODE:CARMapping:CELL[:ROW<ch0>]
<MapCellNum>**

Queries which of the carriers is output at which baseband.

Parameters:

<MapCellNum> integer

Indicates the carrier.
Carriers are numbered automatically, where the maximum number of carriers is set with the command `[ :SOURce<hw>]:BB:NR5G:NODE:NCARrier`.
The number of available carriers and their default mapping to the available basebands depends on the selected system configuration.

Range: 0 to 15
*RST: 0

Example: See [Example "Mapping the carriers to the outputs"](#) on page 412.

Manual operation: See ["Carrier"](#) on page 73

12.12 User Commands

<code>[:SOURce<hw>]:BB:NR5G:UBWP:NUSer</code>	474
<code>[:SOURce<hw>]:BB:NR5G:UBWP:REStart</code>	475
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:CS</code>	475
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:MCSC</code>	476
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:RA</code>	476
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SFI</code>	476
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SPCSi</code>	476
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:TC</code>	477
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:UEID</code>	477
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:NUMSfi</code>	477
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:CCODing:STATe</code>	477
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:CCODing:STATe?</code>	477
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DATA</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DATA</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DLISt</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DLISt</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:INITpattern</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:INITpattern</code>	478
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:PATtern</code>	479
<code>[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:PATtern</code>	479

[:SOURce<hw>]:BB:NR5G:UBWP:NUSer <NumUsers>

Sets the number of simulated users.

Parameters:

<NumUsers> integer
 Range: 1 to 50
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Options: R&S SMW-K148 supports up to 50 users.

Manual operation: See ["Number of Users"](#) on page 78

[:SOURce<hw>]:BB:NR5G:UBWP:REStart <RestartDataSel>

Sets the parameter for restarting the configured data sources in customized DCIs.

Parameters:

<RestartDataSel> OFF | COAL | FRAME

OFF
 Disables the restart of data and control. Data sources are initialized only once at the start of the generated signal.

COAL
 Enables the restart of data and control after each codeword and allocation. For example, the same payload is used for repeated allocations.

FRAME
 Enables the restart of data and control after each frame. For example, the same payload is used for allocations which are repeated each frame.

*RST: OFF

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["Restart Data and Control"](#) on page 79

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:CS <CsRnti>

Sets the CS-RNTI of the user. It is a unique UE identification used for semi-persistent scheduling in the downlink.

Parameters:

<CsRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["CS-RNTI"](#) on page 80

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:MCSC <McsCRnti>

Sets the MCS-C-RNTI of the user. It is a unique UE identification used for modulation coding scheme in the downlink.

Parameters:

<McsCRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["MCS-C-RNTI"](#) on page 80

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:RA <RaRnti>

Sets the RA-RNTI of the user. It is used for an identification of the random access response in the downlink and is used during the random access procedure.

Parameters:

<RaRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["RA-RNTI"](#) on page 81

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SFI <UserSfiRnti>

Parameters:

<UserSfiRnti> integer
 Range: 1 to 65519
 *RST: 1

Manual operation: See ["SFI-RNTI"](#) on page 80

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SPCSi <SpCsiRnti>

Sets the SP-CSI-RNTI of the user. It is a unique UE identification used for semi-persistent CSI reporting on PUSCH.

Parameters:

<SpCsiRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["SP-CSI-RNTI"](#) on page 80

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:TC <TcRnti>

Sets the TC-RNTI of the user. It is a unique UE identification used as an identifier of the RRC connection and for scheduling with a temporary cell.

Parameters:

<TcRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["TC-RNTI"](#) on page 81

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:UEID <UserId>

Sets the RNTI of the user.

Parameters:

<UserId> integer
 Range: 0 to 65535
 *RST: 0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["UE ID \(C-RNTI\)"](#) on page 80

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:NUMSfi <NumSfiInDci20>

Sets how many slot format indicator (SFI) fields are transmitted in the DCI format 2_0.

Parameters:

<NumSfiInDci20> integer
 Range: 1 to 16
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["Number of SFIs in DCI 2_0"](#) on page 81

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:CCODing:STATE
 <UschChaCod>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:CCODing:STATE?
 <DschChaCod>**

Enables DSCH/USCH channel coding.

Parameters:

<DschChaCod> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Usage: Query only

Manual operation: See ["DSCH/USCH Channel Coding"](#) on page 81

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DATA <UschDataSource>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DATA <DschDataSource>

Sets the DSCH/USCH data source.

Parameters:

<DschDataSource> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATtern |
 DList | ZERO | ONE
 *RST: PN9

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["\(P\)DSCH/\(P\)USCH Data Source"](#) on page 81

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DList <UschDataList>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DList <DschDataList>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DschDataList> string
 Filename incl. file extension or complete file path

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["\(P\)DSCH/\(P\)USCH Data Source"](#) on page 81

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:INITpattern <PatternInit>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:INITpattern <PatternInit>

Sets an initialization value for the second m-sequence in the PN sequence.

Parameters:

<PatternInit> float
 Range: 1 to 0x7fffff
 Increment: 1
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["Initialization"](#) on page 82

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:PATtern <Pattern>, <BitCount>

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:PATtern <Pattern>, <BitCount>

Sets a bit pattern as a data source.

Parameters:

<Pattern> 64 bits
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See "(P)DSCH/(P)USCH Data Source" on page 81

12.13 DL/UL BWP Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:NBWParts.....	480
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:NBWParts.....	480
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:INDicator.....	480
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:INDicator.....	480
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CILength.....	480
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:CIRNti.....	481
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:NCINd.....	481
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PSRNti.....	481
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SCSPacing.....	482
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SCSPacing.....	482
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:NB26.....	482
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:NSCG.....	482
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:BD23.....	483
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:GTYPe.....	483
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:RBNumber.....	483
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RBNumber.....	483
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:RBOffset.....	484
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RBOffset.....	484
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PRBOffset?.....	484
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PRBOffset?.....	484
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:DFReq?.....	484
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:DFReq?.....	484

```
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:NBWParts
<UserUIBwp>
```

```
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:NBWParts
<UserDIBwp>
```

Sets the number of downlink bandwidth parts (BWP).

Parameters:

<UserDIBwp> integer
 Range: 1 to 4
 *RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["Number of DL/UL BWPs"](#) on page 84

```
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
INDicator <BWPIndicator>
```

```
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
INDicator <BwpIndicator>
```

Sets the indicator for the selected BWP.

Parameters:

<BwpIndicator> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["BWP Indicator"](#) on page 84

```
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
CILength <CancelIndLength>
```

Sets the length for each cancellation indication in the DCI format 2_4.

The "Cancellation Indication Length" and [Number of Cancellation Indications](#) set the size of the DCI format 2_4 [pattern](#).

Parameters:

<CancelIndLength> 1 | 2 | 4 | 7 | 8 | 14 | 16 | 32 | 56 | 112
 *RST: 1

Example: See [Example "DCI format 2_4"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["Cancellation Indication Length"](#) on page 102

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
CIRNti <CiRnti>**

Sets the CI-RNTI of the user. This parameter is a unique UE identifier for the cancellation indication in the DCI format 2_4.

Parameters:

<CiRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "DCI format 2_4"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["CI-RNTI"](#) on page 102

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:NCIND
<NumCancelInd>**

Sets the number of cancellation indications in the DCI format 2_4.

The maximum number of cancellation indications depends on the [Cancellation Indication Length](#) value.

Parameters:

<NumCancelInd> integer
 Range: 1 to 8
 *RST: 1

Example: See [Example "DCI format 2_4"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["Number of Cancellation Indications"](#) on page 102

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
PSRNti <PsRnti>**

Sets the PS-RNTI of the user. It is a unique UE identifier for the starting position block in the DCI format 2_6.

Parameters:

<PsRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "DCI format 2_6"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["PS-RNTI"](#) on page 102

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  SCSPacing <SCSPacing>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  SCSPacing <SCSPacing>
```

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP).

Parameters:

<SCSPacing> N15 | N30 | N60 | X60 | N120 | N240
 *RST: N30

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["SC Spacing/CP"](#) on page 84

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
  NB26 <NumBlkInDci26>
```

Sets the number of dormancy indications in the DCI format 2_6.

Parameters:

<NumBlkInDci26> integer
 Range: 1 to 10
 *RST: 1

Example: See [Example "DCI format 2_6"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["Number of Dormancy Indications"](#) on page 103

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
  NSCG <NumCellGroups>
```

Sets the number of bits for the "SCell Dormancy Indication" pattern in the DCI format 2_6.

Parameters:

<NumCellGroups> integer
 Range: 0 to 5
 *RST: 0

Example: See [Example "DCI format 2_6"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["Number of SCell Groups"](#) on page 103

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
BD23 <NumBlocksInDci2>**

Sets the number of blocks (i.e. couples of closed loop indicators and TPC command fields) in the DCI format 2_3.

Parameters:

<NumBlocksInDci2> integer
Range: 1 to 11
*RST: 1

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["Number of Blocks"](#) on page 102

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:
GTYPe <GroupType>**

Sets the SRS-TPC-PDCCH-Group type.

Parameters:

<GroupType> A | B
*RST: A

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["SRS-TPC-PDCCH-Group Type"](#) on page 102

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
RBNumber <UIBwpRBNumber>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RBNumber <DIBwpRBNum>**

Sets the number of resource blocks (RB) the bandwidth part (BWP) occupies.

Parameters:

<DIBwpRBNum> integer
The number of available RBs depends on the SCS and channel bandwidth.
CORESET allocations span always a multiple of 6 resource blocks. Thus, for CORESET allocations the minimum value is 6 and the allowed values are multiple of 6.
Range: 1 to 273
*RST: 11

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["No. RBs"](#) on page 85

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
RBOffset <RBOffset>
```

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
RBOffset <RBOffset>
```

Sets the offset between the first resource block in the BWP relative to the first usable resource blocks (URB).

Parameters:

<RBOffset> integer
 Range: 0 to 255
 *RST: 0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Manual operation: See ["RB Offset in TxBW"](#) on page 85

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PRBOffset?
```

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PRBOffset?
```

Queries the frequency starting position of the BWP relative to the point A.

Return values:

<PointAOffset> integer
 Range: 0 to 500
 *RST: 0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Usage: Query only

Manual operation: See ["RB Offset to Point A"](#) on page 85

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
DFReq?
```

```
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
DFReq?
```

Queries the frequency offset between the BWP center and the center frequency of the carrier.

Return values:

<DeltaFCarrier> float
 Range: -40E6 to 40E6
 Increment: 1.0
 *RST: 0.0

Example: See [Example "Configuring the users and the BWPs"](#) on page 413.

Usage: Query only

Manual operation: See "[Δf to Carrier \(Centers\) /MHz](#)" on page 86

12.14 BWP Configuration Commands

• PDSCH Commands.....	485
• PUCCH Commands.....	496
• Uplink Commands.....	496
• ZP and NZP CSI-RS Commands.....	498
• Rate Match Commands.....	505
• PUCCH Commands.....	509
• FRC Commands.....	511
• PUSCH Commands.....	514
• PUSCH UCI Commands.....	525
• SRS Commands.....	527
• PTRS Commands.....	536

12.14.1 PDSCH Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: CBGF:STATe.....	486
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh[:DMRS]:APSelect<s2us0>.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:BSAMe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:CTYPe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:CTYPe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:APIIndex.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:APIIndex.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:MLENgtH.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:MLENgtH.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:SID0.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:SID1.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:SID0.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:SID1.....	488

BWP Configuration Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: MCBGroups.....	489
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: PREC:BBSet1.....	489
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: PREC:BSSet2.....	490
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: PREC:BSIZe.....	490
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: PREC:BTYPe.....	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: PREC:STATe.....	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: SCRambling:STATe.....	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DSID.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: MCWDci.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: MCSTable.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:OI11.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: RESalloc.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: RBGSize.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TDANum.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TD<grp0>:KNULl.....	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TD<grp0>:MAPPing.....	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TD<grp0>:STARt.....	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TD<grp0>:LENGth.....	495
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: TD<grp0>:SLIV?.....	495
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:VPINter.....	495

**[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:CBGF:STATe <CBGFlushIndicat>**

Indicates if the code block group buffer is empty. Default is disabled.

Parameters:

<CBGFlushIndicat> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Code Block Group Flush Indicator"](#) on page 92

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh[:DMRS]:APSelect<s2us0>
  <PdschAPSel>
```

Each layer of a PDSCH allocation is mapped to a certain antenna port. By the command the antenna ports are selected which are used for the transmission of the PDSCH allocation.

Parameters:

```
<PdschAPSel>    AP1000 | AP1001 | AP1002 | AP1003 | AP1004 | AP1005 |
                  AP1006 | AP1007 | AP1008 | AP1009 | AP1010 | AP1011
*RST:           AP1000
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["DMRS Antenna Ports ..."](#) on page 163

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:BSAMe <SameDmreSetting>
```

Per default, the same configuration applies for DMRS mapping type A and B. Disable "Same Settings for Type A and Type B" to modify the mapping type B settings.

Mapping type A and B define the DMRS position in the PDSCH, the starting symbol and length. The UE informs the BS about the mapping type supportability via the UE capability information message.

Parameters:

```
<SameDmreSetting> 0 | 1 | OFF | ON
*RST:             1
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Same Settings for Type A and Type B"](#) on page 94

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:CTYPE <TypeBConfigType>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:CTYPE <TypeAConfigType>
```

Sets the configuration type (type 1 or type 2) and defines the mapping of the DMRS to the physical resource elements.

Parameters:

```
<TypeAConfigType> T1 | T2
*RST:             T1
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Config Type"](#) on page 94

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:APIndex <TypeBAddPosIdx>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:APIndex <TypeAAddPosIdx>
```

Sets the parameter additional position index, required to select the positions of the DMRS symbols.

Parameters:

<TypeAAddPosIdx> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Additional Position Index"](#) on page 94

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:MLENgtH <TypeBMaxLength>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:MLENgtH <DmrsMaxLength>
```

Sets if single- or double-symbol DMRS is used.

Parameters:

<DmrsMaxLength> integer
 Range: 1 to 2
 *RST: 2

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Max Length"](#) on page 95

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:SID0 <ScramID0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:SID1 <ScramID1>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:SID0 <ScramID0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:SID1 <ScramID1>
```

Sets the scrambling ID.

Parameters:

<ScramID1> integer
 Range: 0 to 65535
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Scrambling ID 0/Scrambling ID 1"](#) on page 95

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:MCBGperTB <DlMaxCBGperTB>**

Limits the number of code block groups per transport block.

In 5G NR a huge TB (transport block) is split into multiple code blocks (CB). Multiples CBs are grouped into one code block group (CBG). The number of code blocks grouped into the CBG can be limited by the "Max Code Block Groups Per Transport Block" setting.

Parameters:

<DlMaxCBGperTB> G2 | G4 | DISabled | G6 | G8

G2

Limits the number of code block groups per transport block to 2.

G4

Limits the number of code block groups per transport block to 4.

G6

Limits the number of code block groups per transport block to 6.

G8

Limits the number of code block groups per transport block to 8.

DISabled

Default value (also G0), which disabled the limitation of code block groups per transport block.

*RST: DISabled

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Max Code Block Groups Per Transport Block"](#) on page 91

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BBSet1 <DlBwpBundleSet1>**

Configures the dynamic PRB bundle type. Only available if "Precoding" is enabled and "Dynamic" is selected as "PRB Bundling Type".

Parameters:

<DlBwpBundleSet1> N4 | WIDeband | N2WB | N4WB

N4

Default value. Dynamic PRB bundle size set 1 is set to N4.

WIDeband

Dynamic PRB bundle size set 1 is set to wideband.

N2WB

Dynamic PRB bundle size set 1 is set to N2-wideband.

N4WB

Dynamic PRB bundle size set 1 is set to N4-wideband.

*RST: N4

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Bundle Size Set 1"](#) on page 93

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BSSet2 <DIBwpBundleSet2>
```

Configures the dynamic PRB bundle type. Only available if "Precoding" is enabled and "Dynamic" is selected as "PRB Bundling Type".

Parameters:

<DIBwpBundleSet2> N4 | WIDeband

N4

Default value. Dynamic PRB bundle size set 2 is set to N4.

WIDeband

Dynamic PRB bundle size set 2 is set to wideband.

*RST: N4

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Bundle Size Set 2 "](#) on page 93

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BSIZe <DIBwpStaticBSiz>
```

Configures the static PRB bundle type. Only available if "Precoding" is enabled and "Static" is selected as "PRB Bundling Type".

Parameters:

<DIBwpStaticBSiz> N4 | WIDeband | N2WB | N4WB

N4

Default value. Static PRB bundle is set to N4.

WIDeband

Static PRB bundle is set to wideband.

N2WB

Static PRB bundle is set to N2 wideband.

N4WB

Static PRB bundle is set to N4 wideband.

*RST: N4

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Static Bundle Size "](#) on page 93

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:BTYPe <DIBwpPRBbundlin>**

Indicates the PRB bundle type and bundle sizes.

If "dynamic" is chosen, the actual bundle size set to use is indicated via DCI.

Only available if "Precoding" is enabled.

The PRB bundling type supports the UE to reduce the computational effort to receive the information which PRBs use the same precoding. The UE only has to do channel estimation per PRB bundle not per PRB. Without this information, the UE has to decode all the information itself based on the DMRS.

Parameters:

<DIBwpPRBbundlin> NOTC | STATic | DYNamic

NOTC

Default value, PRB bundling is not configured.

STATic

PRB bundling is set to static and can be adjusted by the "Static Bundle Size".

DYNamic

PRB bundling is set to dynamic and can be adjusted by the "Bundle Size Set 1" and "Bundle Size Set 2".

*RST: NOTC

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["PRB Bundling Type "](#) on page 92

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:PREC:STATe <DLBwpPrecState>**

Enabled or disables precoding.

Parameters:

<DLBwpPrecState> 0 | 1 | OFF | ON

*RST: 0

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Precoding "](#) on page 92

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:SCRambling:STATe <PdschScrambling>**

Sets if a data scrambling ID is used for the initialization of the generator of the PDSCH scrambling sequence.

Parameters:

<PdschScrambling> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Use PDSCH Scrambling ID"](#) on page 89

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSch:DSID <DataScrambleId>**

If [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSch:SCRambling:STATe](#) 1, sets the data scrambling ID.

Parameters:

<DataScrambleId> integer
 Range: 0 to 1023
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Data Scrambling ID"](#) on page 90

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSch:MCWDci <MaxCodeWordsPer>**

Sets the number of codewords.

Parameters:

<MaxCodeWordsPer>integer
 Range: 1 to 2
 *RST: 1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Max. Number of Codewords per DCI"](#) on page 90

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSch:MCSTable <PdschMcsTable>**

Sets the MCS table and defines the used modulation scheme.

Parameters:

<PdschMcsTable> QAM64 | QAM256 | QAM64LSE
 *RST: QAM64

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["MCS Table"](#) on page 90

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:OI11 <MinAppOffsetInd>**

Enables/disables the configuration of the minimum applicable scheduling offset indicator in the DCI format 1_1.

Parameters:

<MinAppOffsetInd> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Options: R&S SMW-K148

Manual operation: See ["Minimum Scheduling Offset Available"](#) on page 94

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RESalloc <ResourceAlloc>**

Sets the used resource allocation type.

Parameters:

<ResourceAlloc> T0 | T1 | DS
*RST: T1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Resource Allocation"](#) on page 91

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:RBGSize <UrDIBpPdschRBGS>**

Sets the size of the resource block group.

Parameters:

<UrDIBpPdschRBGS>C1 | C2
*RST: C1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Resource Block Group Size"](#) on page 91

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TDANum <NumTDAllocs>**

Sets the number of PDSCH time domain allocations.

Parameters:

<NumTDAAllocs> integer
 Range: 0 to 16
 *RST: 0

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Manual operation: See ["Time Domain Allocations"](#) on page 98

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSCh:TD<grp0>:KNULI <K0>**

Sets the slot offset K_0 .

Parameters:

<K0> integer
 Range: 0 to 32
 *RST: 0

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Manual operation: See ["K0"](#) on page 98

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSCh:TD<grp0>:MAPPING <MappingType>**

Sets the DMRS-mapping type A and B.

Parameters:

<MappingType> A | B
 *RST: A

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Manual operation: See ["Mapping Type"](#) on page 98

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSCh:TD<grp0>:START <Start>**

Sets the start OFDM symbol of the PDSCH allocation.

Parameters:

<Start> integer
 Range: 0 to 12
 *RST: 0

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Manual operation: See ["Start"](#) on page 98

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:LENGth <Length>**

Sets the PDSCH allocation length.

Parameters:

<Length> 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14
*RST: 2

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Manual operation: See ["Length"](#) on page 98

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:TD<grp0>:SLIV?**

Queries the resulting start and length indicator SLIV.

Return values:

<SLIV> integer
Range: 0 to 32
*RST: 0

Example: See [Example "Configuring PDSCH time domain scheduling with PDSCH time domain allocation list"](#) on page 417.

Usage: Query only

Manual operation: See ["SLIV"](#) on page 99

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:VPINter <VrbToPrbInterle>**

Queries the mapping method used for the mapping of the virtual resource blocks (VRB) to the physical resource blocks (PRB).

Parameters:

<VrbToPrbInterle> VPN | VP2 | VP4
VPN
Non-interleaved
VP2|VP4
Interleaving is enabled. The value defines the interleaving unit size: $VP2 = 2$ and $VP4 = 4$.
*RST: VPN

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["VRB-to-PRB Interleaver"](#) on page 90

12.14.2 PUCCH Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:INT.....	496
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDCCh: NUMPreempt.....	496

**`[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
INT <IntRnti>`**

Sets the INT-RNTI of the user.

Parameters:

`<IntRnti>` integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423.

Manual operation: See ["INT-RNTI"](#) on page 99

**`[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDCCh:NUMPreempt <NumPreEmptionIn>`**

Sets how many pre-emption indication fields are transmitted in the DCI format 2_1.

Parameters:

`<NumPreEmptionIn>` integer
 Range: 1 to 9
 *RST: 1

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423.

Manual operation: See ["Number of Pre-Emption Indications in DCI 2_1"](#) on page 99

12.14.3 Uplink Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PUCCh....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PUSCh....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:SRS.....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUCCh:TPAS....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh:TPAS....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUCCh:BD22....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh:BD22....	497
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:OI01.....	498

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
  PUCCh <PucchTpcRnti>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
  PUSCh <PuschTpcRnti>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:
  SRS <TpcSrsRnti>
```

Sets the corresponding RNTI of the user.

Parameters:

<TpcSrsRnti> integer
 Range: 1 to 65519
 *RST: 1

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423.

Manual operation: See ["TPC-SRS-RNTI"](#) on page 101

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PUCCh:TPAS <TwoPcAdjustment>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PUSCh:TPAS <TwoPcAdjustment>
```

If enabled, the DCI format 2_2 filed closed loop indicator is transmitted.

Parameters:

<TwoPcAdjustment> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423.

Manual operation: See ["TwoPUSCH-PC Adjustment"](#) on page 101

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PUCCh:BD22 <NumBlocksInDci2>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PUSCh:BD22 <NumBlocksInDci2>
```

Sets the number of blocks in the DCI format 2_2.

Parameters:

<NumBlocksInDci2> integer
 Range: 1 to 22
 *RST: 1

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423.

Manual operation: See ["Number of PUSCH Blocks"](#) on page 101

**[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:OI01 <MinAppOffsetInd>**

Enables/disables the configuration of the minimum applicable scheduling offset indicator in the DCI format 0_1.

Parameters:

<MinAppOffsetInd> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Options: R&S SMW-K148

Manual operation: See ["Minimum Scheduling Offset Available"](#) on page 126

12.14.4 ZP and NZP CSI-RS Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSI:RTSize.....	499
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: STAt.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: STAt.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:NRESources.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:NRESources.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:PER.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:PER.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:OFFSet.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:OFFSet.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:RBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:RBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:SRBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:SRBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:ROW.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:ROW.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:PORTs?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:PORTs?.....	502

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:DENSity.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:DENSity.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:CDMType?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:CDMType?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:BITMap.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:BITMap.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:I0.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP: SET<gr0>:RES<user0>:I1.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:I0.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:I1.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:SCID.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:PWR.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude.....	505
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP: SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe.....	505

**[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSI:
RTSize <RepTrigSize>**

Sets the trigger size of the CSI (channel state information) request field in DCI (bits).

Parameters:

<RepTrigSize>	integer
Range:	0 to 6
*RST:	0

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Report Trigger Size"](#) on page 100

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:STATe <State>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:STATe <State>
```

Enables the NZP/ZP CSI-RS transmission.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["State"](#) on page 107

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:NRESources <Resources>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:NRESources <Resources>
```

Sets the number of CSI-RS resources.

Parameters:

<Resources> integer
 Range: 0 to 64
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Resources"](#) on page 107

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:PER <Periodicity>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:PER <Periodicity>
```

Sets the periodicity $T_{\text{CSI-RS}}$ (in slots).

Parameters:

<Periodicity> 4 | 5 | 8 | 10 | 16 | 20 | 32 | 40 | 64 | 80 | 160 | 320 | 640
 *RST: 4

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Periodicity"](#) on page 108

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:OFFSet <Offset>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:OFFSet <Offset>
```

Sets the slot offset T_{offset} .

Parameters:

<Offset> integer
 Range: 0 to 639
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Offset"](#) on page 108

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 ZP:SET<gr0>:RES<user0>:RBNumber <CsiRsZpNumRB>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 NZP:SET<gr0>:RES<user0>:RBNumber <CsiRsNZpNumRB>**

Sets the number of resource blocks the CSI-RS spans.

Parameters:

<CsiRsNZpNumRB> integer
 Range: 24 to 273
 *RST: = number of RB in the BWP

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["No. RBs"](#) on page 108

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 ZP:SET<gr0>:RES<user0>:SRBNumber <CsiRsZpStartRb>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 NZP:SET<gr0>:RES<user0>:SRBNumber <CsiRsNZpStartRB>**

Sets the first resource block the CSI-RS occupies.

Parameters:

<CsiRsNZpStartRB> integer
 Range: 0 to 273
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Start RB"](#) on page 108

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 ZP:SET<gr0>:RES<user0>:ROW <Row>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
 NZP:SET<gr0>:RES<user0>:ROW <Row>**

Sets the parameter row.

Parameters:

<Row> integer
 Range: 1 to 18
 *RST: 1

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Row"](#) on page 108

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:PORTs?
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:PORTs?
```

Sets the number of ports x.

Return values:

<Ports> 1 | 2 | 4 | 8 | 12 | 16 | 24 | 32
*RST: 1

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Usage: Query only

Manual operation: See ["Ports"](#) on page 109

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:DENSity <Density>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:DENSity <Density>
```

Sets the parameter density.

Parameters:

<Density> EVE5 | ODD5 | DEN1 | DEN3
*RST: DEN3

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Density"](#) on page 109

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:CDMType?
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:CDMType?
```

Queries the higher-level parameter `cdm-Type`.

The value is automatically, depending on the value set with the command `[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs: NZP:SET<gr0>:RES<user0>:ROW` on page 501

Return values:

<CDMType> NOCDm | CDM2 | CDM4 | CDM8
*RST: NOCDm

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Usage: Query only

Manual operation: See ["CDM-Type"](#) on page 109

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:BITMap <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:BITMap <Pattern>, <BitCount>
```

Sets the location of the ZP CSI-RS in the frequency domain.

Parameters:

<Pattern>	12 bits
*RST:	#H0
<BitCount>	integer
Range:	1 to 12
*RST:	1

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Bitmap"](#) on page 109

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:I0 <I0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  ZP:SET<gr0>:RES<user0>:I1 <I1>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:I0 <I0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:I1 <I1>
```

Sets the parameters I_0 and I_1 and define the ZP CSI-RS location relative to the start of as slot.

Parameters:

<I1>	integer
Range:	2 to 12
*RST:	11

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["I0/I1"](#) on page 110

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:SCID <ScramblingId>
```

Sets the parameter n_{ID} (scrambling ID).

Parameters:

<ScramblingId>	integer
Range:	0 to 1023
*RST:	0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Scrambling ID"](#) on page 110

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:PWR <NZpPower>
```

Sets the power of the NZP resource relative to the PDSCH power.

Parameters:

<NZpPower> float
 Range: -80 to 10
 Increment: 0.01
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Power"](#) on page 109

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL
  <APMapDataReal>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary
  <APMapDataImag>
```

Sets the mapping of the antenna ports (AP).

Suffix:

<s2us0> AP3000
 Antenna port
 <s3us0> 0 to 7
 Available basebands

Parameters:

<APMapDataImag> float
 The REAL (magnitude) and IMAGinary (phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:
 $|\text{REAL} + j \cdot \text{IMAGinary}| \leq 1$
 Otherwise, the values are normalized to magnitude = 1.
 Range: -1 to 1
 Increment: 0.001
 *RST: 0

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Mapping table"](#) on page 111

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude
  <APMapDataMagn>
```

Sets the mapping of the antenna ports (AP).

Parameters:

```
<APMapDataMagn> float
                    Range:    0 to 1
                    Increment: 0.001
                    *RST:     0
```

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Mapping table"](#) on page 111

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:
  NZP:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe
  <APMapDataPhase>
```

Sets the mapping of the antenna ports (AP).

Parameters:

```
<APMapDataPhase> float
                    Range:    0 to 360
                    Increment: 0.1
                    *RST:     0
```

Example: See [Example "Configuring the CSI-RS settings"](#) on page 418.

Manual operation: See ["Mapping table"](#) on page 111

12.14.5 Rate Match Commands

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:STATe.....506
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  NRESources.....506
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  GRPNumber.....506
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  RS<gr0>:RBDList.....507
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  RS<gr0>:RBPatt.....507
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  RS<gr0>:SLOT.....507
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
  RS<gr0>:SLTPatt.....508
```

<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:PER</code>	508
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:PERPatt</code>	508
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:GRID</code>	508

`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:STATE <RateMatchState>`

Enables the configuration of rate match groups.

Parameters:

`<RateMatchState>` 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["State"](#) on page 112

`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:NRESources <RateMatResource>`

Sets the number of rate match resources.

Parameters:

`<RateMatResource>` integer
 Range: 0 to 8
 *RST: 0

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Resources"](#) on page 113

`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:GRPNumber <RateMatNoOfGrps>`

Sets the number of rate match pattern groups

Parameters:

`<RateMatNoOfGrps>` integer
 Range: 0 to 2
 *RST: 0

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Number of Groups"](#) on page 112

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:RBDList <RateRBPattDList>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<RateRBPattDList> string
 Filename incl. file extension or complete file path

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["RB Pattern"](#) on page 113

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:RBPatt <Pattern>, <Bitcount>

Sets the resource block level bitmap pattern directly, alternatively to loading a data list with the command [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:RBDList](#).

Parameters:

<Pattern> 275 bits
 *RST: #H0

<Bitcount> integer
 Range: 275 to 275
 *RST: 0

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["RB Pattern"](#) on page 113

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:SLOT <RateMatchSlot>

Sets the number of slots.

Parameters:

<RateMatchSlot> integer
 Range: 1 to 2
 *RST: 1

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Slot"](#) on page 113

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
RS<gr0>:SLTPatt <RateMatSlotPatt>, <Bitcount>**

Set the slots to be used as a pattern.

Parameters:

<RateMatSlotPatt> 28 bits
*RST: #H0

<Bitcount> integer
Range: 14 to 28
*RST: 14

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Slot Pattern"](#) on page 114

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
RS<gr0>:PER <RateMatchPeriod>**

Sets the time-domain pattern.

Parameters:

<RateMatchPeriod> 1 | 2 | 5 | 4 | 8 | 10 | 20 | 40
*RST: 2

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Periodicity"](#) on page 114

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
RS<gr0>:PERPatt <RateMatPerdPatt>, <BitCount>**

Sets the periodicity in a pattern form.

Parameters:

<RateMatPerdPatt> 40 bits

<BitCount> integer
Range: 1 to 40
*RST: 2

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Periodicity Pattern"](#) on page 114

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:
RS<gr0>:GRID <RateMatchGrpID>**

Sets the group identifier for the selected rate match pattern.

Parameters:

<RateMatchGrpID> N | G1 | G2
 *RST: N

Example: See [Example "Configuring the DL BWP rate match settings"](#) on page 419.

Manual operation: See ["Group ID"](#) on page 114

12.14.6 PUCCH Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:	
ADMRs:STATe	509
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:	
BPSK:STATe	509
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:	
HACK:STATe	510
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:	
PDSHarq:NTMentry	510
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:	
PDSHarq:TMIValue<gr0>	510

[\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:](#)
[PUCCh:ADMRs:STATe](#) <AdditionalDMRS>

Defines if additional DMRS is used for PUCCH format 3 and 4.

Parameters:

<AdditionalDMRS> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Additional DMRS"](#) on page 116

[\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:](#)
[PUCCh:BPSK:STATe](#) <PiBpsk>

If enabled, the $\pi/2$ - BPSK modulation order is used for PUCCH, instead of the default QPSK.

Parameters:

<PiBpsk> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["π/2 - BPSK"](#) on page 116

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:HACK:STATe <PucchHarAckCSI>**

Reserved for future use.

Parameters:

<PucchHarAckCSI> 0
*RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Simultaneous HARQ-ACK-CSI"](#) on page 116

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:PDSHarq:NTMentry <NumUIBpPucchACK>**

Sets the number of entries in the sequence of PDSCH to HARQ timing values.

The value set here defines the available suffixes in the command [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:PDSHarq:TMIValue<gr0>](#).

Parameters:

<NumUIBpPucchACK> float
Range: 0 to 8

Example: See [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:PDSHarq:TMIValue<gr0>](#) on page 510.

Manual operation: See ["Number of Entries"](#) on page 117

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUCCh:PDSHarq:TMIValue<gr0> <UserUIBwpPucchD>**

Sets the individual timing values.

Suffix:

<gr0> 0 to 7
Indicator number
Value range depends on the value set with the command [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:PDSHarq:NTMentry](#).

Parameters:

<UserUIBwpPucchD> float
Range: 0 to 15

Example:

```
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:PDSHarq:NTMentry 3
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:PDSHarq:TMIValue0 1
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:PDSHarq:TMIValue1 0
SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUCCh:PDSHarq:TMIValue2 15
```

Manual operation: See ["Value of Indicator x"](#) on page 117

12.14.7 FRC Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:STATe.....	511
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:TYPE.....	511
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:SCS?.....	512
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:ALRB?.....	513
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC: MODulation?.....	513
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:PASize?.....	513
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC: RBOFset.....	513
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC: MAPType.....	514
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:PTRS: STATe.....	514

**[\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
STATe <FrcState>](#)**

Enables the fixed reference measurement channels (FRC), as defined in [TS 38.141](#).

Parameters:

<FrcState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Fixed reference channels"](#) on page 414.

Manual operation: See ["FRC State"](#) on page 118

**[\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
TYPE <FrcType>](#)**

Selects the fixed reference measurement channel (FRC).

The currently available FRCs depend on the selected BWP subcarrier spacing SCS) and selected number of resource blocks.

Parameters:

<FrcType>

FR1A11 | FR1A12 | FR1A13 | FR1A14 | FR1A15 | FR1A16 |
 FR1A17 | FR1A18 | FR1A19 | FR2A11 | FR2A12 | FR2A13 |
 FR2A14 | FR2A15 | FR1A21 | FR1A22 | FR1A23 | FR1A24 |
 FR1A25 | FR1A26 | NA | FR1A38 | FR1A39 | FR1A310 |
 FR1A311 | FR1A312 | FR1A313 | FR1A314 | FR1A322 |
 FR1A323 | FR1A324 | FR1A325 | FR1A326 | FR1A327 |
 FR1A328 | FR1A48 | FR1A49 | FR1A410 | FR1A411 |
 FR1A412 | FR1A413 | FR1A414 | FR1A422 | FR1A423 |
 FR1A424 | FR1A425 | FR1A426 | FR1A427 | FR1A428 |
 FR1A58 | FR1A59 | FR1A510 | FR1A511 | FR1A512 |
 FR1A513 | FR1A514 | FR1A331 | FR1A332 | FR2A31 |
 FR2A32 | FR2A33 | FR2A34 | FR2A35 | FR2A36 | FR2A37 |
 FR2A38 | FR2A39 | FR2A310 | FR2A311 | FR2A312 | FR2A41 |
 FR2A42 | FR2A43 | FR2A44 | FR2A45 | FR2A46 | FR2A47 |
 FR2A48 | FR2A49 | FR2A410 | FR2A51 | FR2A52 | FR2A53 |
 FR2A54 | FR2A55 | FR2A313 | FR2A314 | FR2A315 |
 FR2A316 | FR2A317 | FR2A318 | FR2A319 | FR2A320 |
 FR2A321 | FR2A322 | FR2A323 | FR2A324 | FR2A411 |
 FR2A412 | FR2A413 | FR2A414 | FR2A415 | FR2A416 |
 FR2A417 | FR2A418 | FR2A419 | FR2A420 | FR2A56 |
 FR2A57 | FR2A58 | FR2A59 | FR2A510 | FR1A31 | FR1A32 |
 FR1A33 | FR1A34 | FR1A35 | FR1A36 | FR1A37 | FR1A315 |
 FR1A316 | FR1A317 | FR1A318 | FR1A319 | FR1A320 |
 FR1A321 | FR1A329 | FR1A330 | FR1A41 | FR1A42 | FR1A43 |
 FR1A44 | FR1A45 | FR1A46 | FR1A47 | FR1A415 | FR1A416 |
 FR1A417 | FR1A418 | FR1A419 | FR1A420 | FR1A421 |
 FR1A51 | FR1A52 | FR1A53 | FR1A54 | FR1A55 | FR1A56 |
 FR1A57 | FR1A110 | FR1A111 | FR1A333 | FR1A333A |
 FR1A334 | FR1A334A | FR2A71 | FR2A72 | FR2A73 | FR2A74 |
 FR2A75 | FR2A76 | FR2A77 | FR2A78 | FR2A79 | FR2A710

*RST: 1A12

Example: See [Example "Fixed reference channels"](#) on page 414.**Manual operation:** See ["FRC"](#) on page 118

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
SCS?**

Queries the SCS of the selected FRC.

Return values:

<SubcarrierSpac> N15 | N30 | N60 | X60 | N120 | N240

*RST: N30

Example: See [Example "Fixed reference channels"](#) on page 414.**Usage:** Query only**Manual operation:** See ["Subcarrier Spacing"](#) on page 119

**[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
ALRB?**

Queries the number of used RBs of the selected FRC.

Return values:

<AllocRB> integer
Range: 6 to 273
*RST: 11

Example: See [Example "Fixed reference channels"](#) on page 414.

Usage: Query only

Manual operation: See ["Allocated Resource Blocks"](#) on page 120

**[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
MODulation?**

Queries the modulation scheme used by the selected FRC.

Return values:

<Modulation> BPSK | BPSK2 | QPSK | QAM16 | QAM64 | QAM256 |
NSQAM1024 | NSQAM2048 | NSQAM4096 | PSK8
*RST: QPSK

Example: See [Example "Fixed reference channels"](#) on page 414.

Usage: Query only

Manual operation: See ["Modulation"](#) on page 120

**[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
PASize?**

Queries the payload size of the selected FRC.

Return values:

<PayloadSize> integer
Range: 528 to 217128
*RST: 984

Example: See [Example "Fixed reference channels"](#) on page 414.

Usage: Query only

Manual operation: See ["Payload Size"](#) on page 120

**[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:
RBOffset <RbOffset>**

Sets the RB offset for the selected FRC.

Parameters:

<RbOffset> integer
 Range: 0 to dynamic
 *RST: 0

Example: See [Example "Fixed reference channels"](#) on page 414.

Manual operation: See ["RB Offset"](#) on page 120

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:MAPType <MappingType>

Sets the PUSCH mapping type for the selected FRC.

Parameters:

<MappingType> A | B
 *RST: A

Example: See [Example "Fixed reference channels"](#) on page 414.

Manual operation: See ["Mapping Type"](#) on page 120

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:PTRS:STATe <FrcPtrsState>

Enables PTRS for the selected FRC.

Parameters:

<FrcPtrsState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Fixed reference channels"](#) on page 414.

Manual operation: See ["PTRS"](#) on page 120

12.14.8 PUSCH Commands

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:BSAMe.....	516
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:CTYPE.....	516
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:CTYPE.....	516
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:MLENgtH.....	517
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:MLENgtH.....	517
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PUID.....	517
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PUID.....	517

BWP Configuration Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:APIndex.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:APIndex.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:SID0.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:SID1.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:SID0.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:SID1.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: MCBGroups.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: TPState.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: MRANK.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: TXConfig.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: CBSubset.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: MCSTable.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: MTTPrecoding.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: RESalloc.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh: RBGSize.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: SCRambling:STAt.....	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DSID.....	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: FHOFsets:NOFFsets.....	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: FHOFsets:OFFSet<gr0>.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:FHOP...	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:TP:STAt.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:TP:STAt.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:TP:TMDensity.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:TP:TMDensity.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:TP:SCID.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:TP:SCID.....	523

<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTA:PTRS:TP:RB0.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTA:PTRS:TP:RB1.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTA:PTRS:TP:RB2.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTA:PTRS:TP:RB3.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTA:PTRS:TP:RB4.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTB:PTRS:TP:RB0.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTB:PTRS:TP:RB1.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTB:PTRS:TP:RB2.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTB:PTRS:TP:RB3.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:</code>	
<code>DMTB:PTRS:TP:RB4.....</code>	524
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PDSCh:</code>	
<code>TDANum.....</code>	524

`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:`
`PUSCh:DMTA:BSAMe <SameDmrsSetting>`

Per default, the same configuration applies for DMRS mapping type A and B. Disable "Same Settings for Type A and Type B" to modify the mapping type B settings.

Mapping type A and B define the DMRS position in the PUSCH, the starting symbol and length. The UE informs the BS about the mapping type supportability via the UE capability information message. Before modifying Mapping Type B settings this state has to be deactivated.

Parameters:

`<SameDmrsSetting>` 0 | 1 | OFF | ON
 *RST: 1

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Same Settings for Type A and Type B"](#) on page 126

`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:`
`PUSCh:DMTB:CTYPE <TypeBConfigType>`
`[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:`
`PUSCh:DMTA:CTYPE <TypeAConfigType>`

Sets the configuration type (type 1 or type 2) and defines the mapping of the DMRS to the physical resource elements

Parameters:

<TypeAConfigType> T1 | T2
 *RST: T1

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Config Type"](#) on page 126

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:MLENgtH <TypeBMaxLength>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:MLENgtH <TypeAMaxLength>
```

Sets if single- or double-symbol DMRS is used.

Parameters:

<TypeAMaxLength> integer
 Range: 1 to 2
 *RST: 2

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Max Length"](#) on page 127

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PUID <TypeAPuschID>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PUID <TypeBPuschID>
```

Sets the PUSCH ID value used for DMRS sequence generation.

Parameters:

<TypeBPuschID> integer
 Range: 0 to 1007
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["NPusch ID"](#) on page 127

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:APIIndex <TypeBAddPosIdx>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:APIIndex <TypeAAddPosIdx>
```

Sets the additional position index.

Parameters:

<TypeAAddPosIdx> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Additional Position Index"](#) on page 126

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:SID0 <ScramID0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:SID1 <ScramID1>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:SID0 <ScramID0>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:SID1 <ScramID1>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:MCBGroups <UIMaxCBGperTB>
```

Limits the number of code block groups per transport block.

In 5G NR a huge TB (transport block) is split into multiple code blocks (CB). Multiples CBs are grouped into one code block group (CBG). The number of code blocks grouped into the CBG can be limited by the "Max Code Block Groups Per Transport Block" setting.

Parameters:

<UIMaxCBGperTB> G2 | G4 | DISabled | G6 | G8

G2

Limits the number of code block groups per transport block to 2.

G4

Limits the number of code block groups per transport block to 4.

DISabled

Default value, which disabled the limitation of code block groups per transport block.

G6

Limits the number of code block groups per transport block to 6.

G8

Limits the number of code block groups per transport block to 8.

*RST: DISabled

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Max Code Block Groups Per Transport Block"](#) on page 91
See ["Max Code Block Groups Per Transport Block"](#) on page 125

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:TPSTate <TransformPrec>
```

Enables the precoding operation and thus enables the DFT-s-OFDM.

Parameters:

<TransformPrec> 0 | 1 | OFF | ON

0|OFF

Enables the CP-OFDM.

1|ON

Enables the DFT-s-OFDM.

***RST:** 0**Example:** See [Example "Configuring the PUSCH settings"](#) on page 424.**Manual operation:** See ["Transform Precoding"](#) on page 122

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MRANK <MaximumRank>**

Sets the parameter max rank.

Parameters:

<MaximumRank> integer
 Range: 1 to 4
***RST:** 4

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.**Manual operation:** See ["Max Rank"](#) on page 122

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:TXConfig <TxConfig>**

Sets if codebook-based (CB) or non-codebook-based (NCB) transmission is used.

Parameters:

<TxConfig> NCB | CB
***RST:** NCB

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.**Manual operation:** See ["TxConfig"](#) on page 122

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:CBSubset <CodebookSubset>**

Sets the higher layer parameter codebookSubset.

Parameters:

<CodebookSubset> FPNC | PNC | NC
FPNC
 Fully-and-partial-and-non-coherent
PNC
 Partial-non-coherent
NC
 Non-coherent
***RST:** FPNC

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Codebook Subset"](#) on page 122

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MCSTable <PuschMcsTable>**

Sets the MSC table and defines the used modulation scheme.

Parameters:

<PuschMcsTable> QAM64 | QAM256 | QAM64LSE
*RST: QAM64

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["MCS Table"](#) on page 123

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:MTTPrecoding <PuschMcsTableTP>**

Sets the MCS table.

Parameters:

<PuschMcsTableTP> QAM64 | QAM256 | QAM64LSE
*RST: QAM64

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["MCS Table Transform Precoding"](#) on page 123

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:RESalloc <UIBwpPuschResAl>**

Sets the used resource allocation type.

Parameters:

<UIBwpPuschResAl> T0 | T1 | DS
*RST: T1

Example: See [Example "Scheduling PxSCH type 0 allocation"](#) on page 417.

Manual operation: See ["Resource Allocation"](#) on page 91

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PUSCh:RBGSize <PuschRBGSize>**

Sets the size of the resource block group.

Parameters:

<PuschRBGSize> C2 | C1

Example: See [Example "Scheduling PxSCH type 0 allocation"](#) on page 417.

Manual operation: See ["Resource Block Group Size"](#) on page 91

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:SCRambling:STAtE <UseScramblingId>**

Sets if a data scrambling ID is used for the initialization of the generator of the PUSCH scrambling sequence.

Parameters:

<UseScramblingId> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Use PUSCH Scrambling ID"](#) on page 123

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DSID <DataScrambleId>**

If [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:SCRambling:STAtE 1](#), sets the data scrambling ID.

Parameters:

<DataScrambleId> integer
Range: 0 to 1023
*RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Data Scrambling ID"](#) on page 123

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:FHOFFsets:NOFFsets <NumFreqHopOff>**

Defines the number off frequency hopping offsets.

- If the size of the active BWP is fewer than 50 PRBs, one of two higher layer configured offsets are indicated in the UL grant.
- If the size of the active BWP is equal to or greater than 50 PRBs, one of four higher layer configured offsets are indicated in the UL grant.

Parameters:

<NumFreqHopOff> integer
Range: 2 to 4
*RST: 4

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Number of Offsets"](#) on page 125

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:FHOFFsets:OFFSet<gr0> <FreqHopOffset>
```

Sets the value of the available frequency hopping offsets.

The number of offsets is set automatically to 2 or 4 depending on the size of the active BWP. See [Number of Offsets](#).

Suffix:

<gr0> 0 to 3
 Defines to which offset the frequency hopping value is applied.

Parameters:

<FreqHopOffset> integer
 Range: 1 to 274
 *RST: 1

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Offset Values"](#) on page 125

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:FHOP <SelFreqHopp>
```

Disables or enables inter- or intra-slot frequency hopping.

Parameters:

<SelFreqHopp> DIS | INTRA | INTER
DIS
 Disable frequency hopping.
INTRA
 Enable intra slot frequency hopping. Both intra- and inter-sub-frame hopping are performed. The PUSCH position in terms of used resource blocks is changed each slot and each subframe.
INTER
 Enable inter-slot frequency hopping. The PUSCH position in terms of used resource blocks is changed each subframe.
 *RST: DIS

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Frequency Hopping"](#) on page 124

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:STATe <PtrsTpState>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:STATe <PtrsTpPtrsState>
```

Simulates the transmission of the higher-layer parameter transformPrecoderEnabled.

Parameters:

<PtrsTpPtrsState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["State"](#) on page 130

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:TMDensity <PtrsTpTimeDens>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:TMDensity <PtrsTpTimeDens>
```

Sets the PTRS time density.

Parameters:

<PtrsTpTimeDens> TD1 | TD2
 *RST: TD1

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Time Density"](#) on page 131

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:SCID <TpPtrsScramId>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:SCID <TpPtrsScramId>
```

Sets whether the PTRS Scrambling ID value used for PTRS sequence generation is configured by the [NPusch ID](#) (higher layer) or by the cell ID.

Parameters:

<TpPtrsScramId> CID | PUID
CID
 Sets the cell ID as the scrambling ID for PTRS sequence generation.
PUID
 Sets the [NPusch ID](#) as the scrambling ID for PTRS sequence generation.
 *RST: CID

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Scrambling ID"](#) on page 131

```

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:RB0 <PtrsTpNumRB0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:RB1 <PtrsTpNumRB1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:RB2 <PtrsTpNumRB2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:RB3 <PtrsTpNumRB3>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:TP:RB4 <PtrsTpNumRB4>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:RB0 <PtrsTpNumRB0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:RB1 <PtrsTpNumRB0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:RB2 <PtrsTpNumRB2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:RB3 <PtrsTpNumRB3>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:TP:RB4 <PtrsTpNumRB4>

```

Sets the corresponding parameter `sampleDensity`.

Parameters:

<PtrsTpNumRB4> integer
 Range: 1 to 276
 *RST: RB0 = 1/RB4 = 276

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["N_RB_x"](#) on page 131

```

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PDSCh:TDANum <NumTDAllocs>

```

Sets the number of time domain allocations used to calculate the bitwidth of the [Time Domain Resource Assignment](#) for the UL DCI format 0_1 as specified in [TS 38.214](#).

Parameters:

<NumTDAllocs> integer
 Range: 0 to 16
 *RST: 0

Example: `SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PDSCh:TDANum 2`

Manual operation: See ["Time Domain Allocations"](#) on page 127

12.14.9 PUSCH UCI Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:STATe.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:MODE.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:ALPHa.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ: OFF0.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ: OFF1.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ: OFF2.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF10...	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF11...	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF20...	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF21...	526

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:STATe <UCIState>

Enables the transmission and the configuration of the uplink control information (UCI).

Parameters:

<UCIState> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["State"](#) on page 132

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:MODE <PuschUciMode>

Defines the information transmitted on the PUSCH.

Parameters:

<PuschUciMode> UCLSch | UCInly

UCLSch

Control information and data are multiplexed into the PUSCH.

UCInly

Only uplink control information is transmitted on PUSCH.

*RST: UCLSch

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Mode"](#) on page 132

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:ALPHa <PuschUciAlpha>

Sets the scaling parameter alpha.

Parameters:

<PuschUciAlpha> A0_5 | A0_65 | A0_8 | A1_0
 *RST: A05

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Scaling Alpha"](#) on page 133

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  HARQ:OFF0 <PuschUciHarqOff>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  HARQ:OFF1 <PuschUciHarqOf1>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  HARQ:OFF2 <PuschUciHarq2Of>
```

Sets the HARQ information offsets OFF0 | OFF1 | OFF2, each used for the multiplexing of defined number of HARQ-ACK information bits.

Parameters:

<PuschUciHarq2Of> integer
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["I_HARQ_Offset,x"](#) on page 133

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  CSI:OF10 <PuschUciCsiOf10>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  CSI:OF11 <PuschUciCsiOf11>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  CSI:OF20 <PuschUciCsiOf20>
```

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:
  CSI:OF21 <PuschUciCsiOf21>
```

Sets the CSI part 1 (OF10 | OF11) and CSI part 2 (OF20 | OF21) information offsets, where the OF10 | OF20 are used if up to 11 CSI bits are multiplexed and OF11 | OF21 otherwise.

Parameters:

<PuschUciCsiOf21> integer
 Range: 0 to 18
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["I_CSI1_Offset,x, I_CSI2_Offset,x"](#) on page 133

12.14.10 SRS Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:STATe.....	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: NRSets.....	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RSType.....	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:USAGe.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:NRESources.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:PER.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:OFFSet.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:SPOS.....	530
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:SYMNumber.....	530
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:FPOS.....	530
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:FQSHift.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:BSRS.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:CSRS.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:BHOP.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:REFactor.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:TRTComb.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:COFFset.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:SEQ:CYCShift.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:SEQ:ID.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:SEQ:HOPping.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:NAPort.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:POWer.....	534
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:PTRS.....	534
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS: SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL.....	534

```

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:
    SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary..... 535
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:
    SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude..... 536
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:
    SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe..... 536

```

[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:STATE <SrsState>

Enables the SRS transmission.

Parameters:

<SrsState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["State"](#) on page 136

[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:NRSets <SrsResourceSets>

Sets the number of SRS sets.

Parameters:

<SrsResourceSets> integers
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Resource Sets"](#) on page 136

[[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RSType <SrsRsSetRsType>

Sets the SRS transmission type.

Parameters:

<SrsRsSetRsType> PER | APER | SP
 Supported is only PER (periodic) SRS transmission.
 *RST: PER

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Resource Type"](#) on page 137

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:USAGe <SrsRsSetUsage>
```

Queries the type of the SRS transmission.

Parameters:

<SrsRsSetUsage> NCB | CB | BM | ASW
 NCB = non-codebook based
 CB = codebook
 BM = beam management (reserved for future use)
 ASW = antenna switching (reserved for future use)
 *RST: NCB

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Usage"](#) on page 137

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:NRESources <SrsResPerSet>
```

Sets the number of SRS resources in the SRS resource set.

Parameters:

<SrsResPerSet> integer
 Range: 0 to 4
 *RST: 1

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Resources"](#) on page 137

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:PER <SrsRsPeriodicit>
```

Sets the SRS repetition factor.

Parameters:

<SrsRsPeriodicit> SL1 | SL2 | SL4 | SL5 | SL8 | SL10 | SL16 | SL20 | SL32 | SL40 |
 SL64 | SL80 | SL160 | SL320 | SL640 | SL1280 | SL2560
 *RST: SL1

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Periodicity"](#) on page 137

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:OFFSet <SrsRsOffset>
```

Sets time position of first SRS allocation within an SRS periodicity.

Parameters:

<SrsRsOffset> integer
 Range: 0 to 1279
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Offset"](#) on page 138

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
 RS:SET<gr0>:RES<user0>:SPOS <SrsRsSPosition>**

Sets the starting position (the OFDM symbol number) of the SRS allocation within a slot.

Parameters:

<SrsRsSPosition> integer
 Range: 0 to 5
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Start Pos."](#) on page 138

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
 RS:SET<gr0>:RES<user0>:SYMNumber <SrsRsNumSymbols>**

Sets the number of consecutive OFDM symbols the SRS resource spans.

Parameters:

<SrsRsNumSymbols> SYM1 | SYM2 | SYM4
 *RST: SYM1

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["No. Sym."](#) on page 138

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
 RS:SET<gr0>:RES<user0>:FPOS <SrsRsFPosition>**

Sets the starting position of the SRS allocation in the frequency domain.

Parameters:

<SrsRsFPosition> integer
 Range: 0 to 67
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Freq. Pos."](#) on page 138

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:FQSHift <SrsRsFreqShift>
```

Sets the frequency shift.

Parameters:

<SrsRsFreqShift> integer
 Range: 0 to 268
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Freq. Shift"](#) on page 138

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:BSRS <SrsRsBSrs>
```

Sets the parameter b-SRS needed to define the length of the SRS sequence.

Parameters:

<SrsRsBSrs> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["B SRS"](#) on page 138

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:CSRS <SrsRsCSrs>
```

Sets the parameter c-SRS to define the length of the SRS sequence.

Parameters:

<SrsRsCSrs> integer
 Range: 0 to 63
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["C SRS"](#) on page 139

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:BHOP <SrsRsBHop>
```

Sets the parameter b_{Hop} that defines the frequency hopping of the SRS.

Parameters:

<SrsRsBHop> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["B Hop"](#) on page 139

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:REFactor <SrsRsRepFactor>**

Sets how many times the SRS symbols are repeated.

Parameters:

<SrsRsRepFactor> REP1 | REP2 | REP4
*RST: REP1

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Rep. Factor"](#) on page 139

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:TRTComb <SrsRsTransCombo>**

Sets the transmission comb (k_{TC}).

Parameters:

<SrsRsTransCombo> TC2 | TC4
*RST: TC2

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Trans. Comb"](#) on page 139

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:COFFset <SrsRsCombOffset>**

Sets the parameter transmission comb offset.

Parameters:

<SrsRsCombOffset> integer
Range: 0 to 3
*RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Comb Offset"](#) on page 139

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:SEQ:CYCShift <SrsRsCyclicShif>**

Sets the number of cyclic shifts, required for the SRS sequence generation.

Parameters:

<SrsRsCyclicShif> float
Range: 0 to 11
*RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Cyclic Shift"](#) on page 140

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:SEQ:ID <SrsRsSequenceld>**

Sets the higher-layer parameter sequence ID required for the SRS sequence generation.

Parameters:

<SrsRsSequenceld> float
Range: 0 to 1023
*RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Sequence ID"](#) on page 140

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:SEQ:HOPping <SrsRsHopping>**

Sets the higher-layer parameter `groupOrSequenceHopping` that defines the sequence group, required for the SRS sequence generation.

Parameters:

<SrsRsHopping> N | GRP | SEQ
N
Neither
GRP
Group hopping (reserved for future use)
SEQ
Sequence hopping (reserved for future use)
*RST: N

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Group or Sequence Hopping"](#) on page 140

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:NAPort <SrsNumAp>**

Sets how many antenna ports (AP) are used for every SRS transmission.

Parameters:

<SrsNumAp> AP1 | AP2 | AP4
*RST: AP1

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["No. Ports"](#) on page 140

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:POWER <SrsRsPower>
```

Sets the SRS power.

Parameters:

<SrsRsPower> float
 Range: -80 to 10
 Increment: 0.01
 *RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Power"](#) on page 141

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:PTRS <SrsPtrsPortIdx>
```

Sets the PTRS antenna port index.

Parameters:

<SrsPtrsPortIdx> P1 | P0
 *RST: P0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["PTRS Port Idx"](#) on page 140

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL
<SrAPMapDataReal>
```

Define the mapping of the antenna ports to the physical antennas.

Suffix:

<s2us0> 1000 to 1003
 Defines the antenna port
 Value range depends on the selected number of antenna ports
 as follows

$\text{<s2us0>} = 1000 + \{0 \text{ to } \text{NAPort} - 1\}$

<s3us0> 0 to 1
 Available basebands (i.e. rows in the antenna port-mapping
 table)
 Depends on the number of basebands outputs currently mapped
 to a cell (see [\[:SOURce<hw>\]:BB:NR5G:NODE:CARMapping:CELL\[:ROW<ch0>\]](#) on page 474)

Parameters:

<SrAPMapDataReal> float

The **REAL** (magnitude) and **IMAGinary** (phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:

$$|\text{REAL} + j * \text{IMAGinary}| \leq 1$$

Otherwise, the values are normalized to magnitude = 1.

Range: -1 to 1

Increment: 0.001

*RST: 0

Example:See [Example "Configuring one SRS resource set"](#) on page 419.**Manual operation:**See ["Mapping table"](#) on page 141

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary
<SrsAPMapDataIma>
```

Define the mapping of the antenna ports to the physical antennas.

Suffix:

<s2us0>

1000 to 1003

Defines the antenna port

Value range depends on the selected number of antenna ports as follows

$$\text{<s2us0>} = 1000 + \{0 \text{ to } \text{NAPort} - 1\}$$

<s3us0>

0 to 1

Available basebands (i.e. rows in the antenna port-mapping table)

Depends on the number of basebands outputs currently mapped to a cell (see [\[:SOURce<hw>\]:BB:NR5G:NODE:CARMapping:CELL\[:ROW<ch0>\]](#) on page 474)

Parameters:

<SrsAPMapDataIma> float

The **REAL** (magnitude) and **IMAGinary** (phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:

$$|\text{REAL} + j * \text{IMAGinary}| \leq 1$$

Otherwise, the values are normalized to magnitude = 1.

Range: -1 to 1

Increment: 0.001

*RST: 0

Example:See [Example "Configuring one SRS resource set"](#) on page 419.**Manual operation:**See ["Mapping table"](#) on page 141

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude
  <SrsAPMapDataMag>
```

Defines the mapping of the antenna ports to the physical antennas, cylindrical mapping coordinates are used.

Parameters:

<SrsAPMapDataMag>float

Range: 0 to 1

Increment: 0.001

*RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Mapping table"](#) on page 141

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:
  RS:SET<gr0>:RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe
  <SrsAPMapDataPha>
```

Defines the mapping of the antenna ports to the physical antennas, if cylindrical mapping coordinates are used.

Parameters:

<SrsAPMapDataPha>float

Range: 0 to 360

Increment: 0.1

*RST: 0

Example: See [Example "Configuring one SRS resource set"](#) on page 419.

Manual operation: See ["Mapping table"](#) on page 141

12.14.11 PTRS Commands

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:
  DMTA:PTRS:STaTe..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:
  DMTB:PTRS:STaTe..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:
  DMTA:PTRS:STaTe..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:
  DMTB:PTRS:STaTe..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:
  DMTA:PTRS:REOF..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:
  DMTB:PTRS:REOF..... 538
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:
  DMTA:PTRS:REOF..... 538
```

BWP Configuration Commands

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:REOF.....	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:EPRE.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:EPRE.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:POWer.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:POWer.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:PORT.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:PORT.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:MCS1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:MCS2.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:MCS3.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:MCS1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:MCS2.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:MCS3.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:MCS1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:MCS2.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:MCS3.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:MCS1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:MCS2.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:MCS3.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:RB0.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTA:PTRS:RB1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:RB0.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh: DMTB:PTRS:RB1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:RB0.....	540

<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTA:PTRS:RB1.....</code>	540
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:RB0.....</code>	541
<code>[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh: DMTB:PTRS:RB1.....</code>	541

```

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:STATe <TypeAPtrsState>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:STATe <PtrsState>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:STATe <TypeAPtrsState>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:STATe <PtrsState>

```

Enables the transmission of phase-tracking reference signals.

Parameters:

<PtrsState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["State"](#) on page 96

```

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTA:PTRS:REOF <ResElemOffset>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
PUSCh:DMTB:PTRS:REOF <ResElemOffset>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTA:PTRS:REOF <ResElemOffset>
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:REOF <ResElemOffset>

```

Sets the parameter resource element offset.

Parameters:

<ResElemOffset> RE00 | RE01 | RE10 | RE11
 *RST: RE00

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["RE-offset"](#) on page 96

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:EPRE <EpreRatio>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:PTRS:EPRE <PtrsEpreRatio>
```

Sets the parameter EPRE ratio.

Parameters:

<PtrsEpreRatio> RAT0 | RAT1
 *RST: RAT0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["EPRE Ratio"](#) on page 97

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:POWer <PtrsPower>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:POWer <PtrsPower>
```

Sets the parameter `ptrs-Power` and thus defines the PUSCH to PTRS power ratio per layer per resource element.

Parameters:

<PtrsPower> P00 | P01
 *RST: P00

Example: `SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:`
 `DMTB:PTRS:POWer P00`

Manual operation: See ["Power"](#) on page 129

```
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:PORT <PtrsMaxNrofPort>
[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:PORT <PtrsMaxNrofPort>
```

Sets the maximum number of configured PTRS ports.

Parameters:

<PtrsMaxNrofPort> P1 | P2
 *RST: P1

Example: `SOURce1:BB:NR5G:UBWP:USER0:CELL0:UL:BWP0:PUSCh:`
 `DMTB:PTRS:PORT P1`

Manual operation: See ["Max Number of Ports"](#) on page 129

```

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:MCS1 <PtrsImcs1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:MCS2 <PtrsImcs2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:MCS3 <PtrsImcs3>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:MCS1 <PtrsImcs1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:MCS2 <PtrsImcs2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:MCS3 <PtrsImcs3>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:MCS1 <PtrsImcs1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:MCS2 <PtrsImcs2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:MCS3 <PtrsImcs3>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:PTRS:MCS1 <PtrsImcs1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:PTRS:MCS2 <PtrsImcs2>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTB:PTRS:MCS3 <PtrsImcs3>

```

Sets the threshold values ptrs-MCS_l with $l = \{1, 2, 3\}$.

Parameters:

<PtrsImcs3> integer
 Range: 0 to 29
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See "[I_MCS_1/I_MCS_2/I_MCS_3](#)" on page 97

```

[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:RB0 <PtrsNrb0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTA:PTRS:RB1 <PtrsNrb1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:RB0 <PtrsNrb0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
  PUSCh:DMTB:PTRS:RB1 <PtrsNrb1>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:RB0 <PtrsNrb0>
[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
  PDSCh:DMTA:PTRS:RB1 <PtrsNrb1>

```


**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:RB0 <PtrsNrb0>**

**[:SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
PDSCh:DMTB:PTRS:RB1 <PtrsNrb1>**

Sets the threshold values NRB_l with $l = \{0, 1\}$.

Parameters:

<PtrsNrb1> integer
Range: 1 to 276
*RST: 276

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["N_RB_1/N_RB_2"](#) on page 97

12.15 Scheduling Commands

[:SOURce<hw>]:BB:NR5G:SCHeduling:MODE.....	542
[:SOURce<hw>]:BB:NR5G:SCHeduling:RSSPace.....	542
[:SOURce<hw>]:BB:NR5G:SCHeduling:SFN:STATE.....	543
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CONTent.....	543
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CONFlct?.....	543
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: NALLoc.....	544
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:APPLy.....	544
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:SLOT.....	544
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:SUBF.....	544
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:MAPType.....	545
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SLOT.....	545
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:FMT.....	545
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:TPSTate.....	546
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SYMNumber.....	546
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SYMoffset.....	546
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:RBNumber.....	546
[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:RBNumber?.....	547

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:RBOFFset.....	547
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:POWer.....	548
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:STATe.....	548
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:REPetitions.....	548
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:DURation.....	548
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:PERiod.....	549
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: RESulting:ALLOc<user0>:INFO?.....	549
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLOc<user0>:INFO?.....	550

[SOURce<hw>]:BB:NR5G:SCHeDuling:MODE <SchedulingMode>

Defines how the scheduling and the content of the different PDSCH allocations is defined and performed.

Parameters:

<SchedulingMode> MANual | AUTO

MANual

No cross-reference between the settings made for the CORE-SET DCIs and the PDSCHs settings.
Configure the PDSCH allocations manually.

AUTO

Content and scheduling of the PDSCH according to the configuration of the CORESET DCIs.

*RST: MANual

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["PDSCH Scheduling"](#) on page 44

[SOURce<hw>]:BB:NR5G:SCHeDuling:RSSPace <RestrToSSpace>

If enabled, the CCE start index is selected automatically to be within the current search space.

Parameters:

<RestrToSSpace> 0 | 1 | OFF | ON

*RST: 0

Example: See [Example "Search space configuration"](#) on page 420.

Manual operation: See ["Restrict to Search Space"](#) on page 44

[:SOURce<hw>]:BB:NR5G:SCHeDuling:SFN:STATe <SysFrameNum>

Enables the full counting of the system frame number carried by the PBCH block from 0 to 1023, independent from the configured ARB [Sequence Length](#).

If [System Frame Number Offset](#) is set, the counting starts at the configured SFN offset value and restarts when the SFN offset value is reached again as follows: offset, (offset+1), (offset+ 2), ..., 1023, 0, 1, 2, ..., (offset-1).

Parameters:

<SysFrameNum> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the SS/PBCH"](#) on page 411.

Options: R&S SMW-B9/-K148.

Manual operation: See ["Count Full System Frame Number"](#) on page 45

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CONTent <Content>**

Sets the allocated channel or signal.

Parameters:

<Content> PDSCh | COReset | PUSCh | PUCCh | DUMRe | SPBCh |
PRACH | CSIRs | SRS | LTERCs | PRS
*RST: PSS

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Content"](#) on page 145

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CONFlict?**

Queries if allocations overlap.

Return values:

<Conflict> 0 | 1 | OFF | ON
*RST: 0

Example:

```
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CONFlict?
// 0
// there is no conflict, i.e. allocations are not overlapping
```

Usage: Query only

Manual operation: See ["Conflict"](#) on page 144

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:NALLoc <NumUserAlloc>**

Sets the number of configurable allocations in the selected
USER<dir0>:BWPart<gr0> group.

Parameters:

<NumUserAlloc> integer
Range: 0 to 64
*RST: 0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["No. of Allocations"](#) on page 145

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:COPYto:APPLy**

Start the copy progress. The selected line from the scheduling settings table will be copied to the selected subframe and slot.

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Usage: Event

Manual operation: See ["Apply"](#) on page 146

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:COPYto:SLOT <UserAllcCpyToSL>**

Select the slot the data from the selected line from the scheduling settings table will be copied to.

Parameters:

<UserAllcCpyToSL> integer
Range: 0 to 31
*RST: 0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Slot"](#) on page 146

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:COPYto:SUBF <UserAllcCpyToSF>**

Select the slot the data from the selected line from the scheduling settings table will be copied to.

Parameters:

<UserAllocCpyToSF> integer
 Range: 0 to 99
 *RST: 0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Subframe"](#) on page 146

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:MAPType <MappingType>**

Defines to which symbols of the PDSCH/PUSCH allocation the demodulation reference signals (DMRS) are mapped.

Parameters:

<MappingType> A | B
 *RST: A

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Mapping Type"](#) on page 147

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:SLOT <Slot>**

Sets the start slot for the selected allocation.

Parameters:

<Slot> integer
 Range: 0 to 31
 *RST: 0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Slot"](#) on page 146

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:FMT <AllocPucchForma>**

In uplink, selects the PUCCH format.

Parameters:

<AllocPucchForma> F0 | F1 | F2 | F3 | F4
 *RST: F0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Format"](#) on page 147

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:TPStAtE <TrPrecState>
```

In UL, enables the optional DFT-s-OFDM instead of CP-OFDM per PUSCH.

Parameters:

<TrPrecState> 0 | 1 | OFF | ON
 *RST: 0

Example:

```
SOURce1:BB:NR5G:LINK UP
SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER1:BWPart0:ALLoc0:TPStAtE 1
```

Manual operation: See ["Transform Precoding"](#) on page 149

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:SYMNumber <UserAllocSymNum>
```

Sets the number of symbols the allocation spans.

Parameters:

<UserAllocSymNum> integer
 Range: 1 to 14
 *RST: 1

Example:

See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["No. Sym."](#) on page 147

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:SYMOffset <UserAllocSymOff>
```

Sets the allocation's start (OFDM symbol) within the slot.

Parameters:

<UserAllocSymOff> integer
 Range: 0 to 13
 *RST: 0

Example:

See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Sym. Offset"](#) on page 148

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:RBNumber <UserAllocRBNum>
```

Sets the number of resource blocks (RB) the allocation spans.

Parameters:**<UserAllocRBNu>** integer

CORESET allocations span always a multiple of 6 resource blocks. Thus, only values that are multiple of 6 are allowed for these allocations.

The number of resource blocks that are available for PUSCH depends on whether the transform precoding is enabled or not (that is if DFT-s-OFDM is applied), see [\[:SOURce<hw>\]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLOc<user0>:TPStAtE.](#)

Query the number of resource blocks used by PRACH with the command [\[:SOURce<hw>\]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLOc<user0>:PRACH:RBNumber?](#).

Range: 20 to 275

*RST: 20

Example:

See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["No. RB"](#) on page 148

[\[:SOURce<hw>\]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLOc<user0>:PRACH:RBNumber?](#)

Queries the number of resource blocks the PRACH allocation spans.

Return values:**<UserAllocRBNu>** integer

Range: 3 to 24

*RST: 12

Example:

See [Example "Configuring the PRACH settings"](#) on page 428.

Usage:

Query only

Manual operation: See ["No. RB"](#) on page 148

[\[:SOURce<hw>\]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLOc<user0>:RBOffset <RbOff>](#)

Adds a frequency offset and sets the start resource block of the selected allocation.

Parameters:**<RbOff>** integer

Range: 0 to 255

*RST: 0

Example:

See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["RB Offset"](#) on page 149

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:POWer <Power>**

Sets the power for the selected allocation relative to the power of the other allocations.

Parameters:

<Power> float
Range: -80 to 10.0
Increment: 0.01
*RST: 0.0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["Power"](#) on page 150

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:STATe <State>**

Activates the allocation.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Manual operation: See ["State"](#) on page 151

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:REPetitions <Repetition>**

Defines if and how often the allocation is repeated.

Parameters:

<Repetition> OFF | SUBFrame | FRAME | SLOT | CUSTom
*RST: depends on allocation number

Example: See [Example "Configuring the configurable allocations in the users and BWPs groups"](#) on page 414.

Example:

```
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWPart0:ALLoc0:REPetitions CUSTom
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWPart0:ALLoc0:PERiod 2
SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER1:BWPart0:ALLoc0:DURation 5
```

Manual operation: See ["Repetition/Repetition Type"](#) on page 151

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:DURation <RepDuration>**

Sets in how many consecutive slots within a frame the allocation is repeated.

Parameters:

<RepDuration> integer
 Range: 1 to 10
 *RST: 1

Example:

See `[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:REPetitions.`

Manual operation: See ["Duration"](#) on page 152

`[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PERiod <RepPeriod>`

Sets the repetition periodicity.

Parameters:

<RepPeriod> integer
 Range: 1 to max*
 *RST: 10
 *) Max repetition period is calculated as follows:
 $\text{RepPeriod}_{\text{max}} = \text{\#SlotsPerFrame} * \text{"SequenceLength"}$, where:
 #SlotsPerFrame: is the number of available slots and depends on the used subcarrier spacing.
 "SequenceLength": is the ARB sequence length as set with the command `[ :SOURce<hw> ] :BB:NR5G:OUTPut:SEQLen.`

Example:

See `[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:REPetitions.`

Manual operation: See ["Period"](#) on page 152

`[ :SOURce<hw> ] :BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:RESulting:ALLoc<user0>:INFO?`

Queries scheduling information on the selected automatically created allocation.

Return values:

<ResultingInfo> string
 Syntax follows the [JSON schema](#) format.
 Retrieved information depends on the channel type.

Example:

```

SOURCE1:BB:NR5G:SCHed:CELL0:SUBF1:USER0:
BWPart0:RESulting:ALLoc0:INFO?
{
  "commonSets": {
    "powerDb": 0.0,
    "slotInFrame": 2
  },
  "content_type": "Coreset",
  "content": {
    "pdcchs": [
      {
        "scramblingRnti": 0,
        "crcRnti": 65535,
        "aggregationLevel": "L1",
        "cceStartIndex": 0
      }
    ]
  }
}
```

Usage: Query only

Manual operation: See ["Info"](#) on page 150

**[:SOURCE<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:INFO?**

Queries information on the current configuration.

Return values:

<UserAllocInfo> string

Example:

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:INFO?

Response:

```
{
  "common_settings": {
    "power_dB": 0.0,
    "slot_in_frame": 0
  },
  "content_type": "PXsch",
  "content": {
    "frequency_domain_allocation_type": "FrequencyAllocationType1",
    "frequency_domain_allocation": {
      "vrb_offset": 0,
      "vrb_num": 273
    },
    "transport_block_settings_no_coding": [
      {
        "modulation": "QAM16"
      },
      {
        "modulation": "QAM64"
      }
    ],
    "ptrs_settings": {
      "antenna_port": [
        1002
      ]
    }
  }
}
```

Usage: Query only

Manual operation: See ["Info"](#) on page 173

12.16 PDSCH/PUSCH Commands

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:PRECG.....	554
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:BMAid.....	554
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TYPE.....	555
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:NCW.....	555
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:SBCZero:STATe.....	555
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:PATGrp.....	556

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:RESalloc.....	556
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:RESalloc:PATtern.....	556
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:MOD.....	557
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PHYsbits?.....	557
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:DMR:NIDSel.....	557
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:SEQGen.....	558
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:NSID.....	558
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:SEQHopping.....	558
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:LENGth.....	559
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:SLTSymbols?.....	559
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:DMRS:POWEr.....	559
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TXSCHEME:NLAYers.....	560
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TXSCHEME:CDMData.....	560
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh[:DMRS]:APSelect<s2us0>.....	560
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh[:DMRS]:APSelect<s2us0>.....	561
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh[:DMRS]:APSelect<s2us0>.....	561
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:FHOI.....	561
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:HPRNumber.....	561
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:FHOP:STATE.....	562
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:TXSCHEME:TPMidx.....	562
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:TXSCHEME:INTervp.....	562
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:TXSCHEME:SRI.....	563
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:PTRS:MODE.....	563
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:PTDMrs.....	563
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:PTRS:STATE.....	564

[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:PTRS:TMDen.....	564
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:PTRS:REOF.....	564
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:PTRS:FRQDen.....	564
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh:PTRS:EPRE.....	565
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:POWer.....	565
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:PORT.....	565
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:MODE.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:STATe.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:TMDensity.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:NGRPs.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:SCID.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:SPPG.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:IMCS.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:TCRate.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:TBSIZE?.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:RVINdex.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI1:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI2:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:ACK:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI1:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI2:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:ACK:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:IMAGinary.....	570

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:REAL.....570
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:MAGNitude.....571
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:PHASe.....571
```

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh:PRECG <UserAllocPDSCHP>
```

For PDSCH allocations, the precoding granularity can be adjusted. Precondition is that the precoding for the PDSCH is enabled under "User/BWP Settings > DL BWP Config > PDSCH > General Settings > Static Bundle Size".

Parameters:

<UserAllocPDSCHP> N2 | N4 | WIDeband

N2

Precoding granularity is set to N2.

N4

Precoding granularity is set to N4.

This setting is not available if:

- [VRB-to-PRB Interleaver](#) equals 2 or
- [Resource Block Group Size](#) equals Config1 and BWP size ≤ 36 RBs

WIDeband

Precoding granularity is set to wideband.

*RST: N2

Example: See: [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415

Manual operation: See ["Precoding Granularity"](#) on page 156

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:BMAid <BurstRefAllocID>
```

Sets the bandwidth of the given allocation as reference for the "Burst" power mode.

Parameters:

<BurstRefAllocID> 0 | 1 | OFF | ON

0|OFF

Disables the given allocation as burst reference for the "Burst" power mode.

1|ON

Sets the given allocation as burst reference for the "Burst" power mode.

*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415 and [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Burst Mode Ref Alloc Identifier"](#) on page 156

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:TYPE <PXschType>**

Defines the PDSCH/PUSCH type by selecting the DCI format by that the PDSCH/PUSCH content is defined.

Parameters:

<PXschType> F00 | F01 | F10 | F11
*RST: F00

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["PDSCH Type/PUSCH Type"](#) on page 155

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:NCW <NumUserAllocCW>**

For PDSCH, sets if one or two codewords are used.

Parameters:

<NumUserAllocCW> integer
Range: 1 to 2
*RST: 1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Number of Codewords"](#) on page 155

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh:SBCZero:STATe <UserAllocPdschS>**

Sets if the PDSCH settings are scheduled by CORESET 0 or not.

Parameters:

<UserAllocPdschS> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Scheduled by CORESET 0"](#) on page 156

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh:PATGrp <RateMatPattGrp>
```

For PDSCH allocations, selects one of the configured rate match pattern groups.

Parameters:

<RateMatPattGrp> N | G1 | G2

N = none

*RST: N

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Rate Match Pattern Group"](#) on page 156

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:RESalloc <UserAllocPXschR>
```

Sets the resource allocation type.

Parameters:

<UserAllocPXschR> T0 | T1

*RST: T1

Example: See [Example "Scheduling PxSCH type 0 allocation"](#) on page 417.

Manual operation: See ["Resource Allocation"](#) on page 156

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:RESalloc:PATtern
  <ResAllocType0BM>, <BitCount>
```

If `[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:RESalloc` on page 556 T0, sets the PDSCH resource block groups allocation as bit pattern.

Parameters:

<ResAllocType0BM> 19 bits

*RST: #H0

<BitCount> integer

Range: 0 to 19

*RST: 18

Example: See [Example "Scheduling PxSCH type 0 allocation"](#) on page 417.

Manual operation: See ["Resource Block Group Bitmap"](#) on page 157

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:MOD <Modulation>
```

Sets the modulation scheme.

Parameters:

<Modulation> BPSK | BPSK2 | QPSK | QAM16 | QAM64 | QAM256
Supported modulations depend on the channel.
*RST: BPSK

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Modulation"](#) on page 157

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:PHYSbits?
```

Queries the size of the selected allocation in bits.

Return values:

<AllocPhysBits> integer
Range: 0 to 65535
*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Usage: Query only

Manual operation: See ["Phys. Bits"](#) on page 158

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:DMR:NIDSel <PuschDmrsIdSel>
```

Sets whether the variable n_{ID}^{CELL} or n_{ID}^{PUSCH} is used by the generation of the DMRS sequence.

Parameters:

<PuschDmrsIdSel> CID | PUID
CID
 n_{ID}^{CELL} is used by the generation of the DMRS sequence
PUID
 n_{ID}^{PUSCH} is used by the generation of the DMRS sequence
*RST: CID

Example: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["N_ID^RS"](#) on page 162

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:SEQGen <SeqGen>
```

Sets how the scrambling ID for DMRS is derived.

Parameters:

<SeqGen> CELLid | DMRSid

DMRSid
 N_{ID}^{DMRS} : Scrambling ID (i.e. n_{ID}) = DMRS scrambling ID (i.e. N_{ID}^{DMRS})

CELLid
 N_{ID}^{Cell} : Scrambling ID (i.e. n_{ID}) = cell ID (i.e. N_{ID}^{Cell})

*RST: CELLid

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Sequence Generation"](#) on page 161

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:NSID <NScid>
```

Sets the scrambling ID (N_{ID}).

Parameters:

<NScid> integer

Range: 0 to 1

*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["N_SCID"](#) on page 161

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:SEQHopping
  <DmrsGrpSeqHopp>
```

Sets the higher-layer parameter `groupOrSequenceHopping` that defines the sequence group, required for the DMRS sequence generation according to [TS 38.211](#).

Parameters:

<DmrsGrpSeqHopp> NEITher | GRP | SEQUENCE

NEITher
 Disables the group and sequence hopping for the DMRS sequence generation.

GRP
 Enables the group hopping for the DMRS sequence generation.

SEQuence

Enables the sequence hopping for the DMRS sequence generation.

*RST: NEITher

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Group or Sequence Hopping"](#) on page 162

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:LENGth <DmrsLen>**

Defines whether single- or double-symbol DMRS is used.

Parameters:

<DmrsLen> integer
Range: 1 to 2
*RST: 1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Length"](#) on page 162

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:SLTSymbols?**

Queries the slot number of DMRS symbols.

Return values:

<PxschDmrsSlotSy> string
Range: 0 char to 256 char

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Usage: Query only

Manual operation: See ["Slot Symbols"](#) on page 162

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:DMRS:POWer <DmrsPower>**

Sets the power of the PDSCH/PUSCH, relative to the power of the other channels.

Parameters:

<DmrsPower> float
Range: -80.00 to 10.00
Increment: 0.001
*RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Power"](#) on page 162

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCCh|PUSCh:TXSCHeM:NLAYers
  <TxNumLayers>
```

For DCI format 0_1, sets the number of precoding layers.

Parameters:

<TxNumLayers> integer
 Range: 1 to 8
 *RST: 1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Number of Layers"](#) on page 159

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCCh|PUSCh:TXSCHeM:CDMData
  <CDMGroupData>
```

For DCI format 0_1, sets the number of DMRS CDM groups without data.

Parameters:

<CDMGroupData> integer
 Range: 0 to 2
 *RST: 1

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["CDM Groups w/o Data"](#) on page 159

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCCh[:DMRS]:APSelect<s2us0>
  <PdschAPSel>
```

Each layer of a PDSCH allocation is mapped to a certain antenna port. By the command the antenna ports are selected which are used for the transmission of the PDSCH allocation.

Parameters:

<PdschAPSel> AP1000 | AP1001 | AP1002 | AP1003 | AP1004 | AP1005 |
 AP1006 | AP1007 | AP1008 | AP1009 | AP1010 | AP1011
 *RST: AP1000

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["DMRS Antenna Ports ..."](#) on page 163

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh[:DMRS]:APSelect<s2us0>
  <PuschAPSel>
```

Each layer of a PUSCH allocation is mapped to a certain antenna port. By the command the antenna ports are selected which are used for the transmission of the PUSCH allocation.

Parameters:

<PuschAPSel> AP0 | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 |
 AP10 | AP11
 *RST: AP0

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["DMRS Antenna Ports ..."](#) on page 163

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh[:DMRS]:APSelect<s2us0>
  <PuschAPSel>
```

Each layer of a PUSCH allocation is mapped to a certain antenna port. By the command the antenna ports are selected which are used for the transmission of the PUSCH allocation.

Parameters:

<PuschAPSel> AP0 | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 |
 AP10 | AP11
 *RST: AP0

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["DMRS Antenna Ports ..."](#) on page 163

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh:FHOI <AllocPuschFHOld>
```

Sets the frequency hopping offset index.

Parameters:

<AllocPuschFHOld> float

Example: See: [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Index to Frequency Hopping Offset"](#) on page 157

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh:HPRNumber <ProcessNumber>
```

Sets the HARQ process number for the relevant DCI.

The value can be set between 0 and 15.

Only accessible when the "HPN Mode" is enabled in the "Node Settings > Feedback".

Parameters:

<ProcessNumber> integer
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["HARQ Process Number"](#) on page 158

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PUSCh:FHOP:STATe <AllocPUSCHDoFH>**

Enable or disable the frequency hopping.

Parameters:

<AllocPUSCHDoFH> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424

Manual operation: See ["Frequency Hopping"](#) on page 157

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PUSCh:TXSCHEME:TPMIIdx <TxTPMIIndex>**

For PUSCH DCI format 0_1, sets the TPMI index, required to select the precoding matrix.

Parameters:

<TxTPMIIndex> integer
 Range: 0 to 27
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["TPMI"](#) on page 159

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PDSCh:TXSCHEME:INTervp
 <UserAllocPdschV>**

If [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:
 PDSCh:VPINTer VP2 | VP4](#), enables interleaved VRB-to-PRB mapping.

Parameters:

<UserAllocPdschV> 0 | 1 | OFF | ON

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Example: `SOURce1:BB:NR5G:UBWP:USER0:CELL0:DL:BWP0:PDSCh:VPINter VP2`
`SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc1:PDSCh:TXSCHEME:INTERvp 1`

Manual operation: See ["Interleaved VRB-to-PRB"](#) on page 160

[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUSCh:TXSCHEME:SRI <AllocPuschSri>

Selects the SRS resource to be used.

Parameters:

<AllocPuschSri> integer
 The max value depends on the number of SRS resources, as set with the command `[ :SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:NRESources`.
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["SRS Resource Indicator"](#) on page 160

[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:MODE <PtrsMode>

Sets if the PTRS configuration is defined, manually (with the `...PDSCH:PTRS:...` commands) or automatically (from the current PDSCH DMRS settings).

Parameters:

<PtrsMode> MANual | AUTO
 *RST: MANual

Manual operation: See ["Mode"](#) on page 168

[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:PTDMrs <PtrsDmrsAssocia>

Sets the PTRS-DMRS association.

Parameters:

<PtrsDmrsAssocia> integer
 Range: 0 to 3
 *RST: 0

Example: `SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:PUSCh:PTRS:PTDMrs 0`

Manual operation: See ["PTRS-DMRS Association"](#) on page 168

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:STATe
  <PXschPtrsState>
```

Enables the transmission of phase-tracking reference signals.

Parameters:

```
<PXschPtrsState>  0 | 1 | OFF | ON
                  *RST:      0
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["State"](#) on page 168

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:TMDen
  <PtrsTimeDensity>
```

Sets the parameter time density.

Parameters:

```
<PtrsTimeDensity> TD1 | TD2 | TD4
                  *RST:      TD1
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Time Density \(L_PTRS\)"](#) on page 168

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh|PUSCh:PTRS:REOF <PtrsREOffset>
```

Sets the parameter resource element offset.

Parameters:

```
<PtrsREOffset>    RE00 | RE01 | RE10 | RE11
                  *RST:      RE00
```

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["RE-offset"](#) on page 169

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PDSCh:PTRS:FRQDen <PtrsFreqDensity>
```

Sets the parameter frequency density.

Parameters:

```
<PtrsFreqDensity> FD2 | FD4
                  *RST:      FD2
```


Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Frequency Density \(K_PTRS\)"](#) on page 168

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PDSCh:PTRS:EPRE <EpreRatio>
```

Sets the parameter EPRE ratio.

Parameters:

<EpreRatio> RAT0 | RAT1
*RST: RAT0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["EPRE Ratio"](#) on page 169

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh:PTRS:POWEr <PtrsPower>
```

Sets the parameter `ptrs-Power` and thus defines the PUSCH to PTRS power ratio per layer per resource element.

Parameters:

<PtrsPower> P00 | P01
*RST: P00

Example: SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:
 BWPart0:ALLOc0:PUSCh:PTRS:POWEr P00

Manual operation: See ["Power"](#) on page 169

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:PUSCh:PTRS:PORT <MaxNrofPorts>
```

Sets the maximum number of configured PTRS ports.

Parameters:

<MaxNrofPorts> P1 | P2
*RST: P1

Example: SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:
 BWPart0:ALLOc0:PUSCh:PTRS:PORT P1

Manual operation: See ["Max Number of Ports"](#) on page 169

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:MODE <PtrsTpMode>
```

Sets if the PTRSconfiguration is defined, manually (with the ... PUSCH:PTRS:TP:... commands) or automatically (from the current PUSCH DMRS settings).

Parameters:

<PtrsTpMode> MANual | AUTO
 *RST: MANual

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Mode"](#) on page 170

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:STATE <PtrsTPState>
```

Enables the transmission of phase-tracking reference signals.

Parameters:

<PtrsTPState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["State"](#) on page 170

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:TMDensity
  <PtrsTpTimeDens>
```

Sets the higher-layer parameter `timeDensity`.

Parameters:

<PtrsTpTimeDens> TD1 | TD2
 TD1
 $L_{PT-RS} = 1$
 TD2
 $L_{PT-RS} = 2$
 *RST: TD1

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Time Density \(\$L_{PT-RS}\$ \)"](#) on page 170

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:NGRPs <PtrsTpNumGroups>**

Sets the number of PTRS groups.

Parameters:

<PtrsTpNumGroups> G2 | G4 | G8

*RST: G2

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Number of PTRS Groups"](#) on page 171

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:SCID <TpPtrsScramId>**

Sets whether the PTRS Scrambling ID value used for the PTRS sequence generation is configured by the [NPusch ID](#) (higher layer) or by the cell ID.

Parameters:

<TpPtrsScramId> CID | PUID

CID

Sets the cell ID as the scrambling ID for PTRS sequence generation.

PUID

Sets the [NPusch ID](#) as the scrambling ID for PTRS sequence generation.

*RST: CID

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["PTRS Scrambling ID"](#) on page 171

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PUSCh:PTRS:TP:SPPG <PtrsTpSamplesPG>**

Sets the number of samples per PTRS group.

Parameters:

<PtrsTpSamplesPG> S4 | S2

*RST: S2

Example: See [Example "Configuring the PUSCH PTRS with enabled transform precoding"](#) on page 426.

Manual operation: See ["Samples Per PTRS Group"](#) on page 171

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:PDSCh|PUSCh:CCODing:IMCS
  <ChanCodingIMCS>
```

Sets the modulation and coding scheme index.

Parameters:

<ChanCodingIMCS> integer

Range:	0 to 28
*RST:	0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["I_MCS"](#) on page 164

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:PDSCh|PUSCh:CCODing:
  TCRate <TargetCodeRate>
```

Queries the target code rate for the selected modulation and coding scheme.

Parameters:

<TargetCodeRate> float

Range:	0.0 to 1.0
Increment:	0.001
*RST:	0.0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Target Code Rate"](#) on page 165

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:PDSCh|PUSCh:CCODing:
  TBSize?
```

Queries the resulting transport block size (TBS).

Return values:

<TransBlockSize> integer

Range:	0 to 3824
*RST:	0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Usage: Query only

Manual operation: See ["Transport Block Size"](#) on page 165

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>[:CW<s2us0>]:PDSCh|PUSCh:CCODing:
  RVIndex <RVIndex>
```

Sets the redundancy version index.

Parameters:

<RVIndex> integer
 Range: 1 to 2
 *RST: 0

Example: See [Example "Configuring the PDSCH incl. PTRS and Precoding settings"](#) on page 415.

Manual operation: See ["Redundancy Version Index"](#) on page 165

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI1:BITS <PuschUciCSI1Bit>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI2:BITS <PuschUciCSI2Bit>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:ACK:BITS <PuschUciAckBit>
```

Sets the number of ACK/CSI 1/CSI 2 bits.

Parameters:

<PuschUciAckBit> float
 Range: 0 to 128
 Increment: 1
 *RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["Number of ACK Bits"](#) on page 166

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI1:PATtern <CSI1Pattern>,
  <CSI1Bitcount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:CSI2:PATtern <CSI2Pattern>,
  <CSI2Bitcount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:ACK:PATtern <AckPattern>,
  <AckBitcount>
```

Sets the ACK/CSI 1/CSI 2 bits in pattern form.

Parameters:

<AckPattern> 128 bits
 Bit pattern
 *RST: #H0

<AckBitcount> integer

Pattern length, should be the same as the length set with the command `[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUSCh:UCI:ACK:BITS`.

Range: 0 to 128
*RST: 0

Example: See [Example "Configuring the PUSCH settings"](#) on page 424.

Manual operation: See ["ACK Pattern"](#) on page 166

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:
  IMAGinary <APMapDataImag>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:REAL
  <APMapDataReal>
```

Define the mapping of the antenna ports to the physical antennas.

Suffix:

<s2us0> 0 to 7
Defines the antenna port (i.e. the column in the antenna port mapping table)
Value range depends on the selected number of layers

<s3us0> 0 to 7
Available basebands (i.e. rows in the antenna port mapping table)
Depends on the number of basebands outputs currently mapped to a cell (see `[ :SOURce<hw>]:BB:NR5G:NODE:CARMapping:CELL[:ROW<ch0>]` on page 474)

Parameters:

<APMapDataReal> float

The REAL (Magnitude) and IMAGinary (Phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:
 $|\text{REAL} + j \cdot \text{IMAGinary}| \leq 1$
Otherwise, the values are normalized to Magnitude = 1.

Range: -1 to 1
Increment: 0.001
*RST: 0

Example: See [Example "Antenna port settings"](#) on page 418.

Manual operation: See ["Mapping Table"](#) on page 172

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:APMap:COL<s2us0>:ROW<s3us0>:
  MAGNitude <APMapDataMagn>
```

Defines the mapping of the antenna ports to the physical antennas, cylindrical mapping coordinates are used.

Parameters:

<APMapDataMagn> float
 Range: 0 to 1
 Increment: 0.001
 *RST: 0

Example: See [:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:
 SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLOc<user0>:
 APMap:COL<s2us0>:ROW<s3us0>:PHASe on page 571.

Manual operation: See "Mapping Table" on page 172

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLOc<user0>:APMap:COL<s2us0>:ROW<s3us0>:PHASe
  <APMapDataPhase>
```

Defines the mapping of the antenna ports to the physical antennas, if cylindrical mapping coordinates are used.

Parameters:

<APMapDataPhase> float
 Range: 0 to 360
 Increment: 0.1
 *RST: 0

Example: SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:
 BWPart0:ALLOc1:APMap:MAPCoordinates CYL
 SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:
 BWPart0:ALLOc1:APMap:COL0:ROW0:PHASe 0
 SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:
 BWPart0:ALLOc1:APMap:COL0:ROW0:MAGNitude 1

Manual operation: See "Mapping Table" on page 172

12.17 CORESET Commands

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLOc<user0>:CS:PREGran.....579
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLOc<user0>:CS:ID.....579
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:
  ALLOc<user0>:CS:DMRS:SCRam:STATe.....580
```

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SCRam:ID.....	580
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:RESalloc:STATE.....	580
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:RESalloc:BITMap.....	581
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:STATE.....	581
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:BUNSize.....	581
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:SHIDx.....	582
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:SIZE.....	582
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SPACe<s2us0>:AGGLevel?.....	582
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate.....	583
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:STATE.....	583
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:DATA.....	583
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:DLISt.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:PATtern.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR1.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR2.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR3.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR4.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR5.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR6.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR7.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR8.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR9.....	584
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR10.....	585
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SR11.....	585
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SSP.....	585

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:TCI.....	585
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:AULBwp.....	585
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:NDCI.....	586
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:USAGe.....	586
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:RNTI.....	587
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FMT.....	587
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SSP.....	588
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:AGGLevel.....	588
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CANDidate.....	588
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:INdEx.....	588
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CPDSch.....	589
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HBTS?.....	589
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRDRes.....	589
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TIDRes.....	590
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRHFlag.....	590
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS.....	590
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB2:MCS.....	590
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TBSCaling.....	591
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI.....	591
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB2:NDI.....	591
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB1:RV.....	591
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TB2:RV.....	591
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HAPRoc.....	592
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TPUSch.....	592
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CAINd.....	592

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:VTPRb.....	593
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DAI2.....	593
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DAI1.....	593
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SRSResind.....	593
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PREInfo.....	594
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ANTPorts.....	594
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SRSRequest.....	594
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CSIRequest.....	594
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PTDMrs.....	595
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BOINd.....	595
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DMSQinit.....	595
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:USINd.....	596
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TPUCch.....	596
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PUCResind.....	596
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PDSHarq.....	597
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SMINd.....	597
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:SIINd.....	597
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:RESVed.....	597
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BWINd.....	598
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PRBBundling.....	598
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:RMINd.....	598
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ZCRTrigg.....	599
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:TCI.....	599
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGTi.....	599
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGFi.....	599

CORESET Commands

[illegible]

CORESET Commands

[illegible]

CORESET Commands

[illegible]

CORESET Commands

[illegible]

<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA5</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA6</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA7</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA8</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA9</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA10</code>	606
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:STATE</code>	607
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DATA</code>	607
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DLISt</code>	607
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:BITLength</code>	607
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:INITpattern</code>	608
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PATTeRn</code>	608

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:PREGran <PrecoderGranula>`

Sets the value of the higher-layer parameter `precoderGranularity`, as defined in TS 38.211.

Parameters:

`<PrecoderGranula>` REG | ACRB

REG
REG bundle (`sameAsREG-bundle`)

ACRB
All contiguous RBs (`allContiguousRBs`)

*RST: REG

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Precoder Granularity"](#) on page 175

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:ID <ID>`

Sets the CORESET ID.

Parameters:

<ID> integer
 Range: 0 to 11
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["CORESET ID"](#) on page 175

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DMRS:SCRam:STATe <CSDmrsScramStat>**

If enabled, the DMRS ID is used to calculate the PUCCH scrambling sequence.

Parameters:

<CSDmrsScramStat> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Use DMRS Scrambling ID"](#) on page 175

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DMRS:SCRam:ID <DmrsScramId>**

Sets the DMRS scrambling ID.

Parameters:

<DmrsScramId> integer
 Range: 0 to 65535
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["ID"](#) on page 176

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:RESalloc:STATe <ResourceAlloc>**

If enabled, the CORESET frequency allocation is set as a bitmap, defined with the command [\[:SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:RESalloc:BITMap](#).

Parameters:

<ResourceAlloc> 0 | 1 | OFF | ON
 *RST: 0
 Default unit: OFF

Example: SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:
 BWPart0:ALLoc0:CS:RESalloc:STATe 1
 SOURce1:BB:NR5G:SCHed:CELL0:SUBF0:USER0:
 BWPart0:ALLoc0:CS:RESalloc:BITMap
 #H1FFFFFFFFFFFF, 45

Manual operation: See ["Use Bitmap for Resources in Frequency Domain"](#)
 on page 176

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:RESalloc:BITMap <ResAllocBitMap>,
 <BitCount>**

If [\[:SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:RESalloc:STATe 1](#), sets the CORESET allocation in the frequency domain.

Parameters:

<ResAllocBitMap> 45 bits
 *RST: #H0

<BitCount> integer
 Range: 45 to 45
 *RST: 45

Example: See [\[:SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:
 SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:
 CS:RESalloc:STATe](#) on page 580.

Manual operation: See ["Frequency Domain Resources"](#) on page 176

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:IL:STATe <CSIntlState>**

If enabled, the CCE-to-REG mapping is interleaved.

Parameters:

<CSIntlState> 0 | 1 | OFF | ON

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["Interleaving State"](#) on page 176

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:IL:BUNSize <BundleSize>**

Sets the bundle size L.

Parameters:

<BundleSize> BS2 | BS3 | BS6
 *RST: BS6

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Bundle Size"](#) on page 176

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:SHIDx <CSIntlShiftIdx>**

Sets the shift index n_{shift} .

Parameters:

<CSIntlShiftIdx> integer
Range: 0 to 274
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Shift Index"](#) on page 177

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:IL:SIZE <CSIntlSize>**

Sets the interleaver size R.

Parameters:

<CSIntlSize> IS2 | IS3 | IS6
*RST: IS2

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Size"](#) on page 177

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:AGGLLevel?**

Queries the possible aggregation levels.

Return values:

<AggrLevel> AL1 | AL2 | AL4 | AL8 | AL16
*RST: AL1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Usage: Query only

Manual operation: See ["Aggregation Level"](#) on page 178

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate
  <MaxCandidate>
```

Sets the maximum number of candidates allowed for the selected aggregation level.

Parameters:

<MaxCandidate> 1 | 2 | 3 | 4 | 5 | 6 | 8
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["Max Candidates"](#) on page 178

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCCes:STATe <DummyCceState>
```

Defines if unused CORESET resources (CCEs) are used for data transmission or not.

Parameters:

<DummyCceState> 0 | 1 | ALLowpdsch
 0
 Disables data transmission in the unused CCEs.
 1
 Fills unused CCEs with dummy data, as set with the command
 [\[:SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:](#)
 [SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:](#)
 [CS:DCCes:DATA.](#)
 ALLowpdsch
 Allows PDSCH transmission in the unused CCEs.
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["Unused CCEs"](#) on page 180

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCCes:DATA <DummyCceDataSrc>
```

Sets the data source for the dummy CCEs.

Parameters:

<DummyCceDataSrc>PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATtern |
 DLISt | ZERO | ONE
 *RST: PN9

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["Dummy CCEs Data Source"](#) on page 180

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCCes:DLISt <DummyCceDataLst>
```

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DummyCceDataLst> string

Filename incl. file extension or complete file path

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Dummy CCEs Data Source"](#) on page 180

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCCes:PATtern <Pattern>, <BitCount>
```

Sets a bit pattern as a data source.

Parameters:

<Pattern> 64 bits

*RST: #H0

<BitCount> integer

Range: 1 to 64

*RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Dummy CCEs Data Source"](#) on page 180

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR1 <DciSRSREQ1>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR2 <DciSRSREQ2>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR3 <DciSRSREQ3>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR4 <DciSRSREQ4>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR5 <DciSRSREQ5>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR6 <DciSRSREQ6>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR7 <DciSRSREQ7>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR8 <DciSRSREQ8>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR9 <DciSRSREQ9>
```

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR10 <DciSRSREQ10>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SR11 <DciSRSREQ11>
```

Sets the DCI 2_3 SRS request 1 value.

Parameters:

<DciSRSREQ11> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 2_3"](#) on page 195

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SSP <SearchSpace>
```

Sets the search space for the selected DCI.

Parameters:

<SearchSpace> USS | CSS0 | CSS1 | CSS2 | CSS3 | CSS0A
 *RST: USS

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Search Space"](#) on page 182

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:TCI <Nr5gCSTCInDCI>
```

Enables support of quasi co-location TCI field in DCI format 1_1.

Parameters:

<Nr5gCSTCInDCI> 0 | 1 | OFF | ON

Example: SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:TC 1
 SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLoc0:CS:DCI0:TCI 1

Manual operation: See ["TCI Present In DCI"](#) on page 181

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:AULBwp <ActiveULBwp>
```

Sets the index of the UL BWP used for the calculation of the DCI bit size.

Parameters:

<ActiveULBwp> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Active UL BWP"](#) on page 180

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:NDCI <NumDci>
```

Sets the number of DCIs.

Parameters:

<NumDci> integer
 Range: 1 to 4
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Number of DCIs"](#) on page 181

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:USAGe <Usage>
```

Sets the RNTI type used to scramble the CRC.

Parameters:

<Usage> C | CS | P | SI | RA | TC | SPCS | SFI | INT | TPUS | TPUC |
 TSRS | MCSC | CI | AI | PS

The RNTI type is defined as follows:

C

Cell

CS

Configured scheduling

P

Paging

SI

System information

RA

Random access

TC

Temporary cell

SPCS

Semi-persistent scheduling cell

SFI

Slot format indication

INT

Interruption

TPUS

Transmit power control-PUSCH

TPUC

Transmit power control-PUCCH

TSRS

Transmit power control-SRS

MCSC

Modulation coding scheme cell

CI

Cancellation indication

PS

Power saving

*RST: C

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Options: CI and PS require R&S SMW-K148

Manual operation: See ["Usage"](#) on page 181

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:RNTI <RNTI>**

Queries the current applicable RNTI of the associated user

Parameters:

<RNTI> integer

Range: 0 to 65535

*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["RNTI"](#) on page 181

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:FMT <AllocDciFmt>**

Sets the DCI format.

Parameters:

<AllocDciFmt> F00 | F01 | F10 | F11 | F20 | F21 | F22 | F23 | CUSTom | F24 |
F25 | F26

*RST: F00

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Options: F24 and F26 require R&S SMW-K148

Manual operation: See ["DCI Format"](#) on page 181

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SSP <SearchSpace>
```

Sets the search space for the selected DCI.

Parameters:

<SearchSpace> USS | CSS0 | CSS1 | CSS2 | CSS3 | CSS0A
 *RST: USS

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Search Space"](#) on page 182

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:AGGLLevel <DciAggLvl>
```

Sets the aggregation level for the selected DCI.

Parameters:

<DciAggLvl> AL1 | AL2 | AL4 | AL8 | AL16
 *RST: 4

Example: See [Example "Search space configuration"](#) on page 420.

Manual operation: See ["Aggregation Level"](#) on page 183

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CANDidate <Candidate>
```

Selects the candidate number for the selected aggregation level, where the maximum number of candidates per aggregation level are set with the command [:

[SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate.](#)

Parameters:

<Candidate> integer
 Range: 0 to 8
 *RST: 0

Example: See [Example "Search space configuration"](#) on page 420.

Manual operation: See ["Candidate"](#) on page 183

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:INDEX <DciCCEIdx>
```

If [:[SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate](#) 0, sets the index and thus the position of the first CCE of the PDCCH.

Parameters:

<DciCCEIdx> integer
 Range: 0 to 10
 *RST: 0

Example: See [Example "Search space configuration"](#) on page 420.

Manual operation: See ["CCE Index"](#) on page 183

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CPDSch <CreatePDSCH>**

Use this command to create the content and scheduling of the PDSCH automatically, as configured with the DCI format 1_0 parameters.

Parameters:

<CreatePDSCH> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Create PDSCH"](#) on page 184

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:HBTS?**

Queries the resulting bit data as selected with the DCI format parameters.

Return values:

<PatternHigh> 64 bits

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Usage: Query only

Manual operation: See ["Bit Data > Pattern"](#) on page 184

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:FRDRes <FreqDomResAssig>**

Sets the DCI field frequency domain resource assignment.

Parameters:

<FreqDomResAssig> integer
 Range: 0 to 262143
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TIDRes <TimeDomResAssig>**

Sets the DCI field time domain resource assignment.

Parameters:

<TimeDomResAssig> integer

Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:FRHFlag <FreqHopFlag>**

Sets the DCI field frequency hopping flag.

Parameters:

<FreqHopFlag> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB1:MCS <MCSTB1>
 [:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB2:MCS <MCSTB2>**

Sets the DCI field modulation and coding scheme per transport block (TB).

Parameters:

<MCSTB2> integer
 Range: 0 to 31
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TBSCaling <TBScaling>**

Sets the DCI field new data indicator per transport block (TB).

Parameters:

<TBScaling> integer
Range: 0 to 3
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 1_0"](#) on page 188

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB1:NDI <NDITB1>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB2:NDI <NDITB2>**

Sets the DCI field new data indicator per transport block (TB).

Parameters:

<NDITB2> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB1:RV <RVTB1>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TB2:RV <RVTB2>**

Sets the DCI field redundancy version per transport block (TB).

Parameters:

<RVTB2> integer
Range: 0 to 3
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:HAPRoc <HarqProc>
```

Sets the DCI field HARQ process number.

Parameters:

<HarqProc> integer
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TPUSch <TpcPusch>
```

Sets the DCI field TPC command for scheduling PUSCH.

Parameters:

<TpcPusch> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
      BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CAINd <CarrierInd>
```

Sets the carrier indicator value.

Parameters:

<CarrierInd> integer
 Range: 0 to 7
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:VTPRb <VrbToPrb>
```

Sets the DCI field VRB-to-PRB mapping.

Parameters:

<VrbToPrb> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DAI2 <DAI2>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DAI1 <DAI1>
```

Sets the DCI filed DL assignment index.

Parameters:

<DAI1> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SRSResind <SRSResInd>
```

Sets the SRS resource indicator value.

When multiple SRS resources are configured, an SRS resource indicator field in uplink DCI is used to indicate the selected SRS resource over whose antenna ports are used by the network to derive the precoding for uplink transmission.

Parameters:

<SRSResInd> integer
 Range: 0 to 255
 *RST: 0

Example: See: [Example "Configuring the CORESET settings"](#)
 on page 420

Manual operation: See ["DCI Format 0_1"](#) on page 186

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PRECinfo <PrecInfo>
```

Sets the precoding info and number of layers (TPMI) value.

Parameters:

<PrecInfo> integer
 Range: 0 to 63
 *RST: 0

Example: See: [Example "Configuring the CORESET settings"](#)
 on page 420

Manual operation: See ["DCI Format 0_1"](#) on page 186

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:ANTPorts <AntPorts>
```

Sets the DCI field antenna ports.

Parameters:

<AntPorts> integer
 Range: 0 to 31
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SRSRequest <SRSRequest>
```

Sets the DCI field SRS request.

Parameters:

<SRSRequest> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CSIRequest <CSIRequest>
```

Sets the DCI field CSI request.

Parameters:

<CSIRequest> integer
 Range: 0 to 63
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420

Manual operation: See ["DCI Format 0_1"](#) on page 186

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PTDMrs <PtrsDmrs>**

If [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
 PUSCh:MRANk#1](#), sets the DCI field PTRS-DMRS association.

Parameters:

<PtrsDmrs> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:BOINd <BetaOffsetInd>**

Sets the DCI field beta offset indicator.

Parameters:

<BetaOffsetInd> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420

Manual operation: See ["DCI Format 0_1"](#) on page 186

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DMSQinit <DmrsSeqInit>**

If [\[:SOURce<hw>\]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:
 PUSCh:TPSTate 0](#), sets the DCI field DMRS sequence initialization.

Parameters:

<DmrsSeqInit> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:USINd <UISullInd>**

If **[:SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYINfo:SUL:STATe 1**, sets the DCI field UL/SUL indicator.

Parameters:

<UISullInd> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_0"](#) on page 184
 See ["DCI Format 0_1"](#) on page 186

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TPUCch <TpcPucch>**

Sets the DCI field TPC command for scheduling PUCCH.

Parameters:

<TpcPucch> integer
Range: 0 to 3
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PUCResind <PucchResInd>**

Sets the DCI field PUCCH resource indicator.

Parameters:

<PucchResInd> integer
Range: 0 to 7
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PDSHarq <PdschToHarq>
```

Sets the DCI field PDSCH-to-HARQ feedback timing Indicator.

Parameters:

<PdschToHarq> integer
 Range: 0 to 7
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 1_1"](#) on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SMINd <ShortMsgInd>
```

Sets the DCI field short message indicator.

Parameters:

<ShortMsgInd> integer
 Range: 0 to 3
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 1_0"](#) on page 188

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SIINd <SiInd>
```

Sets the DCI field system information indicator.

Parameters:

<SiInd> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 1_0"](#) on page 188

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:RESVed <Pattern>,<br>
  <BitCount>
```

Sets the DCI padding and reserved bits.

Parameters:

<Pattern> 32 bits
 *RST: #H0

<BitCount> integer
 Range: 1 to 32
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.
 See [Example "DCI format 2_6"](#) on page 424.

Options: DCI formats 2_4 and 2_6 require R&S SMW-K148.

Manual operation: See ["DCI Format 1_0"](#) on page 188
 See ["DCI Format 2_0"](#) on page 193
 See ["DCI Format 2_4"](#) on page 195
 See ["DCI Format 2_6"](#) on page 196

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:BWInd <BWPInd>**

Sets the DCI field BWP indicator.

Parameters:

<BWPInd> integer
 Range: 0 to 3
 *RST: 0

Manual operation: See ["DCI Format 0_1"](#) on page 186
 See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PRBBundling <PRBBundling>**

Sets the DCI field PRB bundling size indicator.

Parameters:

<PRBBundling> 0 | 1 | OFF | ON
 *RST: 0

Manual operation: See ["DCI Format 1_1"](#) on page 190

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:RMInd <RMInd>**

Sets the DCI field rate matching indicator.

Parameters:

<RMInd> integer
 Range: 0 to 3
 *RST: 0

Manual operation: See "DCI Format 1_1" on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:ZCRTrigg <ZpCsiRsTrigg>
```

Sets the DCI field ZP CSI-RS trigger.

Parameters:

<ZpCsiRsTrigg> integer
 Range: 0 to 3
 *RST: 0

Manual operation: See "DCI Format 1_1" on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TCI <TCI>
```

Sets the DCI field transmission configuration indication.

Parameters:

<TCI> integer
 Values 1 to 7 are available if [:SOURce<hw>]:BB:NR5G:
 SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:TCI 1.
 Range: 0 to 7
 *RST: 0

Manual operation: See "DCI Format 1_1" on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CBGTi <CBGTi>
```

Sets the DCI field CBG transmission information (CBGTI).

Parameters:

<CBGTi> integer
 Range: 0 to 255
 *RST: 0

Manual operation: See "DCI Format 0_1" on page 186
 See "DCI Format 1_1" on page 190

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CBGFi <CBGFi>
```

Sets the DCI field CBG flushing out information (CBGFI).

Parameters:

<CBGFi> 0 | 1 | OFF | ON
 *RST: 0

Manual operation: See ["DCI Format 1_1"](#) on page 190

**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:MOFFs <MinApplOffsInd>**

Enables the minimum applicable scheduling offset indicator for the DCIs 0_1 and 1_1.

This 1-bit indicator is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 for the active UL BWP.

This 1-bit indicator influences the calculation of the PDSCH triggering offsets and A-CSI RS triggering offsets.

Parameters:

<MinApplOffsInd> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420

Options: R&S SMW-K148

Manual operation: See ["DCI Format 0_1"](#) on page 186
See ["DCI Format 1_1"](#) on page 190

**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI1 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI2 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI3 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI4 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI5 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI6 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI7 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI8 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI9 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI10 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI11 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI12 <UserAllocDciSFI>**
**[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI13 <UserAllocDciSFI>**

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI14 <UserAllocDciSFI>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI15 <UserAllocDciSFI>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:SI16 <UserAllocDciSFI>
```

Sets the DCI format 2_0 field slot format indicator.

Parameters:

<UserAllocDciSFI> integer
 Range: 0 to 255
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#)
 on page 420.

Manual operation: See ["DCI Format 2_0"](#) on page 193

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE1 <DciPEI1>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE2 <DciPEI2>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE3 <DciPEI3>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE4 <DciPEI4>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE5 <DciPEI5>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE6 <DciPEI6>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE7 <DciPEI7>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE8 <DciPEI8>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PE9 <DciPEI9>
```

Sets the DCI format 2_1 field pre-emption indication.

Parameters:

<DciPEI9> integer
 Range: 0 to 16383
 *RST: 0

Example: See [Example "DCI format 2_0, 2_1 and 2_2"](#) on page 423

Manual operation: See ["DCI Format 2_1"](#) on page 194

```

[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL1 <AllocDciCLI1>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL2 <AllocDciCLI2>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL3 <AllocDciCLI3>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL4 <AllocDciCLI4>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL5 <AllocDciCLI5>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL6 <AllocDciCLI6>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL7 <AllocDciCLI7>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL8 <AllocDciCLI8>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL9 <AllocDciCLI9>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL10 <AllocDciCLI10>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL11 <AllocDciCLI11>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL12 <AllocDciCLI12>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL13 <AllocDciCLI13>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL14 <AllocDciCLI14>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL15 <AllocDciCLI15>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL16 <AllocDciCLI16>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL17 <AllocDciCLI17>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL18 <AllocDciCLI18>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL19 <AllocDciCLI19>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL20 <AllocDciCLI20>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL21 <AllocDciCLI21>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CL22 <AllocDciCLI22>

```

Sets the DCI format 2_2 field closed loop indicator.

Parameters:

<AllocDciCLI22> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["DCI Format 2_2"](#) on page 194

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP1 <DciTPCCMD1>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP2 <DciTPCCMD2>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP3 <DciTPCCMD3>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP4 <DciTPCCMD4>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP5 <DciTPCCMD5>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP6 <DciTPCCMD6>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP7 <DciTPCCMD7>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP8 <DciTPCCMD8>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP9 <DciTPCCMD9>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP10 <DciTPCCMD10>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP11 <DciTPCCMD11>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP12 <DciTPCCMD12>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP13 <DciTPCCMD13>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP14 <DciTPCCMD14>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP15 <DciTPCCMD15>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP16 <DciTPCCMD16>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP17 <DciTPCCMD17>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP18 <DciTPCCMD18>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP19 <DciTPCCMD19>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP20 <DciTPCCMD20>
```

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP21 <DciTPCCMD21>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:TP22 <DciTPCCMD23>
```

Sets the DCI format 2_2 TPC command number.

Parameters:

```
<DciTPCCMD23>    integer
                  Range:    0 to 3
                  *RST:     0
```

Manual operation: See "[DCI Format 2_2](#)" on page 194

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI1 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI2 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI3 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI4 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI5 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI6 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI7 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI8 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI9 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI10 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI11 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI12 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI13 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI14 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI15 <Pattern>, <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
    BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:CI16 <Pattern>, <BitCount>
```

Sets the cancellation indication parameters for the DCI format 2_4.

Suffix:

CI 1 to 16
Specifies the cancellation indication to which the parameters are applied. For example, CI10 sets the configured parameters to the cancellation indication number 10.
The number of cancellation indications is set by [Number of Cancellation Indications](#).

Parameters:

<Pattern> 7 bits
Bit pattern for the cancellation indication.
*RST: #H0

<BitCount> integer
Range: 1 to 7
*RST: 1

Example: See [Example "DCI format 2_4"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["DCI Format 2_4"](#) on page 195

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI1 <DciDORMI1>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI2 <DciDORMI2>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI3 <DciDORMI3>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI4 <DciDORMI4>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI5 <DciDORMI5>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI6 <DciDORMI6>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI7 <DciDORMI7>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI8 <DciDORMI8>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI9 <DciDORMI9>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DI10 <DciDORMI10>
```

Sets the SCell dormancy indication to the bitmap pattern of the DCI format 2_6.

Suffix:

DI 1 to 10
Specifies SCell dormancy indication to which the parameter is applied. For example, DI10 applies the parameter to the SCell dormancy indication number 10.

Parameters:

<DciDORMI10> integer
 Range: 0 to 31
 *RST: 0

Example: See [Example "DCI format 2_6"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["DCI Format 2_6"](#) on page 196

```
[ :SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA1 <DciWAI1>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA2 <DciWAI2>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA3 <DciWAI2>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA4 <DciWAI4>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA5 <DciWAI5>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA6 <DciWAI6>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA7 <DciWAI6>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA8 <DciWAI8>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA9 <DciWAI9>
[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:WA10 <DciWAI10>
```

Enables/disables the wakeup indication bit for the DCI format 2_6.

Suffix:

WA 1 to 10
 Specifies the wakeup indication to which the parameter is applied. For example, WA10 applies the parameter to the wakeup indication number 10.

Parameters:

<DciWAI10> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "DCI format 2_6"](#) on page 424.

Options: R&S SMW-K148.

Manual operation: See ["DCI Format 2_6"](#) on page 196

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:STATe <ChanCodingState>
```

Enables channel coding for the DCI type custom.

Parameters:

<ChanCodingState> 0 | 1 | OFF | ON
*RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Channel Coding"](#) on page 197

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DATA <DataSource>
```

Sets the data source for the custom DCI.

Parameters:

<DataSource> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATtern |
DLIST | ZERO | ONE
*RST: PN9

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Data Source"](#) on page 197

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:DLIST <DataList>
```

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DataList> string
Filename incl. file extension or complete file path

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Data Source"](#) on page 197

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:BITLength <PatternLength>
```

If channel coding is enabled ([:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:STATe 1), sets the number of DCI bits in the custom DCI.

Parameters:

<PatternLength> integer
 Range: 12 to 128
 *RST: 84

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Pattern Length"](#) on page 198

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:INITpattern <DciPatternInit>**

Sets an initialization value for the second m-sequence in the PN sequence of the custom DCI.

Parameters:

<DciPatternInit> integer
 Range: 1 to #H7ffff
 *RST: 1

Example: See [Example "Custom DCI"](#) on page 423.

Manual operation: See ["Initialization"](#) on page 198

**[:SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:CS:DCI<s2us0>:PATtern <Pattern>,
 <BitCount>**

Sets the content of the custom DCI as a bit pattern.

Parameters:

<Pattern> 128 bits
 Corresponds to the value set with the command [:
[SOURce<hw>\]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:
 USER<dir0>:BWPart<gr0>:ALLoc<user0>:CS:
 DCI<s2us0>:BITLength.](#)
 *RST: #H0

<BitCount> integer
 Range: 1 to 128
 *RST: 1

Example: See [Example "Configuring the CORESET settings"](#) on page 420.

Manual operation: See ["Data Source"](#) on page 197

12.18 PUCCH Commands

<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:GRPHopping</code>	609
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:HOPId</code>	609
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:ISFHopping</code>	610
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:SHOPping</code>	610
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:FS:CYCShift</code>	610
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:FS:TDOcc</code>	611
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:FS:OCCindex</code>	611
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:FS:OCCLength</code>	611
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:SRCount</code>	611
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:BITS</code>	612
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:BITS</code>	612
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:PATtern</code>	612
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:PATtern</code>	612

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:GRPHopping <PucchGrpHopping>`

Sets the higher-layer parameter `pucch-GroupHopping`.

Parameters:

`<PucchGrpHopping>` N | ENA | DIS

N = neither

ENA = enable

DIS = disable

*RST: N

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Group Hopping"](#) on page 201

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:HOPId <PucchHoppingId>`

Sets the parameter hopping ID.

Parameters:

<PucchHoppingId> integer
 Range: 0 to 1024
 Increment: 0
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Hopping ID"](#) on page 201

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PUCCh:ISFHopping <PucchISFreqHop>**

Enables intra-slot frequency hopping.

Parameters:

<PucchISFreqHop> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Intra Slot Frequency Hopping"](#) on page 201

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PUCCh:SHOPping <SecongHoppingPR>**

Sets the physical resource block (PRB) of the second hop.

Parameters:

<SecongHoppingPR> float
 Range: 0 to 273
 Increment: 1
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Second Hop PRB"](#) on page 201

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
 BWPart<gr0>:ALLoc<user0>:PUCCh:FS:CYCShift <InitialCyclicSh>**

For PUCCH format F0 and F1, sets the initial cyclic shift.

Parameters:

<InitialCyclicSh> integer
 Range: 0 to 11
 *RST: 0

Example: SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:
 BWPart0:ALLoc1:FMT F1
 SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:
 BWPart0:ALLoc1:PUCCh:FS:CYCShift 1

Manual operation: See ["Initial Cyclic Shift"](#) on page 202

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLOc<user0>:PUCCh:FS:TDOCC <TimeDomainOccId>**

For PUCCH format F1, sets the time domain OCC index.

Parameters:

<TimeDomainOccId> integer

Range: 0 to 6

*RST: 0

Example:

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLOc1:FMT F1

SOURce1:BB:NR5G:SCHeD:CELL0:SUBF0:USER0:BWPart0:ALLOc1:PUCCh:FS:TDOCC 1

Manual operation: See ["Time Domain OCC Index"](#) on page 202

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLOc<user0>:PUCCh:FS:OCCindex <OCCindex>**

For PUCCH format F4, sets the OCC index.

Parameters:

<OCCindex> integer

Range: 0 to 6

*RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["OCC Index"](#) on page 202

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLOc<user0>:PUCCh:FS:OCCLength <PucchOCCLength>**

For PUCCH format F4, sets the OCC length.

Parameters:

<PucchOCCLength> L2 | L4

*RST: L2

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["OCC Length"](#) on page 202

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLOc<user0>:PUCCh:PL:SRCount <SrCount>**

Sets the number of positive scheduling requests (SR).

Parameters:

<SrCount> integer
 Range: 0 to 10
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Positive SR Count"](#) on page 203

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:BITS <PucchUciBits>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:BITS <ACKBitSize>
```

Sets the number of ACK/UCI bits.

Parameters:

<ACKBitSize> float
 Range: 0 to 128
 Increment: 1
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["Number of ACK Bits"](#) on page 203

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUCCh:PL:UCI:PATtern <PucchUciPattern>,
  <BitCount>
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:PATtern <AckPattern>,
  <Bitcount>
```

Sets the ACK/UCI bits in pattern form.

Parameters:

<AckPattern> 128 bits
 Bit pattern
 *RST: #H0

<Bitcount> integer
 Pattern length, should be the same as the length set with the
 command `[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PUCCh:PL:ACK:BITS`.
 Range: 1 to 128
 *RST: 0

Example: See [Example "Configuring the PUCCH settings"](#) on page 427.

Manual operation: See ["ACK Pattern"](#) on page 203

12.19 PRACH Commands

<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:SCSPacing</code>	613
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:BMAid</code>	613
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:FORMat</code>	614
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:RSET</code>	614
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:RSEquence</code>	614
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:ZCZone</code>	615
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:PRINdex</code>	615
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:RBNumber?</code>	615
<code>[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:TOFFset</code>	615

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:SCSPacing <PrachNumerology>`

Selects a combination of the subcarrier spacing (SCS) and the cyclic prefix (CP) for PRACH.

Parameters:

`<PrachNumerology>` N1_25 | N5 | N15 | N30 | N60 | N120
 *RST: N30

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["SC Spacing/CP"](#) on page 146

`[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:ALLoc<user0>:PRACH:BMAid <RefLevelIdentif>`

Sets the bandwidth of the given allocation as reference for the "Burst" power mode.

Parameters:

`<RefLevelIdentif>` 0 | 1 | OFF | ON

0|OFF

Disables the given allocation as burst reference for the "Burst" power mode.

1|ON

Sets the given allocation as burst reference for the "Burst" power mode.

*RST: 0

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Burst Mode Ref Alloc Identifier"](#) on page 206

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:FORMat <PrachFormat>**

Selects the PRACH format.

Parameters:

<PrachFormat> F0 | F1 | F2 | F3 | FA1 | FA2 | FA3 | FB1 | FB2 | FB3 | FB4 |
FC0 | FC2
*RST: FA1

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Format"](#) on page 205

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:RSET <RestrictedSet>**

Sets the higher-layer parameter `restrictedSetConfig` that defines the type of restricted sets (unrestricted, restricted type A, restricted type B).

Parameters:

<RestrictedSet> URES | ARES | BRES
URES = Unrestricted
ARES = Restricted Type A
BRES = Restricted Type B
*RST: URES

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Restricted Set"](#) on page 206

**[:SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:
BWPart<gr0>:ALLoc<user0>:PRACH:RSEquence <LogicalRootSeq>**

Sets the starting logical root sequence index.

Parameters:

<LogicalRootSeq> integer
Range: 0 to 837
*RST: 0

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Logical Root Sequence"](#) on page 206

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PRACH:ZCZone <ZeroCorrZone>
```

Sets the parameter `zeroCorrelationZoneConfig` according to [TS 38.211](#).

Parameters:

<ZeroCorrZone> integer
 Range: 0 to 15
 *RST: 0

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Zero Correlation Zone"](#) on page 206

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PRACH:PRIndex <PreambleIndex>
```

Sets the PRACH preamble index and thus defines which one of the 64 PRACH preambles is used.

Parameters:

<PreambleIndex> integer
 Range: 0 to 63
 *RST: 0

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Preamble Index"](#) on page 206

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PRACH:RBNumber?
```

Queries the number of resource blocks the PRACH allocation spans.

Return values:

<UserAllocRBNum> integer
 Range: 3 to 24
 *RST: 12

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Usage: Query only

Manual operation: See ["No. RB"](#) on page 148

```
[ :SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:
  BWPart<gr0>:ALLoc<user0>:PRACH:TOFFset <PrachTimeOffset>
```

Sets the timing offset base value for PRACH.

Parameters:

<PrachTimeOffset> float
 Range: -3E-4 to 3E-4
 Increment: 1E-8
 *RST: 0

Example: See [Example "Configuring the PRACH settings"](#) on page 428.

Manual operation: See ["Time Offset"](#) on page 206

12.20 Output Commands

[SOURce<hw>]:BB:NR5G:OUTPut:SEQLen.....	617
[SOURce<hw>]:BB:NR5G:OUTPut:SSOC:STATe.....	617
[SOURce<hw>]:BB:NR5G:OUTPut:FMODe.....	617
[SOURce<hw>]:BB:NR5G:FMODe:USRFile.....	617
[SOURce<hw>]:BB:NR5G:OUTPut:SAMRmode.....	618
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:SRATe?.....	618
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:CONFLict.....	618
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:CONFLict?.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:PBRate.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:VARiation.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:CLEVel.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:CMODe.....	620
[SOURce<hw>]:BB:NR5G:TDWind:STATe.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTime.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTSamples?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:BBConf:ROW<ch0>:AVRL?.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:MODE.....	621
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:RSBW.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S120K:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S15K:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S240K:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S30K:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S60K:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:BWRef:ACRL?.....	622
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ALGorithm.....	623
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ITERations.....	623
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:OCFactor?.....	623

[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:RCFactor?	624
[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:STATe	624
[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:TCRFactor	624

`[:SOURce<hw>]:BB:NR5G:OUTPut:SEQLen <SeqLen>`

Sets the sequence length of the signal in number of frames.

Parameters:

`<SeqLen>` integer
 Range: 1 to depends on settings
 *RST: 1
 If real-time feedback is enabled, max = 50 frames.

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Sequence Length"](#) on page 221

`[:SOURce<hw>]:BB:NR5G:OUTPut:SSOC:STATe <SupSCOnOPCtr>`

If enabled, the subcarriers that use the same frequency as the center frequency of the baseband output are not transmitted.

Parameters:

`<SupSCOnOPCtr>` 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Suppress Subcarrier on Output Center"](#) on page 221

`[:SOURce<hw>]:BB:NR5G:OUTPut:FMODE <FilterBWP>`

Defines if and how the filter is applied, on the whole channel bandwidth or on the individual BWPs separately.

Parameters:

`<FilterBWP>` CBW | BWP | OFF | FAST | 2 | 1 | 0 | USER
 OFF = "Off"
 CBW | 0 = "Channel BW"
 BWP | 1 = "Per BWP"
 FAST | 2 = "Fast"
 USER = "User"
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Filter Mode"](#) on page 221

`[:SOURce<hw>]:BB:NR5G:FMODE:USRFile <FilterFileName>`

Loads the file from the default or the specified directory.

Loaded are files with extension *.vaf or *.dat.

Parameters:

<FilterFileName> string
Complete file path incl. filename and extension

Example:

```
SOURce:BB:NR5G:OUTPut:FMODE USER
SOURce:BB:NR5G:FMODE:USRFile "/var/user/my_filter.dat"
```

Manual operation: See ["Load User Filter"](#) on page 222

[:SOURce<hw>]:BB:NR5G:OUTPut:SAMRmode <SampRateMode>

Sets the sample rate mode.

Parameters:

<SampRateMode> MIN | FFT
*RST: FFT

Manual operation: See ["Sample Rate Mode"](#) on page 223

[:SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:SRATe?

Queries the resulting sample rate.

Suffix:

<ch0> 0 to 7

Return values:

<SampleRate> integer
Among others, value range depends on the selected deployment scenario and channel bandwidth.
Range: 4E6 to 5E8
*RST: 4E6

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Manual operation: See ["Sample Rate"](#) on page 223

[:SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:CONFLICT <Conflict>

Queries if there are conflicts caused by mismatch between the nominal sample rate, playback rate and sample rate in the given row.

Parameters:

<Conflict> 0 | 1 | OFF | ON
*RST: 0

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Conflict"](#) on page 224

[:SOURce<hw>]:BB:NR5G:OUTPut:BBConf:CONFLICT?

Queries if there are existing output conflicts caused by mismatch between the nominal sample rate, playback rate and sample rate in any of the outputs of the baseband block.

Return values:

<AnyOutpConflict> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Manual operation: See ["Conflict"](#) on page 224

[:SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:PBRate <PlaybackRate>

For [\[:SOURce<hw>\]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:VARiation 1](#), sets the playback speed.

Parameters:

<PlaybackRate> integer
 Per default, the playback rate is the same as the calculated sample rate but the value range also depends on the installed options.
 Range: 0 to 24e8
 *RST: same as the calculated sample rate

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Playback Rate"](#) on page 224

**[:SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:VARiation
 <SRateVariation>**

Activates sample rate variation.

Parameters:

<SRateVariation> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Sample Rate Variation"](#) on page 224

[:SOURce<hw>]:BB:NR5G:OUTPut:CLeVel <ClippingLevel>

Sets the limit for level clipping.

Parameters:

<ClippingLevel> integer
 Range: 1 to 100
 *RST: 100

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Clipping Level"](#) on page 223

[[:SOURce<hw>]:BB:NR5G:OUTPut:CMODE <ClippingMode>

Sets the method for level clipping.

Parameters:

<ClippingMode> VECTor | SCALar
 *RST: VECTor

Example: See [Example "Output settings"](#) on page 429.

Manual operation: See ["Clipping Mode"](#) on page 223

[[:SOURce<hw>]:BB:NR5G:TDWind:STATE <TDWindow>

Enables time domain windowing.

Parameters:

<TDWindow> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Time domain windowing"](#) on page 428.

Manual operation: See ["Time Domain Windowing \(WOLA\)"](#) on page 225

[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTime <TransitionTime>
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTime <TransitionTime>
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTime <TransitionTime>
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTime <TransitionTime>
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTime <TransitionTime>
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTime <TransitionTime>

Sets the transition time when time domain windowing is active.

The next to last block in the command syntax indicates the used SCS and CP combination.

- DL: SE<SCS>K, where E indicates the extended CP or for normal CP, the designation is omitted

Parameters:

<TransitionTime> float
 Range: 0 to 1E-5
 Increment: 1E-7
 *RST: 5E-6

Example: See [Example "Time domain windowing"](#) on page 428.

Manual operation: See ["Transition Time"](#) on page 225

```
[[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTSamples?
[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTSamples?
[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTSamples?
[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTSamples?
[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTSamples?
[:SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTSamples?
```

Queries the number of transition samples.

The next to last block in the command syntax indicates the used SCS and CP combination.

- DL: SE<SCS>K, where E indicates the extended CP or for normal CP, the designation is omitted

Return values:

```
<TransitionSampl> integer
Range: 0 to 1000
*RST: 0
```

Example: See [Example "Time domain windowing"](#) on page 428.

Usage: Query only

Manual operation: See ["Transition BB A Samples"](#) on page 226

```
[[:SOURce<hw>]:BB:NR5G:OUTPut:POWEr:BBConf:ROW<ch0>:AVRL?
```

Queries the available basebands with their average power.

Return values:

```
<PowPerBBRelLvl> float
Range: -80 to 10
Increment: 0.001
*RST: 0
```

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Manual operation: See ["Average Power"](#) on page 231

```
[[:SOURce<hw>]:BB:NR5G:OUTPut:POWEr:MODE <PowerMode>
```

Sets how the first output is leveled.

Parameters:

```
<PowerMode> AVG | ACTvsf | PSDConst
```

AVG

Average RMS power

ACTvsf

Average power in the active subframes

PSDConst

The absolute power of a particular allocation is set by multiplying the configured power spectral density (PSD) with the bandwidth of the particular allocation.

Burst

The "Burst" mode is a special case of the "Constant PSD" mode in the sense that it computes automatically a reference bandwidth based on the chosen allocation.

*RST: AVG

Example:

```
SOURce1:BB:NR5G:OUTPut:POWer:MODE PSDConst
SOURce1:BB:NR5G:OUTPut:POWer:RSBW 1000000
```

Manual operation: See ["Power Mode"](#) on page 227

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:RSBW <RefSystemBW>

Sets the reference bandwidth used by the leveling of the output signal at the first output.

Parameters:

<RefSystemBW> float
 Range: 15E3 to 400E6
 Increment: 1
 *RST: 1E6

Example: See [\[:SOURce<hw>\]:BB:NR5G:OUTPut:POWer:MODE](#) on page 621.

Manual operation: See ["Reference System Bandwidth"](#) on page 231

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:S120K:ACRL?

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:S15K:ACRL?

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:S240K:ACRL?

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:S30K:ACRL?

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:S60K:ACRL?

[:SOURce<hw>]:BB:NR5G:OUTPut:POWer:BWRef:ACRL?

Queries the bandwidths/numerologies with their power levels.

Return values:

<ActPowRelLvIPBW> float
 Range: -80 to 10
 Increment: 0.001
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Manual operation: See ["Active Power"](#) on page 232

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ALGorithm <CFRAAlgorithm>

Queries the algorithm used for the crest factor reduction. The "Clipping and filtering" algorithm performs a hard clipping. It is followed by a lowpass filtering of the result in an iterative manner until the target crest factor is reached. You can define the settings of the filter that is used for the calculation.

Parameters:

<CFRAAlgorithm> CLF
 *RST: CLF

Example: See [Example "Output settings"](#) on page 429.

Options: R&S SMW-K548

Manual operation: See ["Algorithm"](#) on page 233

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ITERations <MaxIteration>

Sets the number of iterations that are used for calculating the resulting crest factor. The iteration process is stopped when the desired crest factor is achieved by 0.1 dB.

Parameters:

<MaxIteration> integer
 Range: 0 to 20
 *RST: 5

Example: See [Example "Output settings"](#) on page 429.

Options: R&S SMW-K548

Manual operation: See ["Max Iterations"](#) on page 233

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:OCFactor?

Queries the original crest factor of the waveform after the calculation of the resulting crest factor is completed.

The original crest factor is calculated as an average over the whole waveform, including any idle periods that might be present in TDD waveforms.

Return values:

<OriginalCFR> integer
 Range: 0 to 100
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Options: R&S SMW-K548

Manual operation: See ["Original Crest Factor"](#) on page 233

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:RCFactor?

Queries the resulting crest factor of the waveform after the calculations are completed. The resulting crest factor is calculated as an average over the whole waveform, including any idle periods that might be present in TDD waveforms.

Return values:

<ResultingCFR> integer
 Range: 0 to 100
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Usage: Query only

Options: R&S SMW-K548

Manual operation: See ["Resulting Crest Factor"](#) on page 233

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:STATe <CrestFactorStat>

Enables the crest factor reduction calculation.

Parameters:

<CrestFactorStat> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Output settings"](#) on page 429.

Options: R&S SMW-K548

Manual operation: See ["State"](#) on page 233

[[:SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:TCRFactor <TargetCRF>

Sets the desired crest factor value.

Parameters:

<TargetCRF> float
 Range: 0 to 30
 Increment: 0.1
 *RST: 10

Example: See [Example "Output settings"](#) on page 429.

Options: R&S SMW-K548

Manual operation: See ["Target Crest Factor"](#) on page 233

12.21 Trigger Commands

<code>[SOURce<hw>]:BB:NR5G[:TRIGger]:SEquence</code>	625
<code>[SOURce<hw>]:BB:NR5G:TRIGger:SOURce</code>	625
<code>[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:SYNChronize:OUTPut</code>	626
<code>[SOURce<hw>]:BB:NR5G:TRIGger:DElay:UNIT</code>	626
<code>[SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:DElay</code>	626
<code>[SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:INHibit</code>	627
<code>[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:RDElay?</code>	627
<code>[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:TDElay</code>	627
<code>[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:DElay</code>	628
<code>[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:INHibit</code>	628
<code>[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:RDElay?</code>	628
<code>[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:TDElay</code>	628
<code>[SOURce<hw>]:BB:NR5G:TRIGger:ARM:EXECute</code>	629
<code>[SOURce<hw>]:BB:NR5G:TRIGger:EXECute</code>	629
<code>[SOURce<hw>]:BB:NR5G:TRIGger:RMODE?</code>	629
<code>[SOURce<hw>]:BB:NR5G:TRIGger:SLENgth</code>	630
<code>[SOURce<hw>]:BB:NR5G:TRIGger:SLUNit</code>	630

`[SOURce<hw>]:BB:NR5G[:TRIGger]:SEquence <TrigMode>`

Sets the trigger mode.

Parameters:

`<TrigMode>` AUTO | RETRigger | AAUTo | ARETrigger | SINGLE
 *RST: AUTO

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["Trigger Mode"](#) on page 209

`[SOURce<hw>]:BB:NR5G:TRIGger:SOURce <TrigSource>`

Selects the trigger signal source and determines the way the triggering is executed.
 Provided are:

- Internal triggering by a command (INTernal)
- External trigger signal via one of the local or global connectors
 - EGT1 | EGT2: External global trigger
 - EGC1 | EGC2: External global clock
 - ELTRigger: External local trigger
 - ELCLock: External local clock
- Internal triggering by a signal from the other basebands (INTA | INTB)
- In master-slave mode, the external baseband synchronization signal (BBSY)
- OBASeband | BEXternal | EXternal: Setting only
 Provided only for backward compatibility with other Rohde & Schwarz signal generators.

The R&S SMW accepts these values and maps them automatically as follows:
 EXternal = EGT1, BEXternal = EGT2, OBASeband = INTA or INTB
 (depending on the current baseband)

Parameters:

<TrigSource> INTB|INTernal|OBASeband|EGT1|EGT2|EGC1|EGC2|ELTRig-
 ger|INTA|ELCLock|BEXternal|EXternal | BBSY
 *RST: Internal

Example: See [Example "Configure and enable triggering"](#) on page 430.

Options: ELTRigger|ELCLock require R&S SMW-B10
 BBSY require R&S SMW-B9

Manual operation: See ["Trigger Source"](#) on page 211

[:SOURce<hw>]:BB:NR5G:TRIGger:EXternal:SYNChronize:OUTPut
 <TrigSyncOutSta>

Enables signal output synchronous to the trigger event.

Parameters:

<TrigSyncOutSta> 0 | 1 | OFF | ON
 *RST: 1

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["Sync. Output to External Trigger/Sync. Output to Trigger"](#) on page 211

[:SOURce<hw>]:BB:NR5G:TRIGger:DELay:UNIT <TrigDelUnit>

Sets the units the trigger delay is expressed in.

Parameters:

<TrigDelUnit> SAMPlE | TIME
 *RST: SAMPlE

Example: See [Example "Specifying delay and inhibit values in time units"](#) on page 430.

Manual operation: See ["\(External\) Delay Unit"](#) on page 212

[:SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:DELay <TrigExtDelay>

Sets the trigger delay.

Parameters:

<TrigExtDelay> float
 Range: 0 to 2147483647
 Increment: 0.01
 *RST: 0

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["\(Specified\) External Delay/\(Specified\) Trigger Delay"](#) on page 213

[:SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:INHibit <TrigExtInhibit>

Specifies the duration by which a restart is inhibited.

Parameters:

<TrigExtInhibit> integer
 Range: 0 to dynamic
 *RST: 0

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["External / Trigger Inhibit"](#) on page 212

[:SOURce<hw>]:BB:NR5G:TRIGger:EXternal:RDElay?

Queries the time (in seconds) an external trigger event is delayed for.

Return values:

<ResExtDelaySec> float
 Range: 0 to 688
 Increment: 250E-12
 *RST: 0

Example: See [Example "Specifying delay and inhibit values in time units"](#) on page 430.

Usage: Query only

Manual operation: See ["Actual Trigger Delay/Actual External Delay"](#) on page 213

[:SOURce<hw>]:BB:NR5G:TRIGger:EXternal:TDElay <TrigExtTimeDel>

Specifies the trigger delay for external triggering. The value affects all external trigger signals.

Parameters:

<TrigExtTimeDel> float
 Range: 0 to 688
 Increment: 250E-12
 *RST: 0

Example: See [Example "Specifying delay and inhibit values in time units"](#) on page 430.

Manual operation: See ["\(Specified\) External Delay/\(Specified\) Trigger Delay"](#) on page 213

[[:SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:DELay <TrigIntOthDelay>

Sets the trigger delay for triggering by the trigger signal from the other path.

Parameters:

<TrigIntOthDelay> float
 Range: 0 to 2147483647
 Increment: 0.01
 *RST: 0

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["\(Specified\) External Delay/\(Specified\) Trigger Delay"](#) on page 213

[[:SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:INHibit <IntOthInhibit>

For triggering via the other path, specifies the duration by which a restart is inhibited.

Parameters:

<IntOthInhibit> integer
 Range: 0 to 67108863
 *RST: 0

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["External / Trigger Inhibit"](#) on page 212

[[:SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:RDELay?

Queries the time a trigger event from the other path is delayed.

Return values:

<IntOthRDelaySec> float
 Range: 0 to 688
 Increment: 250E-12
 *RST: 0

Example: See [Example "Specifying delay and inhibit values in time units"](#) on page 430.

Usage: Query only

Manual operation: See ["Actual Trigger Delay/Actual External Delay"](#) on page 213

[[:SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:TDELay <IntOthDelaySec>

Specifies the trigger delay for triggering by the signal from the other path.

Parameters:

<IntOthDelaySec> float
 Range: 0 to 688
 Increment: 250E-12
 *RST: 0
 Default unit: s

Example: See [Example "Specifying delay and inhibit values in time units"](#) on page 430.

Manual operation: See ["\(Specified\) External Delay/\(Specified\) Trigger Delay"](#) on page 213

[:SOURce<hw>]:BB:NR5G:TRIGger:ARM:EXECute

Stops signal generation; a subsequent trigger event restarts signal generation.

Example:

```
SOURce1:BB:NR5G:TRIGger:SOURce INT
SOURce1:BB:NR5G:TRIGger:SEQuence ARETrigger
SOURce1:BB:NR5G:TRIGger:EXEcute
// executes a trigger, signal generation starts
SOURce1:BB:NR5G:TRIGger:ARM:EXECute
// signal generation stops
SOURce1:BB:NR5G:TRIGger:EXEcute
// executes a trigger, signal generation starts again
```

Usage: Event

Manual operation: See ["Arm"](#) on page 210

[:SOURce<hw>]:BB:NR5G:TRIGger:EXECute

Executes a trigger.

Example: See [Example "Configure and enable triggering"](#) on page 430.

Usage: Event

Manual operation: See ["Execute Trigger"](#) on page 210

[:SOURce<hw>]:BB:NR5G:TRIGger:RMODE?

Queries the signal generation status.

Return values:

<TrigRunMode> STOP | RUN
 *RST: STOP

Example: SOURce1:BB:NR5G:TRIGger:RMODE?

Usage: Query only

Manual operation: See ["Running/Stopped"](#) on page 210

[[:SOURce<hw>]:BB:NR5G:TRIGger:SLENgth <TrigSeqLen>

Defines the length of the signal sequence that is output in the `SINGLE` trigger mode.

Parameters:

<TrigSeqLen> integer
 Range: 1 to dynamic
 *RST: 1

Example: See [Example "Configure and enable triggering"](#) on page 430.

Manual operation: See ["Trigger Signal Duration"](#) on page 210

[[:SOURce<hw>]:BB:NR5G:TRIGger:SLUNit <TrigSeqLenUnit>

Defines the unit for the entry of the signal sequence length.

Parameters:

<TrigSeqLenUnit> SEQuence | SAMPlE
 *RST: SEQuence

Example: SOURce1:BB:NR5G:TRIGger:SEQuence SING
 SOURce1:BB:NR5G:TRIGger:SLUNit SEQ
 SOURce1:BB:NR5G:TRIGger:SLENgth 2

Manual operation: See ["Signal Duration Unit"](#) on page 210

12.22 Marker Commands

[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:MODE.....	631
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DELaY.....	631
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:PERiod.....	631
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ROFFset.....	631
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:FOFFset.....	631
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ONTime.....	632
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:OFFTime.....	632
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DUPLexing.....	632
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ECPState.....	632
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NDLSlots.....	633
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NSSLots?.....	633
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NULSlots.....	633
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SCSPacing.....	634
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SLENgth.....	634
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NDLSymbols?.....	634
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NGSYmbols?.....	634
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NULSymbols?.....	635
[[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:SLFMt.....	635

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:MODE <MarkMode>

Defines the signal for the selected marker output.

Parameters:

<MarkMode> SUBFram | FRAM | REStart | PERiod | RATio | SFNRestart |
ULDL
*RST: FRAM

Example: See [Example "Configure and enable standard marker signals"](#) on page 431.

Manual operation: See ["Marker Mode"](#) on page 214

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DELay <MarkDelay>

Defines the delay between the signal on the marker outputs and the start of the signals.

Parameters:

<MarkDelay> float
Range: 0 to 16777215
Increment: 1E-3
*RST: 0

Example: See [Example "Configure and enable standard marker signals"](#) on page 431.

Manual operation: See ["Marker x Delay"](#) on page 216

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:PERiod <MarkUsrPer>

Sets the period of the user-defined period marker.

Parameters:

<MarkUsrPer> integer
Range: 1 to 4294967295
*RST: 2

Example: See [Example "Configure and enable standard marker signals"](#) on page 431.

Manual operation: See ["Marker Mode"](#) on page 214

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ROFFset <MarkRiseOffs>

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:FOFFset <MarkFallOffs>

Sets the rise/fall offset.

Parameters:

<MarkFallOffs> integer
Range: -640000 to 640000
*RST: 0

Example: See [Example "Configure and enable standard marker signals"](#) on page 431.

Manual operation: See ["Rise/Fall Offset"](#) on page 215

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ONTime <MarkTimeOn>
[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:OFFTime <MarkTimeOff>

Sets the number of samples during which the marker output is on or off.

*) If R&S SMW-B9 is installed, the minimum marker duration depends on the sample/symbol rate.

See chapter "Basics on ..." in the R&S SMW user manual.

Parameters:

<MarkTimeOff> integer
 Range: 1 to 16777215
 *RST: 1

Example: See [Example "Configure and enable standard marker signals"](#) on page 431.

Manual operation: See ["Marker Mode"](#) on page 214

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DUPLexing <Duplexing>

Defines the duplexing mode for a UL/DL pattern containing a marker.

Parameters:

<Duplexing> TDD | FDD
TDD
 Sets TDD (time division duplex) as the duplexing mode.
FDD
 Sets FDD (frequency division duplex) as the duplexing mode.
 *RST: FDD

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Duplexing"](#) on page 217

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ECPState <ScsECPState>

Enables/disables the extended cyclic prefix (ECP) for a UL/DL pattern containing a marker.

Parameters:

<ScsECPState> 0 | 1 | OFF | ON
0|OFF
 Disables the ECP.

1|ON

Enables the ECP.

*RST: 0

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Use Extended Cyclic Prefix"](#) on page 217

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NDLSlots <NumDISlots>

Sets the number of DL slots in a UL/DL pattern containing a marker.

Parameters:

<NumDISlots> integer
 Range: 0 to 10
 *RST: 10

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Number of DL Slots"](#) on page 217

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NSSLots?

Queries the number of special slots in a UL/DL pattern containing a marker.

Return values:

<NumSpecialSlots> integer
 Range: 0 to 1
 *RST: 0

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Usage: Query only

Manual operation: See ["Number of Special Slots"](#) on page 218

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NULSlots <NumUISlots>

Sets the number of UL slots in a UL/DL pattern containing a marker.

Parameters:

<NumUISlots> integer
 Range: 0 to 10
 *RST: 0

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Number of UL Slots"](#) on page 218

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SCSPacing <Scs>

Defines the subcarrier spacing (SCS) value for a UL/DL pattern containing a marker.

The available values depend on the set [Deployment](#) value.

Parameters:

<Scs> SCS15 | SCS30 | SCS60 | SCS120 | SCS240
*RST: SCS30

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Subcarrier Spacing"](#) on page 217

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SLENGth <SlotLength>

Sets the duration of a UL/DL pattern containing a marker.

Parameters:

<SlotLength> S5 | S10
S5
Sets the duration of the UL/DL pattern to 5 slots.
S10
Sets the duration of the UL/DL pattern to 10 slots.
*RST: S10

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Slot Period"](#) on page 217

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NDLSymbols?

Queries the number of DL symbols in the special slot of a UL/DL pattern containing a marker.

Return values:

<SpecSlotDLSym> integer
Range: 0 to 14
*RST: n.a. (no preset. default: 14)

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Usage: Query only

Manual operation: See ["Number of DL Symbols"](#) on page 218

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NGSYmbols?

Queries the number of guarded symbols in the special slot of a UL/DL pattern containing a marker.

Return values:

<GuardedSymbols> integer
 Range: 0 to 14
 *RST: n.a. (no preset. default: 0)

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Usage: Query only

Manual operation: See ["Number of Guarded Symbols"](#) on page 218

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NULSymbols?

Queries the number of UL symbols in the special slot of a UL/DL pattern containing a marker.

Return values:

<ULSymbols> integer
 Range: 0 to 14
 *RST: n.a. (no preset. default: 0)

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Usage: Query only

Manual operation: See ["Number of UL Symbols"](#) on page 218

[:SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:SLFMT <SpecSlotFmtIdx>

Sets the special slot format index of the special slot included in a UL/DL pattern containing a marker according to [TS 38.213](#).

Parameters:

<SpecSlotFmtIdx> integer
 Range: 0 to 45
 *RST: 0

Example: See [Example "Configure and enable an UL/DL marker"](#) on page 431.

Manual operation: See ["Slot Format Index"](#) on page 218

12.23 Clock Commands

[\[:SOURce<hw>\]:BB:NR5G:CLOCK:SOURce.....](#)636
[\[:SOURce<hw>\]:BB:NR5G:CLOCK:MODE.....](#)636

[:SOURce<hw>]:BB:NR5G:CLOCK:SOURce <ClockSour>

Selects the clock source:

- **INTernal**: Internal clock reference
- **ELCLock**: External local clock
- **EXTernal** = **ELCLock**: Setting only
Provided for backward compatibility with other Rohde & Schwarz signal generators

Parameters:

<ClockSour> INTernal|ELCLock|EXTernal
*RST: INTernal

Example: See [Example "Clock settings"](#) on page 431.

Options: ELCLock requires R&S SMW-B10

Manual operation: See ["Clock Source"](#) on page 219

[:SOURce<hw>]:BB:NR5G:CLOCK:MODE <ClockMode>

Sets the type of externally supplied clock.

Parameters:

<ClockMode> SAMPlE
*RST: SAMPlE

Example: See [Example "Clock settings"](#) on page 431.

Manual operation: See ["Clock Mode"](#) on page 220

12.24 Real-time Feedback

Option: see ["Required options"](#) on page 389.

Example: Real-time feedback configuration (serial 3x8 mode)

```
SCONfiguration:MODE STAN
SCONfiguration:OUTPut:MODE ALL
SCONfiguration:APPLy

SOURce1:BB:NR5G:LINK UP

SOURce1:BB:NR5G:HFB:MODE S3x8
SOURce1:BB:NR5G:HFB:HPNMode 1
SOURce1:INPut:TM3:DIRection INPut
SOURce1:INPut:TM3:SIGNAL FEEDback
SOURce1:BB:NR5G:HFB:CONNector LOCal
SOURce1:BB:NR5G:HFB:ADUDelay 0
SOURce1:BB:NR5G:HFB:BBSelector 0
SOURce1:BB:NR5G:HFB:SERate R1M6
```



```

SOURce1:BB:NR5G:HFB:TAMode 1
SOURce1:BB:NR5G:HFB:PDElay -2
SOURce1:BB:NR5G:HFB:LOGPath "/var/user/"
SOURce1:BB:NR5G:HFB:LOGState 1

```

[:SOURce<hw>]:BB:NR5G:HFB:LOGPath	637
[:SOURce<hw>]:BB:NR5G:HFB:LOGState	637
[:SOURce<hw>]:BB:NR5G:HFB:HPNMode	638
[:SOURce<hw>]:BB:NR5G:HFB:MODE	638
[:SOURce<hw>]:BB:NR5G:HFB:CONNector	638
[:SOURce<hw>]:BB:NR5G:HFB:DElay	638
[:SOURce<hw>]:BB:NR5G:HFB:BASEband	639
[:SOURce<hw>]:BB:NR5G:HFB:SRATe	639
[:SOURce<hw>]:BB:NR5G:HFB:TAMode	639
[:SOURce<hw>]:BB:NR5G:HFB:PDElay	640

`[:SOURce<hw>]:BB:NR5G:HFB:LOGPath <LogGenOutPath>`

Defines the output folder on the device for the log files.

Parameters:

`<LogGenOutPath>` string

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636

Manual operation: See ["Output Path"](#) on page 400

`[:SOURce<hw>]:BB:NR5G:HFB:LOGState <LogGenState>`

Enables the R&S SMW to create and store debug reports, i.e. log files with detailed information on the real-time feedback.

The instrument generates two types of reports:

- Transmission report
 - This file contains information about what is *sent* (e.g. redundancy versions) during the first 100 slots after triggering.
 - File is created after the 100 slots are sent.
- Reception report
 - This file contains information about the first 100 *received* serial commands.
 - File is created after 100 commands are successfully received.

Use these debug files for troubleshooting of complex real-time feedback tests.

Parameters:

`<LogGenState>` 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636

Manual operation: See ["Logging State"](#) on page 400

[SOURce<hw>]:BB:NR5G:HFB:HPNMode <HpnMode>

Enables or disables the HARQ process number (HPN) mode.

When the "HPN Mode" is set to active, the additional user delay is set to -1.00 Slots and made unchangeable. An additional "HARQ Process Number" parameter is accessible in the PUSCH settings ([Chapter 12.16, "PDSCH/PUSCH Commands"](#), on page 551).

Parameters:

<HpnMode> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636

Manual operation: See ["HPN Mode"](#) on page 399

[SOURce<hw>]:BB:NR5G:HFB:MODE <FbMode>

Enables real-time feedback and determines the mode of the feedback line.

Parameters:

<FbMode> OFF | SERial | S3X8
 *RST: OFF

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Manual operation: See ["Closed Loop Feedback Mode"](#) on page 397

[SOURce<hw>]:BB:NR5G:HFB:CONNECTor <FbConnector>

Sets the feedback line connector.

Parameters:

<FbConnector> LOCal | GLOBal
LOCal
 T/M 3 connector
GLOBal
 (reserved for future use)
 USER 6 connector
 *RST: LOCal

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Manual operation: See ["Connector"](#) on page 398

[SOURce<hw>]:BB:NR5G:HFB:DELay <FbUserDelay>

Sets the point in time when the feedback can be sent to the instrument.

Parameters:

<FbUserDelay> float
 Range: -20 to -1.0
 Increment: 0.01
 *RST: -2.0

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Manual operation: See ["Feedback Delay"](#) on page 399

[:SOURce<hw>]:BB:NR5G:HFB:BASEband <FbBaseband>

In serial mode, required for multiplexing serial commands for different basebands to one feedback line.

See also [Example "Configuring the "Baseband Selector" for the 2 Tx antenna ports test cases"](#) on page 399.

Parameters:

<FbBaseband> integer
 Range: 0 to 3
 *RST: 0 (for Baseband A); 1 (for Baseband B)

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Manual operation: See ["Baseband Selector"](#) on page 398

[:SOURce<hw>]:BB:NR5G:HFB:SRATe <FbSerialRate>

Sets the bit rate of the serial transmission.

For test cases with high subcarrier spacing (SCS) and short slot duration, a serial rate of 115.2 kbps is insufficient. We recommend that you use higher serial rate so that at least one feedback command per slot is received.

Parameters:

<FbSerialRate> R1M6 | R115 | R1M9
 *RST: R1M9

Example: See [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Manual operation: See ["Serial Rate"](#) on page 398

[:SOURce<hw>]:BB:NR5G:HFB:TAMode <TaMode>

Enables timing advance (TA) adjustment for the selected feedback mode.

The TA adjustment uses the [Processing Delay](#) to define a new timing advance value for advancing or delaying the UL transmission.

Parameters:

<TaMode> 0 | 1 | OFF | ON
 *RST: 0

Example:

See: [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Options:

R&S SMW-K144/-K145/-K148.

Manual operation:

See ["TA State"](#) on page 399

[:SOURce<hw>]:BB:NR5G:HFB:PDELay <ProcessingDelay>

Sets a delay to the slot to which the timing adjustment command (T_A) is applied.

For example, if "Processing Delay" is set to -2.00 and the T_A is received in slot number 6, after processing, the T_A is transmitted in slot number 8.

If [TA State](#) > "Off", the value set for [Feedback Delay](#) is used for "Processing Delay".

Parameters:

<ProcessingDelay> float
 Range: -20 to -1
 Increment: 0.01
 *RST: -2

Example:

See: [Example "Real-time feedback configuration \(serial 3x8 mode\)"](#) on page 636.

Options:

R&S SMW-K144/-K145/-K148.

Manual operation:

See ["Processing Delay"](#) on page 400

12.25 Logging Commands

Option: R&S SMW-K81

Example: Activating logfile generation

To start logfile generation with the default settings:

```
SOURce1:BB:NR5G:PRESet
SOURce1:BB:NR5G:STAtE 1
SOURce1:BB:NR5G:LOGGen:OUTPut "/var/user/"
SOURce1:BB:NR5G:LOGGen:STAtE 1
```

[\[:SOURce<hw>\]:BB:NR5G:LOGGen:STAtE.....](#) 640
[\[:SOURce<hw>\]:BB:NR5G:LOGGen:OUTPut.....](#) 641

[:SOURce<hw>]:BB:NR5G:LOGGen:STAtE <LogGenState>

Activates the logfile generation.

Parameters:

<LogGenState> 0 | 1 | OFF | ON
 *RST: 0

Example: See [Example "Activating logfile generation"](#) on page 640.

Manual operation: See ["Logging State"](#) on page 403

[:SOURce<hw>]:BB:NR5G:LOGGen:OUTPut <LogGenOutPath>

Sets the directory the files are saved in.

Parameters:

<LogGenOutPath> string

Example: See [Example "Activating logfile generation"](#) on page 640.

Manual operation: See ["Output Path"](#) on page 403

12.26 Test Case Wizard Remote-Control Commands

The signal generator gives you the opportunity to use predefined settings which enable base station tests in line with the 3GPP standard. In particular, it allows you to execute 5G test cases described in the specifications [TS 38.141-1](#) and [TS 38.141-2](#). The settings take effect only after execution of command [\[:SOURce<hw>\]:BB:NR5G:TCW:APPLy](#).

[:SOURce<hw>]:BB:NR5G:TCW:APPLy	642
[:SOURce<hw>]:BB:NR5G:TCW:ANT:RXAntennas	643
[:SOURce<hw>]:BB:NR5G:TCW:ANT:TXAntennas	643
[:SOURce<hw>]:BB:NR5G:TCW:AWGN:PLEVel?	643
[:SOURce<hw>]:BB:NR5G:TCW:BEWPhi	643
[:SOURce<hw>]:BB:NR5G:TCW:BEWThet	644
[:SOURce<hw>]:BB:NR5G:TCW:BSCLass	644
[:SOURce<hw>]:BB:NR5G:TCW:BSType	644
[:SOURce<hw>]:BB:NR5G:TCW:DCLDirection	644
[:SOURce<hw>]:BB:NR5G:TCW:IS:DISTance	645
[:SOURce<hw>]:BB:NR5G:TCW:E50	645
[:SOURce<hw>]:BB:NR5G:TCW:FR	645
[:SOURce<hw>]:BB:NR5G:TCW:FA:FRALlocation	646
[:SOURce<hw>]:BB:NR5G:TCW:IS:BAND	646
[:SOURce<hw>]:BB:NR5G:TCW:IS:CHBW?	646
[:SOURce<hw>]:BB:NR5G:TCW:IS:CLID	646
[:SOURce<hw>]:BB:NR5G:TCW:IS:DUPLex	647
[:SOURce<hw>]:BB:NR5G:TCW:IS:FRSHift	647
[:SOURce<hw>]:BB:NR5G:TCW:IS:IS2:IFTYpe	647
[:SOURce<hw>]:BB:NR5G:TCW:IS:IFTYpe	647
[:SOURce<hw>]:BB:NR5G:TCW:IS:NRBLock?	648
[:SOURce<hw>]:BB:NR5G:TCW:IS:OFN	648
[:SOURce<hw>]:BB:NR5G:TCW:IS2:PLEVel?	648

Test Case Wizard Remote-Control Commands

[SOURce<hw>]:BB:NR5G:TCW:IS:PLEVel?	648
[SOURce<hw>]:BB:NR5G:TCW:IS:RBCFrequency?	648
[SOURce<hw>]:BB:NR5G:TCW:IS2:RFFFrequency?	649
[SOURce<hw>]:BB:NR5G:TCW:IS:RFFFrequency	649
[SOURce<hw>]:BB:NR5G:TCW:IS:RBOffset	649
[SOURce<hw>]:BB:NR5G:TCW:IS:SCSPacing?	649
[SOURce<hw>]:BB:NR5G:TCW:IS:TMODeI?	649
[SOURce<hw>]:BB:NR5G:TCW:IS:TREQuire	650
[SOURce<hw>]:BB:NR5G:TCW:IS:UEID	650
[SOURce<hw>]:BB:NR5G:TCW:MARKerconfig	650
[SOURce<hw>]:BB:NR5G:TCW:MEIS	650
[SOURce<hw>]:BB:NR5G:TCW:RELease	651
[SOURce<hw>]:BB:NR5G:TCW:SPEC	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:AUSDeIay	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:BBSeIector	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:CONNeIector	652
[SOURce<hw>]:BB:NR5G:TCW:RTF:MODe	652
[SOURce<hw>]:BB:NR5G:TCW:RTF:SERRate	652
[SOURce<hw>]:BB:NR5G:TCW:TC	653
[SOURce<hw>]:BB:NR5G:TCW:TRIGgerconfig	656
[SOURce<hw>]:BB:NR5G:TCW:WS:ADMRs:STATe	656
[SOURce<hw>]:BB:NR5G:TCW:WS:CBW	656
[SOURce<hw>]:BB:NR5G:TCW:WS:CELLId	656
[SOURce<hw>]:BB:NR5G:TCW:WS:DUPLeX	657
[SOURce<hw>]:BB:NR5G:TCW:WS:FMTHroughput?	657
[SOURce<hw>]:BB:NR5G:TCW:WS:FRC:TYPE	657
[SOURce<hw>]:BB:NR5G:TCW:WS:FROffset	658
[SOURce<hw>]:BB:NR5G:TCW:WS:MAPType	659
[SOURce<hw>]:BB:NR5G:TCW:WS:MODe	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PLEVel	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:FORMat	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:SCSPacing	660
[SOURce<hw>]:BB:NR5G:TCW:WS:PROCondition	660
[SOURce<hw>]:BB:NR5G:TCW:WS:PTRS:STATe	660
[SOURce<hw>]:BB:NR5G:TCW:WS:RBOffset	660
[SOURce<hw>]:BB:NR5G:TCW:WS:RFFFrequency	661
[SOURce<hw>]:BB:NR5G:TCW:WS:SCSPacing	661
[SOURce<hw>]:BB:NR5G:TCW:WS:SYMNumber	661
[SOURce<hw>]:BB:NR5G:TCW:WS:TAPos	662
[SOURce<hw>]:BB:NR5G:TCW:WS:TIOBase?	662
[SOURce<hw>]:BB:NR5G:TCW:WS:TSETup	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:BITS	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI1:PATTeRn	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI2:PATTeRn	663
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSIPart	663
[SOURce<hw>]:BB:NR5G:TCW:WS:UEID	663

[SOURce<hw>]:BB:NR5G:TCW:APPLY

Activates the current settings of the test case wizard.

Note: The settings of the selected test case become active only after executing this command.

Usage: Event

Manual operation: See ["Apply,OK"](#) on page 249

[:SOURce<hw>]:BB:NR5G:TCW:ANT:RXAntennas <RXAntennas>

Shows or sets the number of Rx antennas used for test case.

Parameters:

<RXAntennas> ANT1 | ANT2 | ANT4 | ANT8
*RST: ANT2

Manual operation: See ["Rx Antennas"](#) on page 254

[:SOURce<hw>]:BB:NR5G:TCW:ANT:TXAntennas <TXAntennas>

Shows or sets the number of Tx antennas used for test case.

Parameters:

<TXAntennas> ANT1 | ANT2
*RST: ANT1

Manual operation: See ["Tx Antennas"](#) on page 254

[:SOURce<hw>]:BB:NR5G:TCW:AWGN:PLEVel?

Queries the AWGN power level.

Return values:

<AwgnPowLev> string
Default unit: dBm

Usage: Query only

Manual operation: See ["Power Level"](#) on page 266

[:SOURce<hw>]:BB:NR5G:TCW:BEWPhi <BeWPhiRefsens>

Sets the angle of the beamwidth for to the OTA REFSENS RoAoA in the φ -axis ($\text{BeW}_{\theta,\text{REFSENS}}$), applicable for FR1 only.

Parameters:

<BeWPhiRefsens> float
Range: 0.1 to 360
Increment: 0.1
*RST: 300

Manual operation: See ["BeW\(\$\varphi\$ REFSENS\)"](#) on page 252

[:SOURce<hw>]:BB:NR5G:TCW:BEWThet <BeWThetRefsens>

Sets the angle of the beamwidth for to the OTA REFSSENS RoAoA in the θ -axis ($BeW_{\theta, REFSSENS}$), applicable for FR1 only.

Parameters:

<BeWThetRefsens> float
 Range: 0.1 to 360
 Increment: 0.1
 *RST: 300

Manual operation: See "[BeW\(\$\theta\$ REFSSENS\)](#)" on page 251

[:SOURce<hw>]:BB:NR5G:TCW:BSClass <BSClass>

Sets the NR base station class.

Parameters:

<BSClass> WIDE | MED | LOC
 *RST: WIDE

Example:

```
SOURce1:BB:NR5G:TCW:TC TS381411_TC741
SOURce1:BB:NR5G:TCW:BSClass LOC
SOURce1:BB:NR5G:TCW:WS:PLEVel?
Response: "-87.8 dBm"
```

Manual operation: See "[Base Station Class](#)" on page 250

[:SOURce<hw>]:BB:NR5G:TCW:BSType <BsType>

Sets the base station type for the OTA settings as specified in [TS 38.141-2 D.5](#).

Parameters:

<BsType> BT1H | BT1O | BT2O
BT1
 Sets the BS type 1-H (FR1, hybrid) for the OTA settings.
BT1O
 Sets the BS type 1-O (FR1) for the OTA settings.
BT2O
 Sets the BS type 2-O (FR2) for the OTA settings.
 *RST: BT1O

Manual operation: See "[Base Station Type](#)" on page 251

[:SOURce<hw>]:BB:NR5G:TCW:DCLDirection <DeclaredDir>

Sets the reference for the OSDD.

Parameters:

<DeclaredDir> OTHD | MREFD | OREFD

OTHD

Sets a value different than the minSENS and REFSSENS as the reference for the OSDD.

MREFD

Sets the OTA minimum sensitivity (minSENS) value as the reference for the OSDD.

OREFD

Sets the OTA reference sensitivity (REFSENS) value as the reference for the OSDD.

*RST: MREFD

Manual operation: See ["Declared Direction"](#) on page 251

[[:SOURce<hw>]:BB:NR5G:TCW:IS:DISTance <Distance>

Sets the distance between the test object and test antenna injecting the interferer signal.

Parameters:

<Distance> integer
 Range: 1 to 300
 *RST: 100

Manual operation: See ["Distance"](#) on page 264

[[:SOURce<hw>]:BB:NR5G:TCW:E50 <EIS50M>

Sets the $EIS_{REFSENS\_50M}$ level value applicable in the OTA REFSSENS RoAoA as specified in [TS 38.141-2 D.28](#).

The $EIS_{REFSENS\_50M}$ value is the declared OTA reference sensitivity basis level for FR2 based on a reference measurement channel with 50MHz BS channel bandwidth.

Parameters:

<EIS50M> float
 Range: -119 to -86
 Increment: 0.1
 *RST: -101

Manual operation: See ["EIS 50M"](#) on page 251

[[:SOURce<hw>]:BB:NR5G:TCW:FR <FreqRange>

Sets the frequency range FR2 for the BS type 2-O.

To reach the frequency range FR2, connect an external RF device to your instrument, e.g. an R&S SGS100A.

Parameters:

<FreqRange> FR2LT334 | FR2GT37

FR2LT334

Sets the FR2 range to 24.24 GHz < f ≤ 33.4 GHz

FR2GT37

Sets the FR2 range to 37 GHz < f ≤ 52.6 GHz

*RST: FR2LT334

Manual operation: See ["Frequency Range"](#) on page 252**[[:SOURce<hw>]:BB:NR5G:TCW:FA:FRAllocation <FreqAlloc>**

Sets the frequency allocation to FR1 or FR2.

Parameters:

<FreqAlloc> LOW | HIGH

*RST: HIGH

Manual operation: See ["Frequency Allocation of the Interfering signal"](#) on page 259**[[:SOURce<hw>]:BB:NR5G:TCW:IS:BAND <Band>**

Set the frequency band (n1 to n86) for the interfering signal.

Parameters:<Band> N1 | N2 | N3 | N5 | N7 | N8 | N12 | N20 | N25 | N28 | N34 | N38 |
N39 | N40 | N41 | N50 | N51 | N66 | N70 | N71 | N74 | N75 |
N76 | N77 | N78 | N79 | N80 | N81 | N82 | N83 | N84 | N86

*RST: N1

Manual operation: See ["Band"](#) on page 261**[[:SOURce<hw>]:BB:NR5G:TCW:IS:CHBW?**

Queries the channel bandwidth of the interfering signal.

Return values:<ISCHBW> BW5 | BW10 | BW15 | BW20 | BW25 | BW40 | BW50 | BW60 |
BW100 | BW80 | BW400 | BW200 | BW30 | BW70 | BW90

*RST: BW5

Usage: Query only**Manual operation:** See ["Channel Bandwidth"](#) on page 263**[[:SOURce<hw>]:BB:NR5G:TCW:IS:CLID <ISCellId>**

Sets the cell ID of the interfering signal.

Parameters:

<ISCellId> integer

Range: 0 to 1007

*RST: 0

Manual operation: See ["Cell ID"](#) on page 263

[[:SOURce<hw>]:BB:NR5G:TCW:IS:DUPLex <ISDuplexing>

The duplexing mechanism used for the interfering signal can be switched between FDD and TDD.

Parameters:

<ISDuplexing> FDD | TDD
*RST: FDD

Manual operation: See ["Duplexing"](#) on page 261

[[:SOURce<hw>]:BB:NR5G:TCW:IS:FRSHift <ISFreqShift>

Sets the parameter "Frequency Shift m" for the interfering signal. With this setting, the allocated RB can be offset to a different center frequency.

Parameters:

<ISFreqShift> FS0 | FS1 | FS2 | FS3 | FS4 | FS9 | FS14 | FS19 | FS24 | FS29 | FS54 | FS79 | FS99
*RST: FS0

Manual operation: See ["Frequency Shift m"](#) on page 264

[[:SOURce<hw>]:BB:NR5G:TCW:IS2:IFTYpe <InterfererType2>

Selects the type of the interfering signal. The second interfering signal is always a CW signal.

Parameters:

<InterfererType2> CW
*RST: CW

Manual operation: See ["Interferer Type"](#) on page 261

[[:SOURce<hw>]:BB:NR5G:TCW:IS:IFTYpe <InterfererType1>

Selects the type of the interfering signal:

- For **out-of-band blocking** tests, the interfering signal is fixed, set to a CW signal (CW).
- For **receiver intermodulation** tests, the first interfering signal can be an 5G NR signal (NR) or narrow-band 5G NR signal (NNR).

Parameters:

<InterfererType1> NR | NNR | CW
*RST: NR

Manual operation: See ["Interferer Type"](#) on page 261

[:SOURce<hw>]:BB:NR5G:TCW:IS:NRBLock?

Queries the No. of resource blocks of the interfering signal.

Return values:

<ISNumRB>	integer
Range:	0 to 100
*RST:	25

Usage: Query only

Manual operation: See ["Number of Resource Blocks"](#) on page 263

[:SOURce<hw>]:BB:NR5G:TCW:IS:OFN <OffsetFactorN>

Set the offset factor for the interfering signal.

Parameters:

<OffsetFactorN>	OFN_1 OFN_2 OFN_3
*RST:	OFN_1

Manual operation: See ["n"](#) on page 261

[:SOURce<hw>]:BB:NR5G:TCW:IS2:PLEVel?**[:SOURce<hw>]:BB:NR5G:TCW:IS:PLEVel?**

Queries the power level of the interfering signal.

Return values:

<ISPowLevel>	float
Range:	-145 to 20
Increment:	0.1
*RST:	-52
Default unit:	dBm

Usage: Query only

Manual operation: See ["Power Level"](#) on page 264

[:SOURce<hw>]:BB:NR5G:TCW:IS:RBCFrequency?

Queries the center frequency of the interfering signal.

Return values:

<ISRbCenterFreq>	integer
Range:	100e+03 to 6e+09
*RST:	1.95e+09
Default unit:	Hz

Usage: Query only

Manual operation: See ["Interfering RB Center Frequency"](#) on page 264

[[:SOURce<hw>]:BB:NR5G:TCW:IS2:RFFrequency?**[[:SOURce<hw>]:BB:NR5G:TCW:IS:RFFrequency <ISRFFreq>**

Queries the center frequency of the interfering signal 1 and 2.

Parameters:

<ISRFFreq> integer
 Range: 100e+03 to 6e+09
 *RST: 1.9575075e+09
 Default unit: Hz

Manual operation: See ["RF Frequency"](#) on page 262

[[:SOURce<hw>]:BB:NR5G:TCW:IS:RBOffset <ISRBOffset>

Sets the RB offset of the interfering signal.

Parameters:

<ISRBOffset> integer
 Range: 0 to 273
 *RST: 0

Manual operation: See ["RB Offset"](#) on page 263

[[:SOURce<hw>]:BB:NR5G:TCW:IS:SCSPacing?

Queries the sub-carrier spacing for the interfering signal.

Return values:

<ISSCS> N15 | N30 | N60 | X60 | N120 | N240
 N15, N30, N60, N120, N240
 Normal cyclic prefix, value in kHz
 E60
 Extended cyclic prefix, 60 kHz
 *RST: N15

Usage: Query only**Manual operation:** See ["Sub Carrier Spacing"](#) on page 263

[[:SOURce<hw>]:BB:NR5G:TCW:IS:TModel?

Shows the test model set for the test case. The NR-TMs for FR1 are defined in TS 38.141-1 section 4.9.2.

Return values:

<TestModel> TM1_1
 *RST: TM1_1

Usage: Query only**Manual operation:** See ["Test Model"](#) on page 261

[SOURce<hw>]:BB:NR5G:TCW:IS:TREquire <ISTestRequire>

Selects whether the standard out-of-band blocking requirements test is performed (BLPE) or the optional blocking scenario, when the BS is co-located with another BS in a different operating band (COBS).

Parameters:

<ISTestRequire> BLPE | COBS
 *RST: BLPE

Manual operation: See ["Test Requirement "](#) on page 262

[SOURce<hw>]:BB:NR5G:TCW:IS:UEID <ISUEID>

Sets the UE ID/n_RNTI for the interfering signal.

Parameters:

<ISUEID> integer
 Range: 0 to 65535
 *RST: 0

Manual operation: See ["UE ID"](#) on page 263

[SOURce<hw>]:BB:NR5G:TCW:MARKerconfig <MarkerConfig>

Selects the marker configuration. The marker can be used to synchronize the measuring equipment to the signal generator.

Parameters:

<MarkerConfig> FRAM | UNCH
 FRAM
 The marker settings are customized for the selected test case. "Radio Frame Start" markers are output; the marker delays are set equal to zero.
 UNCH
 The current marker settings of the signal generator are retained unchanged.
 *RST: FRAM

Manual operation: See ["Marker Configuration"](#) on page 253

[SOURce<hw>]:BB:NR5G:TCW:MEIS <MinimumEIS>

Sets the lowest equivalent isotropic sensitivity value ($EIS_{minSENS}$) for the OSDD as specified in [TS 38.141-2 D.27](#).

Parameters:

<MinimumEIS> float
 Range: -145 to -10
 Increment: 0.1
 *RST: -101

Manual operation: See "[Minimum EIS](#)" on page 251

[[:SOURce<hw>]:BB:NR5G:TCW:RELease <Release>

Sets the 3GPP test specification used as a guideline for the test cases.

Parameters:

<Release> REL15
 *RST: REL15

Manual operation: See "[Release](#)" on page 250

[[:SOURce<hw>]:BB:NR5G:TCW:SPEC <TestSpec>

Specifies the 3GPP test specification.

Parameters:

<TestSpec> TS381411
 *RST: TS38141_1

Manual operation: See "[Test Specification](#)" on page 249

[[:SOURce<hw>]:BB:NR5G:TCW:RTF:AUSDeLay <AddUserDelay>

Defines the delay added to the real-time feedback.

Parameters:

<AddUserDelay> float
 Range: -20 to -1
 Increment: 0.01
 *RST: -2

Manual operation: See "[Additional User Delay](#)" on page 265

[[:SOURce<hw>]:BB:NR5G:TCW:RTF:BBSeLector <BBSelector>

Defines which baseband selector index is used in the serial messages to address the baseband.

Parameters:

<BBSelector> integer
 Range: 0 to 3
 *RST: 0

Manual operation: See "[Baseband Selector](#)" on page 265

[[:SOURce<hw>]:BB:NR5G:TCW:RTF:CONNector <Connector>

Sets the connector used for the real-time feedback.

Parameters:

<Connector> LOCal | GLOBal
*RST: LOCal

Manual operation: See "[Connector](#)" on page 265

[[:SOURce<hw>]:BB:NR5G:TCW:RTF:MODE <RTFMode>

Defines the serial line mode used for the real-time feedback.

- Serial
Sets the serial line to 16 bits width.
- Serial 3x8
Sets the serial line to an array with 3 times 8 bits width (24 bits).

Parameters:

<RTFMode> SERial | S3X8
*RST: SERial

Manual operation: See "[Realtime Feedback Mode](#)" on page 265

[[:SOURce<hw>]:BB:NR5G:TCW:RTF:SERRate <SerialRate>

Sets the data rate of serial connection used.

Parameters:

<SerialRate> R1M6 | R115 | R1M9
*RST: R1M9

Manual operation: See "[Serial Rate](#)" on page 265

[:SOURce<hw>]:BB:NR5G:TCW:TC <TestCase>

Selects the test case.

Parameters:

<TestCase>

TS381411_TC72 | TS381411_TC73 | TS381411_TC741 |
 TS381411_TC742A | TS381411_TC742B | TS381411_TC75 |
 TS381411_TC77 | TS381411_TC78 | TS381411_TC821 |
 TS381411_TC822 | TS381411_TC823 | TS381411_TC831 |
 TS381411_TC8321 | TS381411_TC8322 | TS381411_TC8331 |
 TS381411_TC8332 | TS381411_TC834 | TS381411_TC835 |
 TS381411_TC8361A | TS381411_TC8361B |
 TS381411_TC841 | TS381411_TC67 | TS381412_TC72 |
 TS381412_TC73 | TS381412_TC74 | TS381412_TC751 |
 TS381412_TC752A | TS381412_TC752B | TS381412_TC76 |
 TS381412_TC78 | TS381412_TC79 | TS381412_TC821 |
 TS381412_TC822 | TS381412_TC823 | TS381412_TC831 |
 TS381412_TC8321 | TS381412_TC8322 | TS381412_TC8331 |
 TS381412_TC8332 | TS381412_TC834 | TS381412_TC835 |
 TS381412_TC8361A | TS381412_TC8361B |
 TS381412_TC841 | TS381412_TC68

The first part of the parameter indicates the specification and the second part the chapter in which the test case is defined. For example, TS381411_TC72 defines the test case specified in [TS 38.141-1](#) chapter 7.2.

TS381411_TC72

[TS 38.141-1](#) chapter 7.2 Reference Sensitivity Level

TS381411_TC73

[TS 38.141-1](#) chapter 7.3 Dynamic Range

TS381411_TC741

[TS 38.141-1](#) chapter 7.4.1 Adjacent Channel Selectivity (ACS)

TS381411_TC742A|

[TS 38.141-1](#) chapter 7.4.2A In-band General Blocking

TS381411_TC742B

[TS 38.141-1](#) chapter 7.4.2B In-band Narrowband Blocking

TS381411_TC75

[TS 38.141-1](#) chapter 7.5 Out-of-band Blocking

TS381411_TC77

[TS 38.141-1](#) chapter 7.7 Receiver Intermodulation

TS381411_TC78

[TS 38.141-1](#) chapter 7.8 In-channel Selectivity

TS381411_TC821

[TS 38.141-1](#) chapter 8.2.1 PUSCH transform precoding disabled

TS381411_TC822

[TS 38.141-1](#) chapter 8.2.2 PUSCH transform precoding enabled

TS381411_TC823

[TS 38.141-1](#) chapter 8.2.3 UCI multiplexed on PUSCH

TS381411_TC831

TS 38.141-1 chapter 8.3.1 Performance requirements for PUCCH format 0

TS381411_TC8321

TS 38.141-1 chapter 8.3.2.1 NACK to ACK detection for PUCCH format 1

TS381411_TC8322

TS 38.141-1 chapter 8.3.2.2 ACK missed detection for PUCCH format 1

TS381411_TC8331

TS 38.141-1 chapter 8.3.3.1 ACK missed detection for PUCCH format 2

TS381411_TC8332

TS 38.141-1 chapter 8.3.3.2 UCI BLER for PUCCH format 2

TS381411_TC834

TS 38.141-1 chapter 8.3.4 Performance requirements for PUCCH format 3

TS381411_TC835

TS 38.141-1 chapter 8.3.5 Performance requirements for PUCCH format 4

TS381411_TC8361A

TS 38.141-1 chapter 8.3.6.1A NACK to ACK detection for multi-slot PUCCH format 1

TS381411_TC8361B

TS 38.141-1 chapter 8.3.6.1B ACK missed detection for multi-slot PUCCH format 1

TS381411_TC841

TS 38.141-1 chapter 8.4.1 PRACH false alarm probability and missed detection

TS381411_TC67

TS 38.141-1 chapter 6.7 Reference sensitivity level

TS381412_TC72

TS 38.141-2 chapter 7.2 OTA sensitivity

TS381412_TC73

TS 38.141-2 chapter 7.3 OTA reference sensitivity level

TS381412_TC74

TS 38.141-2 chapter 7.4 OTA dynamic range

TS381412_TC751

TS 38.141-2 chapter 7.5.1 OTA adjacent channel selectivity (ACS)

TS381412_TC752A

TS 38.141-2 chapter 7.5.2A OTA in-band general blocking

TS381412_TC752B

TS 38.141-2 chapter 7.5.2B OTA in-band narrowband blocking

TS381412_TC76

TS 38.141-2 chapter 7.6 OTA out-of-band blocking

TS381412_TC78

TS 38.141-2 chapter 7.8 OTA receiver intermodulation

TS381412_TC79

TS 38.141-2 chapter 7.9 OTA in-channel selectivity

TS381412_TC821

TS 38.141-2 chapter 8.2.1 OTA PUSCH with transform precoding disabled

TS381412_TC822

TS 38.141-2 chapter 8.2.2 OTA PUSCH with transform precoding enabled

TS381412_TC823

TS 38.141-2 chapter 8.2.3 OTA UCI multiplexed on PUSCH

TS381412_TC831

TS 38.141-2 chapter 8.3.1 OTA performance requirements for PUCCH format 0

TS381412_TC8321

TS 38.141-2 chapter 8.3.2.1 OTA NACK to ACK detection for PUCCH format 1

TS381412_TC8322

TS 38.141-2 chapter 8.3.2.2 OTA ACK missed detection for PUCCH format 1

TS381412_TC8331

TS 38.141-2 chapter 8.3.3.1 OTA ACK missed detection for PUCCH format 2

TS381412_TC8332

TS 38.141-2 chapter 8.3.3.2 OTA UCI BLER for PUCCH format 2

TS381412_TC834

TS 38.141-2 chapter 8.3.4 OTA performance requirements for PUCCH format 3

TS381412_TC835

TS 38.141-2 chapter 8.3.5 OTA performance requirements for PUCCH format 4

TS381412_TC8361A

TS 38.141-2 chapter 8.3.6.1A OTA NACK to ACK detection for multi-slot PUCCH format 1

TS381412_TC8361B

TS 38.141-2 chapter 8.3.6.1B OTA ACK missed detection for multi-slot PUCCH format 1

TS381412_TC841

TS 38.141-2 chapter 8.4.1 OTA PRACH false alarm probability and missed detection

TS381412_TC68

TS 38.141-2 chapter 6.8 OTA transmitter intermodulation

*RST: TS381411_TC72

Manual operation: See ["Test Case"](#) on page 250

[[:SOURce<hw>]:BB:NR5G:TCW:TRIGgerconfig <TrigConfig>

Selects the trigger configuration. The trigger is used to synchronize the signal generator to the other equipment.

Parameters:

<TrigConfig>

AAUT | UNCH

AAUT

The trigger settings are customized for the selected test case. The trigger setting "Armed Auto" with external trigger source is used; the trigger delay is set to zero. Thus, the base station frame timing is able to synchronize the signal generator by a periodic trigger.

UNCH

The current trigger settings of the signal generator are retained unchanged.

*RST: AAUT

Manual operation: See ["Trigger Configuration"](#) on page 252

[[:SOURce<hw>]:BB:NR5G:TCW:WS:ADMRs:STATe <AddDmrs>

Enables or disabled the additional DMRS.

Additional DMRS signals increase the probability that the UE receives the demodulation reference symbols. It leads to a support of lower SNR conditions.

Parameters:

<AddDmrs>

0 | 1 | OFF | ON

*RST: 0

Manual operation: See ["Additional DMRS"](#) on page 255

[[:SOURce<hw>]:BB:NR5G:TCW:WS:CBW <WSChBw>

Selects the channel bandwidth.

Parameters:

<WSChBw>

BW5 | BW10 | BW15 | BW20 | BW25 | BW40 | BW50 | BW60 |
BW100 | BW80 | BW400 | BW200 | BW30 | BW70 | BW90

Bandwidth in MHz

*RST: BW10

Manual operation: See ["Channel Bandwidth"](#) on page 255

[[:SOURce<hw>]:BB:NR5G:TCW:WS:CELLId <WSCellId>

Sets the cell ID.

Parameters:

<WSCellId> integer
 Range: 0 to 1007
 *RST: 0

Manual operation: See ["Cell ID"](#) on page 255

[[:SOURce<hw>]:BB:NR5G:TCW:WS:DUPLex <Duplexing>

The duplexing mechanism used can be switched between FDD and TDD.

Parameters:

<Duplexing> FDD | TDD
 *RST: FDD

Manual operation: See ["Duplexing"](#) on page 256

[[:SOURce<hw>]:BB:NR5G:TCW:WS:FMTHroughput?

The required throughput is expressed as a fraction of maximum throughput for the FRC. The performance requirements assume HARQ retransmissions.

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs at the given SNR.

Return values:

<FMT> FMT70
 *RST: FMT70

Usage: Query only

Manual operation: See ["Fraction of Max. Throughput"](#) on page 256

[[:SOURce<hw>]:BB:NR5G:TCW:WS:FRC:TYPE <WSFrc>

Queries the fixed reference channel (FRC) used.

See also 3GPP TS 138 141-1, annex A (normative): Reference measurement channels.

Parameters:

<WSFrc>

FR1A11 | FR1A12 | FR1A13 | FR1A14 | FR1A15 | FR1A16 |
 FR1A17 | FR1A18 | FR1A19 | FR2A11 | FR2A12 | FR2A13 |
 FR2A14 | FR2A15 | FR1A21 | FR1A22 | FR1A23 | FR1A24 |
 FR1A25 | FR1A26 | NA | FR1A38 | FR1A39 | FR1A310 |
 FR1A311 | FR1A312 | FR1A313 | FR1A314 | FR1A322 |
 FR1A323 | FR1A324 | FR1A325 | FR1A326 | FR1A327 |
 FR1A328 | FR1A48 | FR1A49 | FR1A410 | FR1A411 |
 FR1A412 | FR1A413 | FR1A414 | FR1A422 | FR1A423 |
 FR1A424 | FR1A425 | FR1A426 | FR1A427 | FR1A428 |
 FR1A58 | FR1A59 | FR1A510 | FR1A511 | FR1A512 |
 FR1A513 | FR1A514 | FR1A331 | FR1A332 | FR2A31 |
 FR2A32 | FR2A33 | FR2A34 | FR2A35 | FR2A36 | FR2A37 |
 FR2A38 | FR2A39 | FR2A310 | FR2A311 | FR2A312 | FR2A41 |
 FR2A42 | FR2A43 | FR2A44 | FR2A45 | FR2A46 | FR2A47 |
 FR2A48 | FR2A49 | FR2A410 | FR2A51 | FR2A52 | FR2A53 |
 FR2A54 | FR2A55 | FR2A313 | FR2A314 | FR2A315 |
 FR2A316 | FR2A317 | FR2A318 | FR2A319 | FR2A320 |
 FR2A321 | FR2A322 | FR2A323 | FR2A324 | FR2A411 |
 FR2A412 | FR2A413 | FR2A414 | FR2A415 | FR2A416 |
 FR2A417 | FR2A418 | FR2A419 | FR2A420 | FR2A56 |
 FR2A57 | FR2A58 | FR2A59 | FR2A510 | FR1A31 | FR1A32 |
 FR1A33 | FR1A34 | FR1A35 | FR1A36 | FR1A37 | FR1A315 |
 FR1A316 | FR1A317 | FR1A318 | FR1A319 | FR1A320 |
 FR1A321 | FR1A329 | FR1A330 | FR1A41 | FR1A42 | FR1A43 |
 FR1A44 | FR1A45 | FR1A46 | FR1A47 | FR1A415 | FR1A416 |
 FR1A417 | FR1A418 | FR1A419 | FR1A420 | FR1A421 |
 FR1A51 | FR1A52 | FR1A53 | FR1A54 | FR1A55 | FR1A56 |
 FR1A57 | FR1A110 | FR1A111 | FR1A333 | FR1A333A |
 FR1A334 | FR1A334A | FR2A71 | FR2A72 | FR2A73 | FR2A74 |
 FR2A75 | FR2A76 | FR2A77 | FR2A78 | FR2A79 | FR2A710

FRxAyz: FRC G-FRx-Ay-z

*RST: FR1A12

Example:

SOURce1:BB:NR5G:TCW:WS:FRC:TYPE?

FR1A23 means G-FR1-A2-3

Manual operation: See "FRC" on page 256**[SOURce<hw>]:BB:NR5G:TCW:WS:FROffset <FreqOffset>**

Sets the frequency offset used for the PRACH.

Parameters:

<FreqOffset>

FO_0 | FO_400

*RST: FO_0

Manual operation: See "Frequency Offset" on page 256

[[:SOURce<hw>]:BB:NR5G:TCW:WS:MAPType <MapType>

Sets the mapping type A or B for the PUSCH.

Parameters:

<MapType> A | B
 *RST: A

Manual operation: See ["Mapping Type"](#) on page 256

[[:SOURce<hw>]:BB:NR5G:TCW:WS:MODE <Mode>

Switches between the detection rate (Pd) and the false detection rate (Pfa).

Parameters:

<Mode> DRAT | FDR
 DRAT
 Pd is defined as the probability of detection of preamble.
 FDR
 Pfa is defined as the total probability of false detection of the preamble.
 *RST: DRAT

Manual operation: See ["Mode"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:PLEVel <WSPowLev>

Specifies the power level of the wanted signal.

Parameters:

<WSPowLev> float
 Range: -145 to 20
 Increment: 0.1
 *RST: -101.1
 Default unit: dB

Manual operation: See ["Power Level"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:FORMat <PrachFormat>

Sets the designated PRACH preamble format.

The preamble is used to obtain the UL synchronization. In 5G NR, there are 64 preambles defined in each time-frequency PRACH occasion. The preamble consists of two parts cyclic prefix (CP) and preamble sequence.

In 5G NR, there are 13 types of preamble format supported known as format 0, format 1, format 2, format 3, format A1, format A2, format A3, format B1, format B2, format B3, format B4, format C0, format C1.

Parameters:

<PrachFormat> F0 | FA1 | FA2 | FA3 | FB4 | FC0 | FC2
 *RST: FA1

Manual operation: See ["Preamble Format"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:SCSPacing <PrachSCS>

Sets the subcarrier spacing using normal cyclic prefix (NCP) or extended cyclic prefix (ECP).

Parameters:

<PrachSCS> N1_25 | N15 | N30 | N60 | N120
 *RST: N30

Manual operation: See ["Sub Carrier Spacing \(PRACH\)"](#) on page 258

[[:SOURce<hw>]:BB:NR5G:TCW:WS:PROCondition <PropagCond>

The propagation conditions define the multipath fading environment.

They indicated as a combination of channel model name and maximum Doppler frequency, i.e. TDLA<DS>-<Doppler> where <DS> indicates the desired delay spread and <Doppler> indicates the maximum Doppler frequency.

Parameters:

<PropagCond> TDLB100D400 | TDLC300D100 | TDLA30D10 | AWGN |
 TDLA30D300 | TDLA30D75
 *RST: TDLB100D400

Manual operation: See ["Propagation Conditions"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:PTRS:STATe <PTRS>

Enables PTRS (phase-tracking reference signal) for the wanted signal of the [Test Cases](#) "8.2.1 OTA PUSCH" and "8.2.3 OTA UCI multiplexed on PUSCH" with [Base Station Type](#) "2-O".

Parameters:

<PTRS> 0 | 1 | OFF | ON
 *RST: 0

Manual operation: See ["PTRS"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:RBOffset <WSRbOffset>

Sets the resource block offset of the wanted signal.

Parameters:

<WSRbOffset> integer
 Number of resource blocks.
 Range: 0 to 273
 *RST: 0

Manual operation: See ["RB Offset"](#) on page 258

[:SOURce<hw>]:BB:NR5G:TCW:WS:RFFrequency <WSRFFreq>

Sets the RF frequency of the wanted signal.

Parameters:

<WSRFFreq> integer
 Range: 100e+03 to 6e+09
 *RST: 1.95e+09

Manual operation: See ["RF Frequency"](#) on page 258

[:SOURce<hw>]:BB:NR5G:TCW:WS:SCSPacing <WSSubCarSpacing>

Sets the subcarrier spacing.

Parameters:

<WSSubCarSpacing> N15 | N30 | N60 | X60 | N120 | N240
N15, N30, N60, N120, N240
 Normal cyclic prefix, value in kHz
E60
 Extended cyclic prefix, 60 kHz
 *RST: N30

Manual operation: See ["Sub Carrier Spacing / Sub Carrier Spacing \(BWP\)"](#) on page 258

[:SOURce<hw>]:BB:NR5G:TCW:WS:SYMNumber <SymbolNumber>

Sets the number of used OFDM symbols.

The starting symbol index is 13 for 1 OFDM symbol and 12 for 2 OFDM symbols.

Parameters:

<SymbolNumber> integer
 Range: 1 to 14
 *RST: 14

Manual operation: See ["Number of OFDM Symbols"](#) on page 257

[[:SOURce<hw>]:BB:NR5G:TCW:WS:TAPos <WSTypeAPos>

Sets the position of first DM-RS symbol for PUSCH (and PDSCH) mapping type A (dmrs-TypeA-Position).

Parameters:

<WSTypeAPos> integer
 Range: 2 to 3
 *RST: 2

Manual operation: See ["DMRS Type A Position"](#) on page 256

[[:SOURce<hw>]:BB:NR5G:TCW:WS:TIOBase?

Queries the timing off base value.

Return values:

<TimingOffBase> float
 Range: 0 to 6.2
 Increment: 0.1
 *RST: 0

Usage: Query only

Manual operation: See ["Timing Offset Base Value"](#) on page 258

[[:SOURce<hw>]:BB:NR5G:TCW:WS:TSETup <TestSetup>

With the test setup selector, the signal definitions can be switched.

Parameters:

<TestSetup> TS_1 | TS_2
 *RST: TS_1

Manual operation: See ["Test Setup"](#) on page 258

[[:SOURce<hw>]:BB:NR5G:TCW:WS:UCI:BITS <UCIBits>

Set the number of UCI bits used.

Defines the size of the uplink control information bits carried in the PUCCH channel. They consist of the HARQ feedback, CSI and SR.

Parameters:

<UCIBits> B_7 | B_40
 *RST: B_7

Manual operation: See ["UCI Bits"](#) on page 259

[[:SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI1:PATtern <CSI1Pattern>

Defines the frequency and time domain of the CSI part 1 subcarrier location.

Parameters:

<CSI1Pattern> Nr5gPUCCHUcidataPattLenMax bits

Manual operation: See "[CSI 1 Pattern](#)" on page 255

[:SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI2:PATtern <CSI2Pattern>

Defines the frequency and time domain of the CSI part 2 subcarrier location.

Parameters:

<CSI2Pattern> Nr5gPUCCHUcidataPattLenMax bits

Manual operation: See "[CSI 2 Pattern](#)" on page 255

[:SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSIPart <CSIPart>

Defines the CSI part selected for the test case.

The PUCCH-based CSI and the PUSCH-based CSI reporting, always padding the CSI report to the worst-case UCI payload size would result in too large overhead. For these cases, the CSI content is instead divided into two CSI parts.

Parameters:

<CSIPart> CSIP_1 | CSIP_2
 *RST: CSIP_1

Manual operation: See "[CSI Part](#)" on page 255

[:SOURce<hw>]:BB:NR5G:TCW:WS:UEID <WSUeld>

Sets the UE ID.

Parameters:

<WSUeld> integer
 Range: 0 to 65535
 *RST: 0

Manual operation: See "[UE ID](#)" on page 259

Glossary: Abbreviations

Symbols

5G NR: 5G new radio

B

BW: Bandwidth

BWP: Carrier bandwidth part

C

CP: Cyclic prefix

CP-OFDM: Cyclic prefix OFDM, as known from LTE

D

DFT-s-OFDM: Discrete Fourier transform spread OFDM

DMRS: Demodulation reference signal

E

ECP: Extended cyclic prefix

F

FR: Frequency range

G

gNB: 5G NR base station

N

NCP: Normal cyclic prefix

P

PSS: Primary synchronisation signal

PTRS: Phase tracking reference signal

R

RB: Resource block

RE: Resource element

RS: Reference signal

S

SCS: Subcarrier spacing

SRS: Sounding reference signal

SS: Synchronisation signal

SSS: Secondary synchronisation signal

Glossary: 5G NR 3GPP Specification References

Symbols

[1]: Rohde & Schwarz
Poster "Be ahead in 5G. Demystifying 5G NR"

T

TS 38.101: "User Equipment (UE) radio transmission and reception"

TS 38.104: "Base Station (BS) radio transmission and reception"

TS 38.133: "Requirements for support of radio resource management"

TS 38.141: "Base Station (BS) conformance testing"

TS 38.141-1: "Base Station (BS) conformance testing Part 1: Conducted conformance testing"

TS 38.141-2: "Base Station (BS) conformance testing Part 2: Radiated conformance testing"

TS 38.201: "Physical layer; General description"

TS 38.211: "Physical channels and modulation"

TS 38.212: "Multiplexing and channel coding"

TS 38.213: "Physical layer procedures for data"

TS 38.214: "Physical layer measurements"

TS 38.306: "User Equipment (UE) radio access capabilities"

TS 38.331: "Radio Resource Control (RRC) protocol specification "

TS 38.521: "Radio transmission and reception; Part 1, 2, 3"

TS 38.523: "User Equipment (UE) conformance specification; Part 1, 2, 3"

List of commands

[SOURce]:BB:NR5G:PLVersion?	437
[SOURce]:BB:NR5G:VERSion?	436
[SOURce<hw>]:BB:NR5G:CLOCK:MODE	636
[SOURce<hw>]:BB:NR5G:CLOCK:SOURce	636
[SOURce<hw>]:BB:NR5G:FMODE:USRFile	617
[SOURce<hw>]:BB:NR5G:HFB:BASEband	639
[SOURce<hw>]:BB:NR5G:HFB:CONNector	638
[SOURce<hw>]:BB:NR5G:HFB:DElay	638
[SOURce<hw>]:BB:NR5G:HFB:HPNMode	638
[SOURce<hw>]:BB:NR5G:HFB:LOGPath	637
[SOURce<hw>]:BB:NR5G:HFB:LOGState	637
[SOURce<hw>]:BB:NR5G:HFB:MODE	638
[SOURce<hw>]:BB:NR5G:HFB:PDElay	640
[SOURce<hw>]:BB:NR5G:HFB:SRAt	639
[SOURce<hw>]:BB:NR5G:HFB:TAMode	639
[SOURce<hw>]:BB:NR5G:LINK	432
[SOURce<hw>]:BB:NR5G:LOGGen:OUTPut	641
[SOURce<hw>]:BB:NR5G:LOGGen:STATe	640
[SOURce<hw>]:BB:NR5G:NODE:CARMapping:AP4000[:ROW<ch0>]	455
[SOURce<hw>]:BB:NR5G:NODE:CARMapping:CELL[:ROW<ch0>]	474
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch>:MAPPed	447
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CARDepl	446
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CBW	446
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CELLid	445
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIF	445
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CIFPresent	445
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:CINDicator	446
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DFReq	447
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:DATA	473
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:DLIS	473
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:MODulation	472
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:PATtern	473
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:POWer	471
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:SCSPacing	472
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:STATe	471
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:DUMRes:TPSTate	472
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:CBW	453
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:NAP	453
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:POINta	453
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:STATe	453
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:LTE:VSHift	453
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N1ID?	446
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:N2ID?	446
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:NSSPbch	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:OFFSet	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PCFReq	447
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:NRSets	465

[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:CMBSize.....	466
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:NREsources.....	466
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:PER.....	466
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBNumber.....	466
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RBStart.....	467
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:REPFactor.....	467
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>: ROW<user0>:IMAGinary.....	467
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>: ROW<user0>:MAGNitude.....	468
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>: ROW<user0>:PHASe.....	468
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:APMap:COL<gr0>: ROW<user0>:REAL.....	467
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:NSYMBOL.....	468
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:POWer.....	468
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:REOFfset.....	469
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SLOFfset.....	469
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SQID.....	469
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:RES<dir0>:SYOFfset.....	470
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:SLOFfset.....	470
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:RSET<st0>:TGAP.....	470
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:SCSPacing.....	470
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:PRS:STATE.....	471
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SCHBy.....	447
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:BSPeriodicty.....	458
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CASE.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DATA.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:DLISt.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:PATtern.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:CCODing:STATe.....	461
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:DFReq?.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:HFRMidx.....	458
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:L.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:ASOF:STATe.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CBARed.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:CSZero.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:IFRResel.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCOFfset.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SCSC.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SFOFfset?.....	463
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SPARe:STATe.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:SSZero.....	464
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:MIB:STATe.....	462
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>:COL<gr0>: ROW<user0>:IMAGinary.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>:COL<gr0>: ROW<user0>:MAGNitude.....	460
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>:COL<gr0>: ROW<user0>:PHASe.....	460

[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:APMap<dir0>:COL<gr0>: ROW<user0>:REAL.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POSition:PATtern.....	457
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:POWer.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:PSSPow.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:RBOffset.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCOFFset.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SCSPacing.....	456
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:SSSPow.....	459
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SSPBch<st0>:STATe.....	455
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYINfo:HACBook.....	451
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYINfo:SFOffset.....	452
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:SYINfo:SUL:STATe.....	452
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAOffset.....	448
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TAPos.....	448
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:CONflict?.....	449
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:POINta.....	449
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:RESolve.....	449
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:KOMU?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:NRB?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:OFFSet.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S15K:USE.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:KOMU?.....	451
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:NRB?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:OFFSet.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S30K:USE.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:KOMU?.....	451
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:NRB?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:OFFSet.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S60K:USE.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:KOMU?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:NRB?.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:OFFSet.....	450
[SOURce<hw>]:BB:NR5G:NODE:CELL<ch0>:TXBW:S120K:USE.....	450
[SOURce<hw>]:BB:NR5G:NODE:NCARrier.....	444
[SOURce<hw>]:BB:NR5G:NODE:RFPHase:MODE.....	444
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:CONflict?.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:CONflict.....	618
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:PBRate.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:SRATe?.....	618
[SOURce<hw>]:BB:NR5G:OUTPut:BBConf:ROW<ch0>:VARiation.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ALGorithm.....	623
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:ITERations.....	623
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:OCFactor?.....	623
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:RCFactor?.....	624
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:STATe.....	624
[SOURce<hw>]:BB:NR5G:OUTPut:CFReduction:TCRFactor.....	624
[SOURce<hw>]:BB:NR5G:OUTPut:CLEVel.....	619
[SOURce<hw>]:BB:NR5G:OUTPut:CMODE.....	620
[SOURce<hw>]:BB:NR5G:OUTPut:FMODE.....	617

[SOURce<hw>]:BB:NR5G:OUTPut:POWer:BBConf:ROW<ch0>:AVRL?	621
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:BWRef:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:MODE	621
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:RSBW	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S15K:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S30K:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S60K:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S120K:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:POWer:S240K:ACRL?	622
[SOURce<hw>]:BB:NR5G:OUTPut:SAMRmode	618
[SOURce<hw>]:BB:NR5G:OUTPut:SEQLen	617
[SOURce<hw>]:BB:NR5G:OUTPut:SSOC:STATe	617
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S15K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S30K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S60K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S120K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:S240K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTime	620
[SOURce<hw>]:BB:NR5G:OUTPut:TDWind:SE60K:TRTSamples?	621
[SOURce<hw>]:BB:NR5G:PRESet	432
[SOURce<hw>]:BB:NR5G:QCKSet:APPLY	443
[SOURce<hw>]:BB:NR5G:QCKSet:DISCard	443
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NDLSlots	441
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NSSLots?	442
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:NULSlots	442
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SLENgth	441
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NDLSymbols	442
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NGSYmbols	443
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:NULSymbols	443
[SOURce<hw>]:BB:NR5G:QCKSet:FRMFormat:SSC:SLFMt	442
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CARDepty	438
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CBW	438
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHRAster	438
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:CHSPacing	438
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:DUPLexing	439
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ECPState	439
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CS:STATe	440
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:CSLength	440
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:MOD	440
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBConfig	440
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBNumber	441
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:ES:RBOffset	441
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:NCARier	439
[SOURce<hw>]:BB:NR5G:QCKSet:GENeral:SCSPacing	439

[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:IMAGinary.....	570
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:MAGNitude.....	571
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:PHASe.....	571
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:APMap:COL<s2us0>:ROW<s3us0>:REAL.....	570
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CONFLict?.....	543
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CONTEnt.....	543
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:APPLY.....	544
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:SLOT.....	544
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:COPYto:SUBF.....	544
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:AULBwp.....	585
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:DATA.....	583
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:DLISt.....	584
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:PATTErn.....	584
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCCes:STATe.....	583
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:AGGLEvel.....	588
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ANTPorts.....	594
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BITLength.....	607
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BOINd.....	595
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:BWIND.....	598
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CAINd.....	592
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CANDIdate.....	588
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGFi.....	599
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CBGTi.....	599
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CI1.....	604
[.SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:CI2.....	604

[illegible]

[illegible]

[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DI10.....	605
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DLISt.....	607
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:DMSQinit.....	595
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FMT.....	587
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRDRes.....	589
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:FRHFlag.....	590
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HAPRoc.....	592
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:HBTS?.....	589
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:INDeX.....	588
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:INITpattern.....	608
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:MOFFs.....	600
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PATteRn.....	608
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PDSHarq.....	597
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE1.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE2.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE3.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE4.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE5.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE6.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE7.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE8.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PE9.....	601
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PRBBundling.....	598
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PRECinfo.....	594
[SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:PTDMrs.....	595

[illegible]

[illegible]

[illegible]

[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA2.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA3.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA4.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA5.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA6.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA7.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA8.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA9.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:WA10.....	606
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DCI<s2us0>:ZCRTrigg.....	599
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SCRam:ID.....	580
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SCRam:STATe.....	580
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SPACe<s2us0>:AGGLLevel?.....	582
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:DMRS:SPACe<s2us0>:MAXCandidate.....	583
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:ID.....	579
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:BUNSize.....	581
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:SHIDx.....	582
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:SIZE.....	582
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:IL:STATe.....	581
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:NDCI.....	586
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:PREGran.....	579
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:RESalloc:BITMap.....	581
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:RESalloc:STATe.....	580
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:CS:TCL.....	585
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:DURation.....	548

[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:FMT.....	545
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:INFO?.....	550
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:MAPType.....	545
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:NCW.....	555
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:PATGrp.....	556
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:PRECG.....	554
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:PTRS:EPRE.....	565
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:PTRS:FRQDen.....	564
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:SBCZero:STATe.....	555
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe:TXSCHeM:INTervp.....	562
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[DMRS]:APSelect<s2us0>.....	487
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[DMRS]:APSelect<s2us0>.....	560
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:BMAid.....	554
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:LENGth.....	559
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:NSID.....	558
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:POWeR.....	559
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:SEQGen.....	558
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:SEQHopping.....	558
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:DMRS:SLTSymbols?.....	559
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:PTRS:MODE.....	563
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:PTRS:REOF.....	564
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:PTRS:STATe.....	564
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:PTRS:TMDen.....	564
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:RESalloc.....	556
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCHe[PUSCh]:RESalloc:PATtern.....	556

[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TXSCHEME:CDMDData.....	560
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TXSCHEME:NLAYers.....	560
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PDSCh PUSCh:TYPE.....	555
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PERiod.....	549
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:POWer.....	548
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:BMAid.....	613
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:FORMat.....	614
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:PRINdex.....	615
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:RBNumber?.....	547
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:RBNumber?.....	615
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:RSEquence.....	614
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:RSET.....	614
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:SCSPacing.....	613
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:TOFFset.....	615
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PRACH:ZCZone.....	615
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:FS:CYCShift.....	610
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:FS:OCCindex.....	611
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:FS:OCCLength.....	611
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:FS:TDOcc.....	611
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:GRPHopping.....	609
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:HOPid.....	609
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:ISFHopping.....	610
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:PL:ACK:BITS.....	612
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:PL:ACK:PATtern.....	612
[.SOURce<hw>]:BB:NR5G:SCHeD:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:PL:SRCCount.....	611

[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:PL:UCI:BITS.....	612
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:PL:UCI:PATtern.....	612
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUCCh:SHOPping.....	610
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:DMR:NIDSel.....	557
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:FHOI.....	561
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:FHOP:STATe.....	562
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:HPRNumber.....	561
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:PORT.....	565
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:POWer.....	565
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:PTDMrs.....	563
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:MODE.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:NGRPs.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:SCID.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:SPPG.....	567
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:STATe.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:PTRS:TP:TMDensity.....	566
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:TXScheme:SRI.....	563
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:TXScheme:TPMidx.....	562
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:ACK:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:ACK:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI1:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI1:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI2:BITS.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh:UCI:CSI2:PATtern.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh[:DMRS]:APSelect<s2us0>.....	561

[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:PUSCh[:DMRS]:APSelect<s2us0>.....	561
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:RBNumber.....	546
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:RBOffset.....	547
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:REPetitions.....	548
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SLOT.....	545
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:STATe.....	548
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SYMNumber.....	546
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:SYMoffset.....	546
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>:TPSTate.....	546
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:MOD.....	557
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:IMCS.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:RVIndex.....	569
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:TBSIZE?.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PDSCh PUSCh:CCODing:TCRate.....	568
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>: ALLoc<user0>[:CW<s2us0>]:PHYSbits?.....	557
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:NALLoc.....	544
[SOURce<hw>]:BB:NR5G:SCHed:CELL<ch0>:SUBF<st0>:USER<dir0>:BWPart<gr0>:RESulting: ALLoc<user0>:INFO?.....	549
[SOURce<hw>]:BB:NR5G:SCHeduling:MODE.....	542
[SOURce<hw>]:BB:NR5G:SCHeduling:RSSpace.....	542
[SOURce<hw>]:BB:NR5G:SCHeduling:SFN:STATe.....	543
[SOURce<hw>]:BB:NR5G:SETTing:CATalog?.....	433
[SOURce<hw>]:BB:NR5G:SETTing:DEL.....	433
[SOURce<hw>]:BB:NR5G:SETTing:LOAD.....	433
[SOURce<hw>]:BB:NR5G:SETTing:STORe.....	433
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:DL:CATalog?.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:BW.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:CATalog.....	436
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:DUPLexing.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:FREQ.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:SCS.....	435
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:FILTer:TMODeL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL.....	434
[SOURce<hw>]:BB:NR5G:SETTing:TMODeL:UL:CATalog?.....	434

[SOURce<hw>]:BB:NR5G:STATe.....	436
[SOURce<hw>]:BB:NR5G:TCW:ANT:RXAntennas.....	643
[SOURce<hw>]:BB:NR5G:TCW:ANT:TXAntennas.....	643
[SOURce<hw>]:BB:NR5G:TCW:APPLY.....	642
[SOURce<hw>]:BB:NR5G:TCW:AWGN:PLEVel?.....	643
[SOURce<hw>]:BB:NR5G:TCW:BEWPhi.....	643
[SOURce<hw>]:BB:NR5G:TCW:BEWThet.....	644
[SOURce<hw>]:BB:NR5G:TCW:BSClass.....	644
[SOURce<hw>]:BB:NR5G:TCW:BSType.....	644
[SOURce<hw>]:BB:NR5G:TCW:DCLDirection.....	644
[SOURce<hw>]:BB:NR5G:TCW:E50.....	645
[SOURce<hw>]:BB:NR5G:TCW:FA:FRALlocation.....	646
[SOURce<hw>]:BB:NR5G:TCW:FR.....	645
[SOURce<hw>]:BB:NR5G:TCW:IS:BAND.....	646
[SOURce<hw>]:BB:NR5G:TCW:IS:CHBW?.....	646
[SOURce<hw>]:BB:NR5G:TCW:IS:CLID.....	646
[SOURce<hw>]:BB:NR5G:TCW:IS:DISTance.....	645
[SOURce<hw>]:BB:NR5G:TCW:IS:DUPLex.....	647
[SOURce<hw>]:BB:NR5G:TCW:IS:FRSHift.....	647
[SOURce<hw>]:BB:NR5G:TCW:IS:IFTType.....	647
[SOURce<hw>]:BB:NR5G:TCW:IS:NRBLock?.....	648
[SOURce<hw>]:BB:NR5G:TCW:IS:OFN.....	648
[SOURce<hw>]:BB:NR5G:TCW:IS:PLEVel?.....	648
[SOURce<hw>]:BB:NR5G:TCW:IS:RBCFrequency?.....	648
[SOURce<hw>]:BB:NR5G:TCW:IS:RBOFset.....	649
[SOURce<hw>]:BB:NR5G:TCW:IS:RFFFrequency.....	649
[SOURce<hw>]:BB:NR5G:TCW:IS:SCSPacing?.....	649
[SOURce<hw>]:BB:NR5G:TCW:IS:TMODeL?.....	649
[SOURce<hw>]:BB:NR5G:TCW:IS:TREquire.....	650
[SOURce<hw>]:BB:NR5G:TCW:IS:UEID.....	650
[SOURce<hw>]:BB:NR5G:TCW:IS2:IFTType.....	647
[SOURce<hw>]:BB:NR5G:TCW:IS2:PLEVel?.....	648
[SOURce<hw>]:BB:NR5G:TCW:IS2:RFFFrequency?.....	649
[SOURce<hw>]:BB:NR5G:TCW:MARKerconfig.....	650
[SOURce<hw>]:BB:NR5G:TCW:MEIS.....	650
[SOURce<hw>]:BB:NR5G:TCW:RELease.....	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:AUSDeLay.....	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:BBSeLector.....	651
[SOURce<hw>]:BB:NR5G:TCW:RTF:CONNeCtor.....	652
[SOURce<hw>]:BB:NR5G:TCW:RTF:MODE.....	652
[SOURce<hw>]:BB:NR5G:TCW:RTF:SERRate.....	652
[SOURce<hw>]:BB:NR5G:TCW:SPEC.....	651
[SOURce<hw>]:BB:NR5G:TCW:TC.....	653
[SOURce<hw>]:BB:NR5G:TCW:TRIGgerconfig.....	656
[SOURce<hw>]:BB:NR5G:TCW:WS:ADMRs:STATe.....	656
[SOURce<hw>]:BB:NR5G:TCW:WS:CBW.....	656
[SOURce<hw>]:BB:NR5G:TCW:WS:CELLid.....	656
[SOURce<hw>]:BB:NR5G:TCW:WS:DUPLex.....	657
[SOURce<hw>]:BB:NR5G:TCW:WS:FMTHroughput?.....	657
[SOURce<hw>]:BB:NR5G:TCW:WS:FRC:TYPE.....	657

[SOURce<hw>]:BB:NR5G:TCW:WS:FROffset.....	658
[SOURce<hw>]:BB:NR5G:TCW:WS:MAPType.....	659
[SOURce<hw>]:BB:NR5G:TCW:WS:MODE.....	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PLEVel.....	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:FORMat.....	659
[SOURce<hw>]:BB:NR5G:TCW:WS:PRACH:SCSPacing.....	660
[SOURce<hw>]:BB:NR5G:TCW:WS:PROCondition.....	660
[SOURce<hw>]:BB:NR5G:TCW:WS:PTRS:STATe.....	660
[SOURce<hw>]:BB:NR5G:TCW:WS:RBOffset.....	660
[SOURce<hw>]:BB:NR5G:TCW:WS:RFFRequency.....	661
[SOURce<hw>]:BB:NR5G:TCW:WS:SCSPacing.....	661
[SOURce<hw>]:BB:NR5G:TCW:WS:SYMNumber.....	661
[SOURce<hw>]:BB:NR5G:TCW:WS:TAPos.....	662
[SOURce<hw>]:BB:NR5G:TCW:WS:TIOBase?.....	662
[SOURce<hw>]:BB:NR5G:TCW:WS:TSETup.....	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:BITS.....	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI1:PATtern.....	662
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSI2:PATtern.....	663
[SOURce<hw>]:BB:NR5G:TCW:WS:UCI:CSIPart.....	663
[SOURce<hw>]:BB:NR5G:TCW:WS:UEID.....	663
[SOURce<hw>]:BB:NR5G:TDWind:STATe.....	620
[SOURce<hw>]:BB:NR5G:TRIGger:ARM:EXECute.....	629
[SOURce<hw>]:BB:NR5G:TRIGger:DELAy:UNIT.....	626
[SOURce<hw>]:BB:NR5G:TRIGger:EXECute.....	629
[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:RDELAy?.....	627
[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:SYNChronize:OUTPut.....	626
[SOURce<hw>]:BB:NR5G:TRIGger:EXternal:TDELAy.....	627
[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:DELAy.....	628
[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:INHibit.....	628
[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:RDELAy?.....	628
[SOURce<hw>]:BB:NR5G:TRIGger:OBASeband:TDELAy.....	628
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DELAy.....	631
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:DUPLexing.....	632
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ECPState.....	632
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:FOFFset.....	631
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:MODE.....	631
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NDLSlots.....	633
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NSSlots?.....	633
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:NULSlots.....	633
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:OFFTime.....	632
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ONTime.....	632
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:PERiod.....	631
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:ROFFset.....	631
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SCSPacing.....	634
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SLENGth.....	634
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NDLSymbols?.....	634
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NGSYmbols?.....	634
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:NULSYmbols?.....	635
[SOURce<hw>]:BB:NR5G:TRIGger:OUTPut<ch>:SSC:SLFMt.....	635
[SOURce<hw>]:BB:NR5G:TRIGger:RMODE?.....	629

[SOURce<hw>]:BB:NR5G:TRIGger:SLenGth.....	630
[SOURce<hw>]:BB:NR5G:TRIGger:SLUNit.....	630
[SOURce<hw>]:BB:NR5G:TRIGger:SOURce.....	625
[SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:DELay.....	626
[SOURce<hw>]:BB:NR5G:TRIGger[:EXternal]:INHibit.....	627
[SOURce<hw>]:BB:NR5G:UBWP:NUSer.....	474
[SOURce<hw>]:BB:NR5G:UBWP:REStart.....	475
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CLenGth.....	480
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIR:RTSize.....	499
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: NRESources.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude.....	505
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe.....	505
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:BITMap.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:CDMType?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:DENsity.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:I0.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:I1.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:OFFSet.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:PER.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:PORTs?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:PWR.....	504
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:RBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:ROW.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:SCID.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:SET<gr0>: RES<user0>:SRBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:NZP:STATe.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: NRESources.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:BITMap.....	503

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:CDMType?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:DENSity.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:I0.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:I1.....	503
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:OFFSet.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:PER.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:PORTs?.....	502
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:RBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:ROW.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:SET<gr0>: RES<user0>:SRBNumber.....	501
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:CSIRs:ZP:STATe.....	500
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:DFReq?.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:INDicator.....	480
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:NCINd.....	481
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDCCh:NUMPreempt.....	496
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:CBGF:STATe.....	486
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:APIIndex.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:BSAMe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:CTYPe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:MLENgtH.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:EPRE..	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:MCS1..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:MCS2..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:MCS3..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:RB0.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:RB1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:REOF..	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:PTRS:STATe..	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:SID0.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTA:SID1.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:APIIndex.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:CTYPe.....	487
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:MLENgtH.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:EPRE..	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:MCS1..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:MCS2..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:MCS3..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:RB0.....	541
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:RB1.....	541
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:REOF..	538

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:PTRS:STATe.	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:SID0.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DMTB:SID1.....	488
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:DSID.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:MCBGroups.....	489
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:MCSTable.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:MCWDci.....	492
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:OI11.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:PREC:BBSet1.....	489
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:PREC:BSIZe.....	490
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:PREC:BSSet2.....	490
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:PREC:BTYPe.....	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:PREC:STATe.....	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:RBGSize.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:RESalloc.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:SCRambling:STATe..	491
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TD<grp0>:KNULl.....	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TD<grp0>:LENGTh...	495
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TD<grp0>:MAPPing.	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TD<grp0>:SLIV?.....	495
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TD<grp0>:STARt.....	494
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:TDANum.....	493
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PDSCh:VPINter.....	495
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PRBOffset?.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUCCh:BD22.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUCCh:TPAS.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh:BD22.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh:RBGSize.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:PUSCh:TPAS.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:GRPNumber.....	506
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:NRESources.....	506
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:GRID.....	508
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:PER.....	508
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:PERPatT.....	508
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:RBDList.....	507
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:RBPatt.....	507
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:SLOT.....	507
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:RS<gr0>:SLTPatt.....	508
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RATM:STATe.....	506
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RBNumber.....	483
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RBOffset.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:CIRNti.....	481
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:INT.....	496
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PSRNti.....	481
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PUCCh.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:PUSCh.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:RNTI:SRS.....	497
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SCSPacing.....	482
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:BD23.....	483
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:GTYPe.....	483

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:NB26.....	482
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:BWP<dir0>:SRS:NSCG.....	482
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:DL:NBWParts.....	480
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:DFReq?.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:ALRB?.....	513
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:MAPType.....	514
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:MODulation?.....	513
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:PASize?.....	513
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:PTRS:STATe.....	514
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:RBOffset.....	513
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:SCS?.....	512
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:STATe.....	511
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:FRC:TYPE.....	511
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:INDicator.....	480
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PDSch:TDANum.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PRBOffset?.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:ADMRs:STATe.....	509
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:BPSK:STATe.....	509
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:HACK:STATe.....	510
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:PDSHrq:NTMentry.....	510
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUCCh:PDSHrq: TMIValue<gr0>.....	510
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:CBSubset.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:APINdex.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:BSAMe.....	516
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:CTYPE.....	516
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:MLENgtH.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:MCS1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:MCS2.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:MCS3.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:PORT.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:POWer.....	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:RB0.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:RB1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:REOF.....	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS:STATe.....	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:RB0.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:RB1.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:RB2.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:RB3.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:RB4.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:SCID.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:STATe.....	522

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PTRS: TP:TMDensity.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:PUID.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:SID0.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTA:SID1.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:APIndex.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:CTYPe.....	516
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:MLENgtH.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:MCS1..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:MCS2..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:MCS3..	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:PORT..	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:POWe..	539
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:RB0.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:RB1.....	540
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:REOF..	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS:STATe..	538
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:RB0.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:RB1.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:RB2.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:RB3.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:RB4.....	524
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:SCID.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:STATe.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PTRS: TP:TMDensity.....	523
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:PUID.....	517
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:SID0.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DMTB:SID1.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:DSID.....	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:FHOFFsets: NOFFsets.....	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:FHOFFsets: OFFSet<gr0>.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:FHOP.....	522
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:MCBGroups.....	518
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:MCSTable.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:MRANK.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:MTTPrecoding.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:OI01.....	498
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:RESalloc.....	520
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:SCRambling:STATe..	521
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:TPSTate.....	518

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:PUSCh:TXConfig.....	519
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:RBNumber.....	483
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:RBOFset.....	484
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SCSPacing.....	482
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:NRSets.....	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: NRESources.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:IMAGinary.....	535
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:MAGNitude.....	536
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:PHASe.....	536
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:APMap:AP<s2us0>:ROW<s3us0>:REAL.....	534
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:BHOP.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:BSRS.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:COFFset.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:CSRS.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:FPOS.....	530
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:FQShift.....	531
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:NAPort.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:OFFSet.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:PER.....	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:POWer.....	534
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:PTRS.....	534
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:REFactor.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:SEQ:CYCShift.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:SEQ:HOPPIng.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:SEQ:ID.....	533
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:SPOS.....	530
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>: RES<user0>:SYMNumber.....	530

[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RES<user0>:TRTComb.....	532
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:RSType..	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:RS:SET<gr0>:USAGe..	529
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:SRS:STATe.....	528
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:ALPHA.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF10.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF11.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF20.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:CSI:OF21.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ:OFF0.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ:OFF1.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:HARQ:OFF2.....	526
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:MODE.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:BWP<dir0>:UCI:STATe.....	525
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:CELL<st0>:UL:NBWParts.....	480
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:CCODing:STATe?.....	477
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DATA.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:DLISt.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:INITpattern.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:DSCH:PATtern.....	479
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:NUMSfi.....	477
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:CS.....	475
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:MCSC.....	476
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:RA.....	476
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SFI.....	476
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:SPCSi.....	476
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:RNTI:TC.....	477
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:UEID.....	477
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:CCODing:STATe.....	477
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DATA.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:DLISt.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:INITpattern.....	478
[SOURce<hw>]:BB:NR5G:UBWP:USER<ch0>:USCH:PATtern.....	479
[SOURce<hw>]:BB:NR5G:WAVEform:CREate.....	436
[SOURce<hw>]:BB:NR5G[:TRIGger]:SEQuence.....	625

Index

Symbols

*.dat file	222
5G new radio in LTE bands	
Omitting CRS	56

A

ACK missed detection for multi-slot PUCCH format 1	331
ACK missed detection for PUCCH format 1	319
ACK missed detection for PUCCH format 2	321
Allocation	
Bandwidth	148
Bandwidth shift	149
Channel power	150
Content	145
DFT-s	149
First slot	146
First symbol	148
Modulation	157
Number of RBs	148
Number of symbols	147
RB offset	149
Repetition	151
Size	158, 165
State	151
Antenna ports	
Mapping table	172
Application cards	13
Application notes	13
Arm	210
Armed_Auto	209
Armed_Retrigger	209
Auto	209

B

Base station class	250
Base station type	251
Baseband selector	398
BeW(θ REFSSENS)	251
BeW(ϕ REFSSENS)	252
Brochures	13
BWP	
Number of RBs	85

C

Carrier	52, 55, 57, 58, 66, 71, 84, 87, 115, 144, 235
Carrier aggregation	
Enable	46
Settings	26
Catalog	
User filter	222
Cell	52, 55, 57, 58, 66, 71, 84, 87, 115, 144, 235
Cell ID	255
Channel bandwidth	255, 258
Clipping	
Level	223
Mode	223
Clock	
Mode	220
Source	219
Closed loop BS tests	396

Common trigger settings	209
Connector	
Real-time feedback	398
Conventions	
SCPI commands	405
CORESET	
Bitmap	176
Frequency domain allocation	176
Interleaving	176
Precoder granularity modes	175
Settings	173
Coupled trigger settings	209
CSI-RS	
Frequency occupation	105, 108
Smaller bandwidth than BWP	105, 108

D

Data sheets	13
DCI format	
Bits	184
Padding	184
Debug reports	
Generate	400
Declared direction	251
Default settings	
5G New Radio	38
Delay	
Marker	216
Trigger	213
Delete	
User filter	222
Delta frequency	
Offset to DC carrier	61, 86
dmrs-Type	94, 126
dmrs-TypeA-Position	51
Documentation overview	11
Dynamic range	275

E

EIS 50M	251
External trigger	212
External trigger delay	213

F

Fall offset	215
Feedback delay	399
Filter	
Apply on whole channel	221
Apply per BWP	221
First subframe	235
FRC	256
freqDomainShift	138
Frequency allocation	259

G

Generate	
Waveform file	39
Generation of logfiles	401
Getting started	12

H

HARQ feedback	
Debug report	400
Transmission/reception report	400
Help	12

I

In-channel selectivity	289
Installation	15
Instrument help	12
Instrument security procedures	12

K

k TC	139

L

Link direction	40
Load	
User filter	222
Logfile generation	
File formats	401
File names	401
Output files	401
LTE-CRS	
Configure	57
Enable	57

M

Mapping coordinates	64, 69, 111, 141, 172
Marker configuration	253
Marker Delay	216
Measured external clock	220
MIB	
Barred cell	77
CORESET	77
DMRS	76
Frequency reselection	77
SCS common	76
Search space	77
SFN start offset	77
Spare bit	78
SS/PBCH subcarrier offset	77
Minimum EIS	251
Modes	
Serial	392
Serial 3x8	392

N

NACK to ACK detection for multi-slot PUCCH format 1 ..	330
NACK to ACK detection for PUCCH format 1	316
No. of Subframe	235
Non-zero-power CSI-RS	
Settings	106

O

Open source acknowledgment (OSA)	13
Orthogonal sequence	202
OTA ACK missed detection for multi-slot PUCCH format 1 ..	385
OTA ACK missed detection for PUCCH format 1	376
OTA ACK missed detection for PUCCH format 2	378

OTA Dynamic range	350
OTA in-channel selectivity	363
OTA NACK to ACK detection for multi-slot PUCCH format 1 ..	384
OTA NACK to ACK detection for PUCCH format 1	375
OTA performance requirements for PUCCH format 0	373
OTA performance requirements for PUCCH format 3	381
OTA performance requirements for PUCCH format 4	382
OTA PRACH false alarm probability and missed detection ..	387
OTA PUSCH transform precoding disabled	369
OTA PUSCH transform precoding enabled	370
OTA receiver Intermodulation	360
OTA reference sensitivity level	347
OTA sensitivity	346
OTA transmitter intermodulation	338
OTA UCI BLER for PUCCH format 2	379
OTA UCI multiplexed on PUSCH	372

P

PBCH	
Channel coding	75
Dummy MIB	74
Power	64
Settings	63, 73
PDSCH	
Additional position index	94
Codewords, number of	90
Enable interleaved VRB-to-PRB mapping	90
Mapping type	147
Max length	95
MSC table	90
n_ID	89
Resource allocation	91, 123
Scrambling ID	89, 90
Settings	153
Size of resource block group	91, 124
VRB-to-PRB	90
Performance characteristics	
Tests overview	240
Performance requirements for PUCCH format 0	314
Performance requirements for PUCCH format 3	324
Performance requirements for PUCCH format 4	327
Phase-tracking reference signals	
see PTRS	95, 127, 130
Power	
Mode	227
PBCH	64
PSS	64
SSS	64
Power level	257
PRACH	
Settings	205
PRACH false alarm probability and missed detection	333
Processing delay	400
PSS	
Power	64
PT-RS	
see PTRS	95, 127, 130
PTRS	
Transform precoding	130
PTRS-Downlink config	96
PTRS-DownlinkConfig	97, 128
PTRS-UplinkConfig	129

PUCCH	
Format	147
Settings	199
PUSCH	
Mapping type	147
n_ID	123
Scrambling ID	123
PUSCH transform precoding disabled	296
PUSCH transform precoding enabled	309

R

RB offset	258
Real-time feedback	396
Troubleshooting	400
Real-time feedback mode	397
Receiver characteristics	
Tests overview	239
Reception report	
Generate	400
Reference sensitivity levels	273
Release notes	13
Report	
HARQ feedback	400
Resource block	
Offset	60
Retrigger	209
RF frequency	258
Rise offset	215
RMSI-PDCCH-Config	77

S

Safety instructions	13
Save/Recall	
5G New Radio	38
Scheduling	
Allocation number	145
Subframe	144
Security procedures	12
Selective preset	249
Sequence length	221
Serial 3x8 mode	397
Serial mode	397
Serial rate	398
Service manual	12
Set to default	
5G candidates	38
Signal duration unit	210
Signal generation status	210
Single	209
SS/PBCH	
Burst length	62
Case	61
Number of blocks	61
Position	62
State	65
Switch off	65
SSPBCH Subcarrier Offset	
Set automatically	76
SSS	
Power	64
Standard settings	
5G New Radio	38
State	
5G New Radio	38

Subcarrier	
Offset	60
Suppress if on output center	221, 231
Support for quasi co-location TCI	181
Supported test cases	239

T

TDD	
Configure	151
Test case	250
Test frequencies	244
Time domain windowing	
Activate	225
Time plan	
Zoom in/zoom out	235
Timing adjustment	396
Transition	
Samples	226
Time	225
Transmission comb	139
Transmission report	
Generate	400
Transmitter characteristics	
Tests overview	239
Transmitter intermodulation	269
Trigger	
Sync. output	211
Trigger configuration	252
Trigger delay	213
Actual	213
Expressed in time	212
Resulting	213
Unit	212
Trigger mode	209
Trigger signal duration	210
Trigger source	211
Troubleshooting	
Real-time feedback	400
Tutorials	12

U

UCI BLER for PUCCH format 2	323
UCI multiplexed on PUSCH	311
UE ID	259
Uplink feedback	396
User	80, 84, 87, 115
User filter	
Create file	222
File format	222
User manual	12

V

Version	
3GPP standard	30

W

Waveform file	
Create	39
White papers	13

Z

Zero-power CSI-RS	
Settings	103