2207 T1/T3 Wireless Field Services Module

Product Highlights

- Easy-to-use, touch-screen graphical user interface (GUI) simplifies and expedites testing

- Modular 2000 Test Pad architecture enables up-to-date support for established and emerging technologies in a single platform

- Engineered for the field with rugged construction, lightweight design, and battery-powered operation

- Dual PCMCIA slots support easy installation of future upgrades and bring added testing functionality and versatility

- Automated testing features minimize training costs and testing complexity

- Combined with DS1, DS3, ISDN PRI and GSM features, the 2207 is an all-in-one solution for high-speed testing the TDM portion of wireless networks

Application Highlights

- Isolate and troubleshoot physical layer problems associated with data or other services

- Verify proper network routings and signal delays to ensure all fractional T1 channel signals are terminated properly and with the correct timing

- Monitor network voice quality and signaling

- Test the ability of a PBX/Switch to handle incoming calls

- Verify or troubleshoot ISDN PRI service

- Qualify DS3 circuits with an array of BERT patterns

- Analyze DS1 tributaries at DS3 access points

- Monitor the quality of Global System for Mobile Communications (GSM) digital wireless traffic

The 2207 T1/T3 Wireless Field Services Module adds digital wireless network test capabilities as well as standard T1 and ISDN PRI qualification and troubleshooting applications to the 2000 Test Pad. It supports GSM network testing from a T1 access point to quickly and accurately diagnose and differentiate wireless service problems from T1 problems. Use the 2207 between the base station and the switch without disrupting revenue-generating traffic.

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Function Highlights

- DS1 signal analysis and BER testing with standard and advanced stress patterns
- Dual DS1 receivers for in-service monitoring and drop-and-insert testing
- DS3 BER testing analysis with patterns for both M13 and C-bit framing
- Drop DS1 channels from a DS3 signal for testing or monitoring
- Monitor, place, or receive calls over T1 voice trunks and analyze signaling bits
- Transmit and measure tones on individual PCM channels
- ISDN PRI call placement and receipt, backup D-Channel and NFAS testing, and Layer three Q.931 results
- VT100 Emulation for equipment configuration and results monitoring
- Monitor and test GSM traffic from a T1 access point

In addition to its digital wireless network test capability, the 2207 includes the TestMATE automated T1 bit error rate testing option which enables both experienced and novice technicians to quickly and accurately install and maintain T1 networks.

The 2207 T1/T3 Wireless Module also provides the capability to monitor GSM traffic from a T1 access point non-intrusively. It displays a real-time overview of traffic activity on all 24 DS0 channels and four sub-channels.

*Fast, simple and intuitive, the 2207 quickly provides your test results*

Applications

The 2207 is designed to simplify testing of today's complex networks by adding the key functionality required to ensure performance of digital wireless networks. Programmed with highly integrated applications for in-service and out-of-service testing, the 2207 tests at both the pipeline and service levels to ensure that your network is performing as advertised. Applications include:

DS1 Physical Layer Testing

Whether provisioning or troubleshooting T1 service, often the first step is to verify proper circuit operation throughout the network by testing the physical layer. Typical requirements include BER testing, signal, alarm, and timing tests to ensure proper performance of T1 network connections.

BER testing is typically conducted from the customer premises at an NIU or HTU-R. To identify and sectionalize circuit problems from network equipment faults, the 2207 provides the capability to monitor and perform BER testing in both directions of a circuit simultaneously. The use of standard or user-programmable loopcodes to loop-back network equipment allows for further sectionalization of network troubles. In addition to commonly used BER testing patterns such as QRSS, the 2207 also offers several industry-recommended advanced stress patterns, including 55 Octet and T1 Daly to ensure network performance.

Advanced timing analysis allows the technician to pinpoint signal delays, timing slips, and mismatches between switch and remote equipment.

Simultaneously monitor and test in both directions on a circuit

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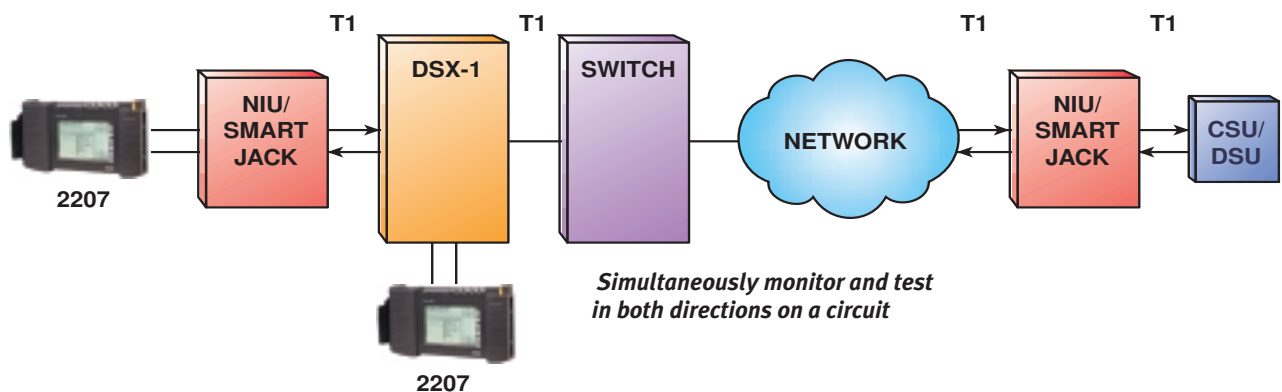
Fractional T1 Channel Testing

The 2207 qualifies of fractional T1 service to verify proper network routings and signal delays ensuring that all channel signals are terminated properly and with the correct timing. In rural locations or on the outer reaches of the service area, it is often critical to isolate single-circuit faults without disrupting the entire line.

Verify proper network routings and signal delays
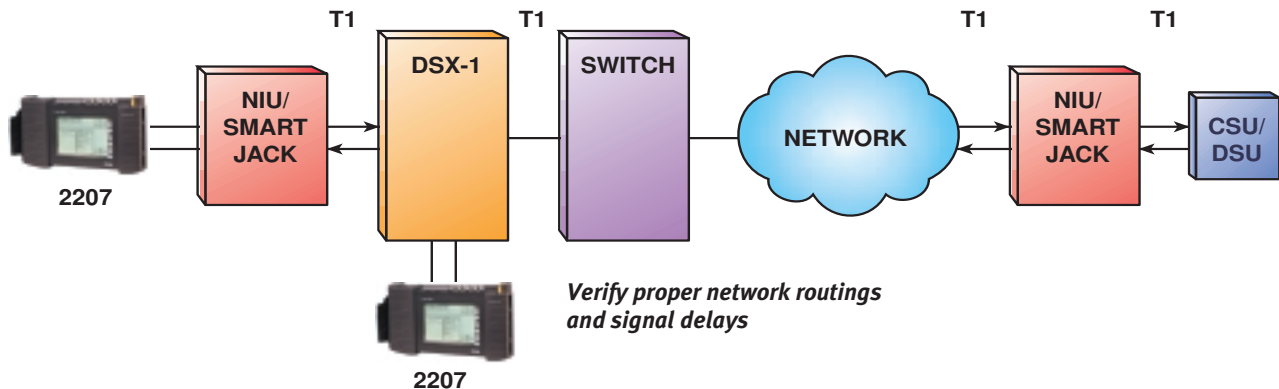
VF Channel Access and PCM TIMS

When problems with voice service arise, the ability to quickly and effectively measure the quality of voice transmissions on the network circuit is required. By monitoring data or signaling bits, the 2207 can check and verify individual channels without disrupting network traffic. Transmitting and measuring tones on an individual PCM channel utilizing the 2207's in-service channel access affects only the channel under test and provides a further level of performance analysis without impacting other revenue-generating channels. The 2207 provides TIMS measurements such as:

- Level
- Frequency
- Signal to Noise Ratio
- Noise (C-Message and C-Notch filters)
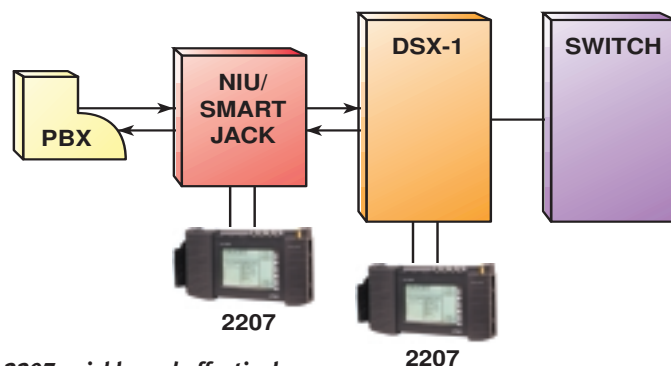
The 2207 quickly and effectively measures the quality of voice transmissions on the network circuit

Signaling

After testing the physical layer when provisioning or troubleshooting T1 voice trunks, it is also necessary to test the transmission and signaling performance of the circuit to verify the ability of a switch or PBX to handle incoming calls and ensure switch-to-switch communications. By placing, receiving, or monitoring voice calls, connectivity can be verified. Capture and display of digits, signaling events, and signaling bits provides a more detailed level of analysis.

The 2207 also simultaneously displays physical layer results so comprehensive testing of the voice trunk can be completed in a matter of minutes. The 2207 provides signaling and voice results such as:

- DP, DTMF, MF digit recognition
- Inter-event/digit delay mesurements
- Event/digit duration measurements
- Speaker/Mircophone or handset functionality for checking voice integrity
- Signaling (ABCD) bits

*Monitor network voice quality and signaling*
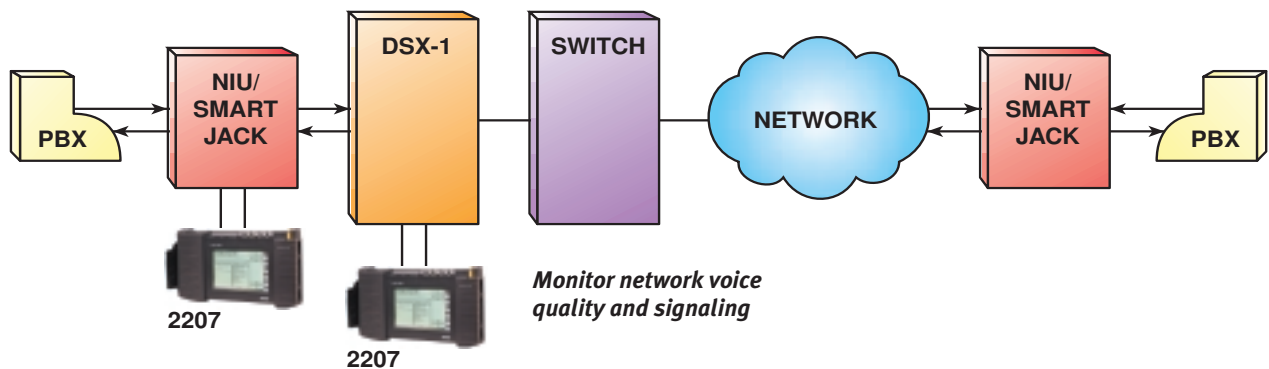
DS3 Testing

The first step in provisioning DS3 circuits is qualifying the physical layer. The 2207 provides the ability to qualify DS3 circuits with an array of BER testing patterns for both M13 and C-bit framing and supports the verification of frame synchronization on the circuit.

For more comprehensive and flexible testing, it is also often necessary to insert test patterns or tones on single, multiple, or all DS1 channels within the DS3 circuit. The 2207 DS3 BER testing measurements include:

- DS3 FEAC loopback codes
- Advanced stress patterns
- Signal level and frequency
- Insertion of logic and frame errors

A final level of analysis is provided by dropping DS1 channels from the DS3 signal for testing or monitoring individual channels.

With the 2207, you can qualify DS3 circutis with a host of BER testing patterns
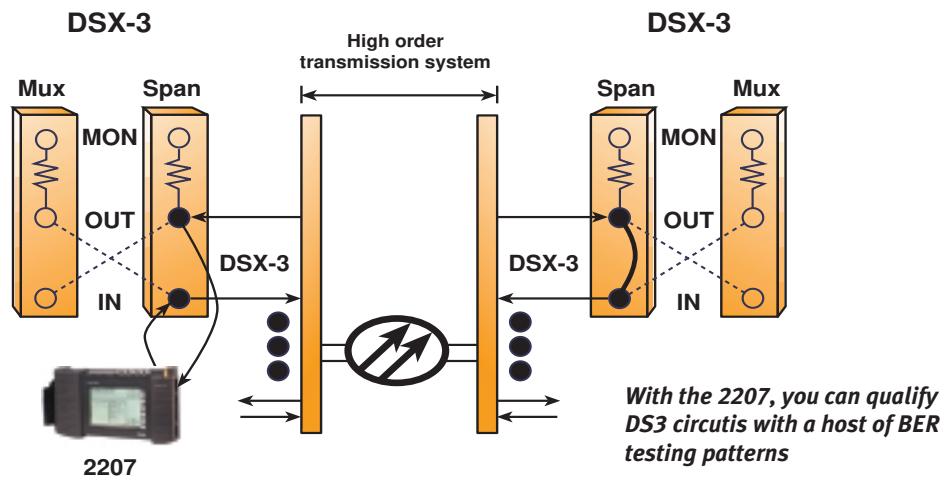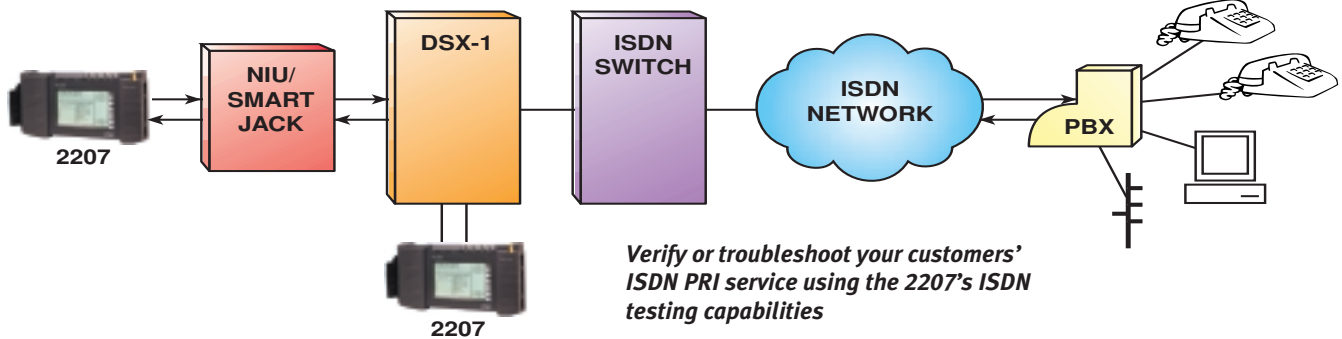
ISDN PRI Testing

After the physical layer has been verified, testing during the provisioning of ISDN service is typically performed at the customer premises by emulating a TE device, such as a PBX, to place and receive voice and data calls. The 2207 supports multiple call types and provides call status results and progress reports for an additional level of detail to ensure calls are successfully established. The reports are also useful for troubleshooting calls that are not established. When multiple PRI lines are in use at the same location, it is often necessary to perform back-up D-Channel and NFAS testing.

By simultaneously providing the user with physical layer (T1), layer 2 (LAPD), and layer 3 (Q.931) results as well as plain text decodes, the 2207 provides an efficient means to verify or troubleshoot the ISDN PRI service. The 2207 tests PRI lines allowing the following:

- Test multiple call types including voice, 56K, 64K, Nx56K, Nx64K, and H0 to verify correct switch translations for both inbound and outbound calls.
- Test data services (calls) using BER testing patterns
- Place and receive calls
- Receive call status results which provide a summary of calls
- Receive English decodes of layer 3 cause codes
- Receive full layer 3 Q.931 decodes, with the ability to print
- Place and receive calls on either T1 (secondary or primary) for NFAS configurations
- Switch from Standby D-Channel to Inservice D-Channel for verification of D-Channel back-up operation in NFAS configurations

Verify or troubleshoot your customers' ISDN PRI service using the 2207's ISDN testing capabilities

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GSM Testing

When provisioning or troubleshooting GSM networks, it is necessary to verify both voice quality and connectivity. Non-intrusively monitoring traffic—including voice conversations and service statistics from a T1 access point verify the A_{bis} interface between the Base Tranceiver Station (BTS) and Base Station Controller (BSC)—provides a comprehensive measure of network and circuit performance. This also allows for sectionalization of trouble between different network elements. Finally, the 2207 can be configured to simultaneously display both service and physical layer (T1) results and provide quick and easy differentiation between GSM service problems and T1 problems. The 2207 supports the following tests and measurements:

- Full rate and enhanced full rate traffic monitoring
- GSM traffic results including TRAU frame type values
- TRAU framing results
- Speaker/Microphone or handset functionality for checking voice integrity
- GSM LAP-D signaling results
- GSM Measurement Report message results such as average uplink signal quality and signal level
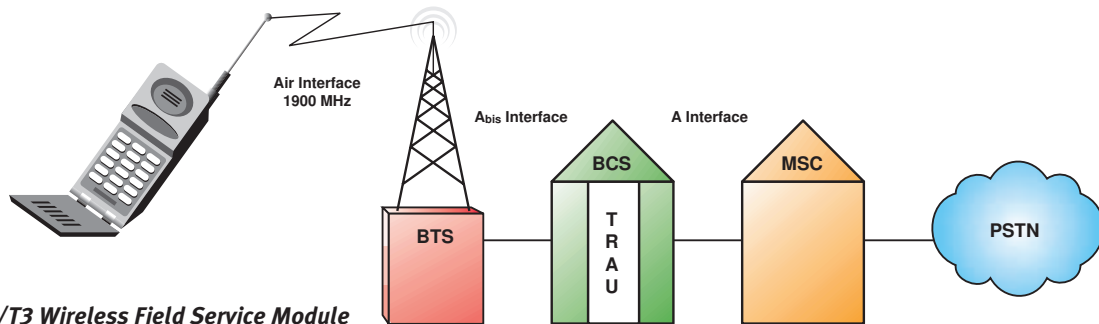
The 2207 T1/T3 Wireless Field Service Module allows you to monitor the quality of GSM service

Technical Specifications

Physical Characteristics
Overall Dimensions:
7.5 x 11.5 x 2.25 in. (19 x 29.2 x 5.7 cm)
Weight:
4.25 lb. (1.93 kg), with battery

Environment
Temperature Range
Operating:
32°F to 122°F (0°C to 50°C)
Storage:
-40°F to 167°F (-40°C to 75°C)
Humidity:
10% to 90% relative humidity,
non-condensing

Power Requirements
AC Adapter:
  100-220 at 60 Hz or
  200-240 at 50Hz VAC
  to 19 VDC, 2.37 AMPS
Charging Time:
Maximum of 2 hours from full
  discharge
Battery Type:
10.8 V NiMH
Operating Time:
Typically 3 hours on a full charge (DS1
  operation only)
Typically 2 hours on a full charge (DS3
  operation only)

Display
6-inch diagonal graphic LCD color
display

Input and Output Connectors
Bantam (4) and RS-232 (printer
  operation)

Input Impedance
BRIDGE:
$\geq 1000\Omega$
TERM:
$100\Omega\_\pm 5\%$
DSX-MON:
$100\Omega\_\pm 5\%$

Receive Level
BRIDGE or TERM:
+6 to -35 dBdsx
DSX-MON:
+6 to -24 dBdsx (of resistive loss)

Line Build Out (LBO)
Range:
0, -7.5, -15.0, -22.5 dB
Accuracy:
± 1 dB at 772 kHz

Transmit Timing Sources
Internal Clock, Recovered Clock

Line Codes
AMI, B8ZS

 DS3 specifications (optional)

Input and Output Connectors
WECO 560A

Impedance
75Ω, nominal unbalanced to ground

Receiver (Single) Frequency
44.736 Mb/s ± 300 ppm

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Level (From Output or Monitor Jack)

HIGH:

Accepts nominal 1.2 Vp, 0 ft of cable
from high source

DSX:

Accepts nominal 0.6 Vp, 450 ft of cable
from high source

LOW:

Accepts nominal 0.3 Vp, 900 ft of cable
from high source

Transmitter (Single) Frequency

44.736 Mb/s ±20 ppm

Line Build Out (LBO)

HIGH:

Nominal 1.2 Vp signal meets ANSI
specification

T1.102-1993 and ITU-T G.703 when
subjected to 450 feet of cable loss

DSX:

Nominal 0.61 Vp signal meets ANSI
specification

T1.102-1993 and ITU-T G.703

LOW:

Nominal 0.31 Vp

Line Code

B3ZS

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Ordering Information

User Interface Module

TTC2000-C	2000 Test Pad with color display (includes kickstand, AC adapter/changer, hanging strap, and printer cable)

Application Modules

TB2207-DS1	2207 DS1 Wireless Communications Analyzer
TB2207-DS3	2207 DS1/DS3 Wireless Communications Analyzer

Additional Application Modules Available

2209 T1/T3 Field Services Module
2109 Copper Analyzer Module
2357 DSL Broadband Services Module
2230 E1/Data Communications Analyzer
2310 SONET Field Services Module
2416 SDH Field Services Module

Analyzer Options

TB2207-ASP	Advanced Stress Patterns
TB2207-FT1	Fractional T1
TB2207-TIM	VF PCM TIMS
TB2207-SIG	Signaling
TB2207-PRI	Primary Rate ISDN
TB2207-ILE	Intelligent Line Equipment
TB2207-GSM	PCS-1900 (GSM) VF Option
TB2207-HDLC	Fractional HDLC Option
TB2207-VT100	VT100 Emulation
TB2207-EXPERT	TestMATE

Optional Accessories

AC-31705	External Battery Charger
AC-31905	Cigarette Lighter Adapter/Charger
BA-014081	Replacement Battery
CC-44581	Carrying Case/Tilt Stand (includes adjustable strap)
CC-44605	Carrying Case, Large Soft
CC-45158	Carrying Case, Multi-Mode (soft)

Package Descriptions

2207-P1	Field Service Package
2207-P2	DS3/DS1 Package
2207-P3	DS1 Package

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NOTE: Specifications, terms, and conditions are subject to change without notice.

2207/WFSM/PRE/LL/GER/1-01

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