



# SPIRENT C2K-ATS

## PLTS FOR LOCATION-BASED SERVICES TESTING

CDMA Position Location Test System (PLTS) is a fully integrated, automated test solution for 1x/EV-DO mobile devices that use Assisted GPS (A-GPS), Advanced Forward Link Trilateration (AFLT), Hybrid (AFLT and A-GPS) or GPS-only (“stand-alone” or “autonomous”) technologies.

### APPLICATIONS

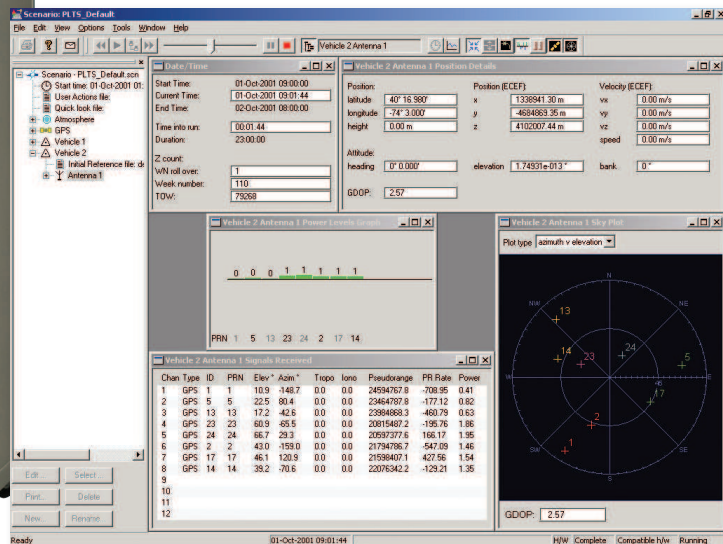
- Product Development
- Design Verification
- Minimum Performance Verification (TIA-916)
- Quality Assurance
- Product Evaluation
- Carrier Compliance Test

Spirent Communications’ PLTS option for the industry-leading C2K-ATS platform is the only commercial single-source solution for comprehensive, automated testing of CDMA mobile-based A-GPS, AFLT, Hybrid or GPS-only position-location technologies. These technologies are driven by the FCC E911 Phase II mandate in the United States and by the commercial potential of Location-Based Services (LBS) in Asia and North America.

To help identify performance breakpoints under real-world conditions, PLTS allows performance evaluation well beyond the baseline test scenarios defined in current industry standards.

### BENEFITS

- *Accuracy* – the only single-source, fully integrated and accurately synchronized solution available
- *Automated testing* – complete automation frees resources, encourages detailed testing, and eliminates human bias from results
- *Repeatability* – controlled environment supports extensive testing and enables easy troubleshooting of issues



**KEY FEATURES**

- Supports AFLT, A-GPS, Hybrid (AFLT and A-GPS) and GPS-only technologies
- Supports both Control Plane and V1/V2 User Plane (TCP/IP) transport mechanisms
- Integrated commercial PDE algorithms
- Emulates CDMA2000 1xRTT, 1xEV-DO, IS-95A/B, TSB-74 and J-STD-008 networks
- Generates up to 6 CDMA pilots and 12 GPS satellite signals
- Provides control over all critical CDMA and GPS parameters, test location and time
- Optional CDMA impairments emulate real-world field scenarios
- Simple Pass/Fail criteria based on performance criteria, including statistical analysis
- Fully automated control of mobile device
- Mobile IP option available to replicate real deployment scenarios
- Over-the-Air (OTA) option supports CTIA OTA testing; easily upgradeable for UMTS OTA testing as well
  - Supports integration with SATIMO chambers (via Satimo Multi-Measurement [SMM] software) and ETS-Lindgren chambers (via EMQuest software)
- Supports stand-alone (autonomous) mode with predicted orbits

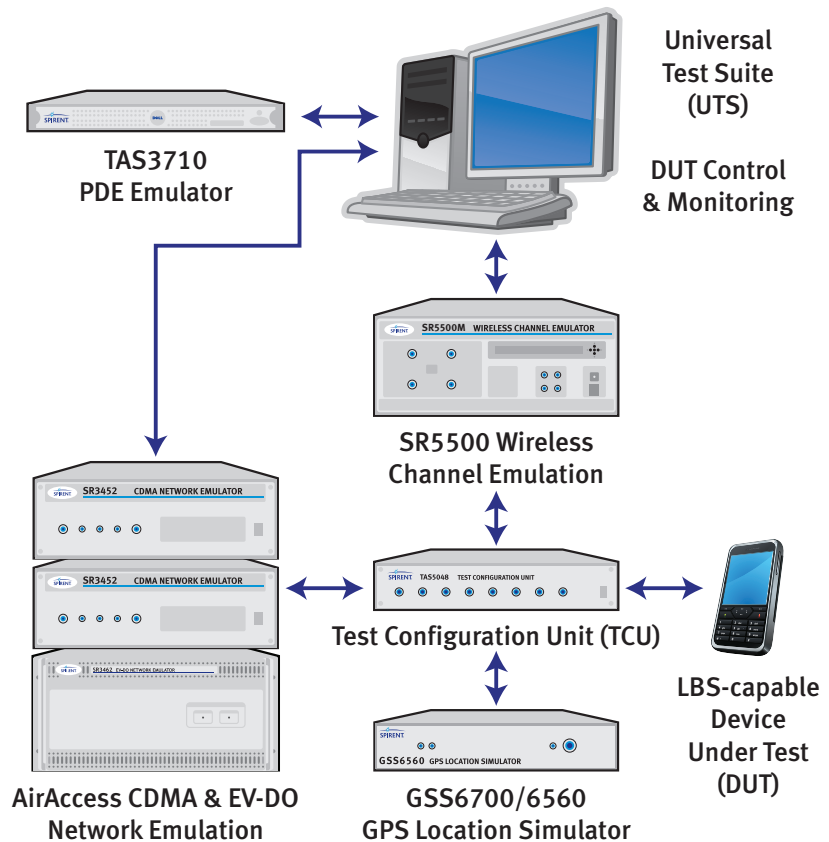
**PLTS SYSTEM ARCHITECTURE**

PLTS provides a complete turnkey test setup for evaluation of A-GPS- or GPS-capable CDMA mobile device performance. It is a highly integrated, automated and accurately synchronized test system that builds on Spirent’s global leadership in GPS and CDMA environment emulation.

The AirAccess® Network Emulator provides advanced protocol control, including support for the IS-801-1 Position Determination Service standard. Simultaneous multi-sector, multi-BSC emulation enables comprehensive AFLT and handoff scenario performance testing. An EV-DO option provides a proven test platform for 1xEV-DO LBS-capable devices. An impairments option adds the SR5500 Wireless Channel Emulator and the TAS5048 Test Configuration Unit instruments. This system configuration allows performance to be characterized under representative field conditions.

A GSS6560 GPS Location Simulator or GSS6700 Multi-GNSS Simulator provides highly accurate simulation of signals and associated propagation effects from up to 12 GPS satellites at two independent locations – one for the mobile device under test, and one for a static PDE reference receiver. An integral Position Determination Entity (PDE) performs network-based position determination using algorithms identical to those deployed in actual network entities. SimGEN’s Virtual Receiver function emulates the PDE reference receiver and outputs reference data directly to the PDE to reduce test time.

Two powerful software programs enable automated, closed-loop device testing. The TASKIT/PLTS test manager configures the system, executes the tests, then collects, analyzes and displays the test results. The Universal Tool Suite (UTS) interface controls the mobile device under test while simultaneously monitoring its real-time performance. UTS automates both mobile-terminated and mobile-originated calls.



PLTS system architecture is flexible and scalable to meet a wide range of testing needs.

## PLTS FOR LOCATION-BASED SERVICES TESTING

**SYSTEM COMPONENTS**

PLTS is comprised of several key Spirent instruments and associated software. Each component adds unique value as part of the automated system.

**TASKIT/PLTS Test Executive Software**

Controls system configuration, test execution, results logging and analysis.

- Eliminates the need for complex software programming
- Supports industry standard (IS-916) and custom test cases for both control and User Plane (TCP/IP)
- Displays results graphically with statistical analysis and pass/fail criteria

**Spirent Universal Tool Suite (UTS) Interface**

Automates testing through simultaneous mobile device monitoring and control.

- Full-featured mobile diagnostic monitor
- Enables automated configuration and control of mobile device under test

**AirAccess CDMA Network Emulator**

Provides highly configurable, real-time 1x/EV-DO CDMA network emulation.

- Real-time CDMA2000 1xRTT and 1xEV-DO, IS-95A/B, TSB-74 and J-STD-008 network emulation
- Support for IS-801-1 signaling with Data Burst and TCP/IP delivery methods and full message decode
- Multi-sector, multi-BSC emulation permits true soft, softer, hard and intergeneration handoffs

**GSS6560 GPS Location Simulator or GSS6700 Multi-GNSS Simulator**

Highly accurate simulation supports all-in-view and multi-path environments.

- Simulates up to 12 GPS L1 C/A Code satellite signals
- Emulates signal impairments, such as atmospheric and multi-path effects
- SimGEN software supports two locations: one for Mobile, one for PDE
- Reference Receiver with Virtual Receiver software
- Simulation of real-world complex motion; data captured via a GPS receiver can be loaded and played back
- The GSS6700 is also capable of emulating GLONASS and Galileo L1 satellites

**TAS3710 Position Determination Entity (PDE)**

Hosted on a compact server platform. Allows realistic system tests to be performed.

- Uses algorithms identical to those in the equivalent deployed network entity
- Key parameters are user-selectable via TASKIT/PLTS software
- PDE software supported by PLTS, tracks software release of the equivalent deployed network entity

**SR5500 Wireless Channel Emulator**

The industry standard for accurate and repeatable wireless channel emulation.

- Accurately emulates multi-path fading, delay spread, path loss and AWGN
- Enables modeling of representative field conditions for meaningful AFLT testing
- Exceeds requirements of 3G test specifications

**TAS5048 Test Configuration Unit**

Automatically manages the switching of RF connections in the system.

- Integrates system instruments for calibrated levels at device antenna
- Provides RF connection to mobile devices with one or two test ports
- Dynamically reconfigures system under software control

**CDMA NETWORK TOPOLOGY**

TASKIT/PLTS automatically converts BTS and mobile device location parameters into a graphical display, allowing the impact of CDMA network geometry on AFLT and hybrid positioning performance to be characterized.



TASKIT/PLTS TEST EXECUTIVE SOFTWARE

TASKIT/PLTS is an advanced, application-specific test executive that automates every aspect of position location test execution, data collection, results reporting and results analysis.

TASKIT/PLTS automatically configures all of the system elements and coordinates the test execution required to evaluate the position location performance of a mobile device.

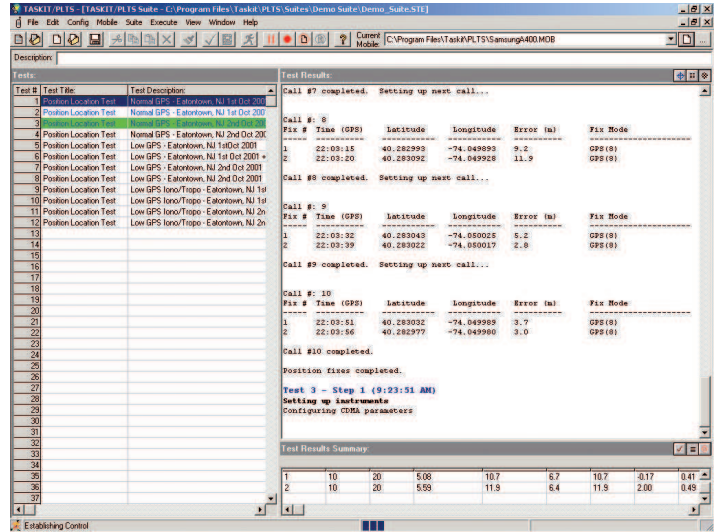
The TASKIT/PLTS test executive provides a structured means to automatically execute a series of test procedures. Test suites are a collection of individual tests, each designed to evaluate a particular aspect of the mobile device's performance.

STANDARD AND COMMERCIAL TEST SUITES

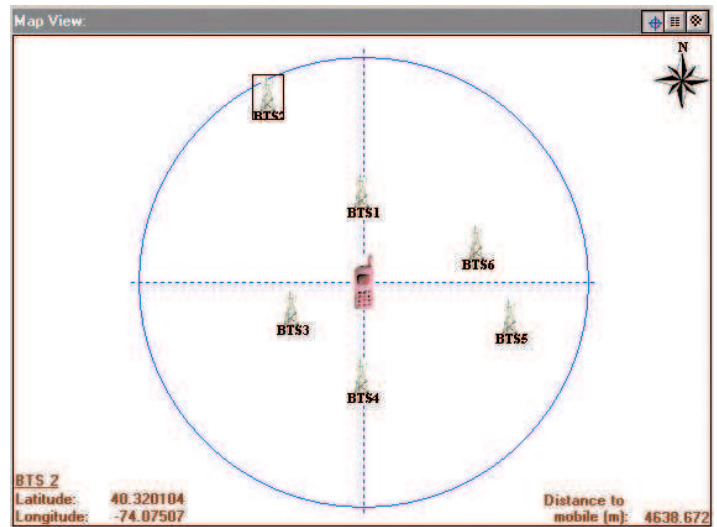
TASKIT/PLTS is a cohesive solution for testing a mobile device to key industry standards. With this software, predefined test suites can be quickly loaded and executed at the touch of a button.

TASKIT/PLTS test suites eliminate the need to comb through test standards and attempt to map the test conditions to instrument settings. Industry standard tests are regularly updated and Spirent provides the corresponding software updates.

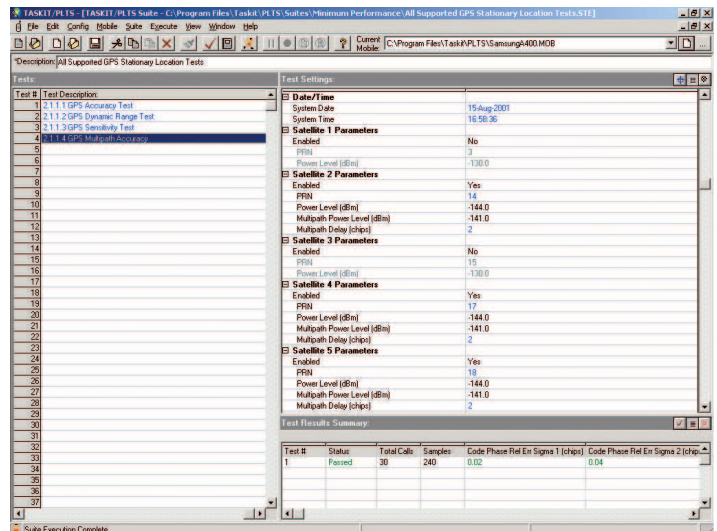
With the focus of service providers expanding into commercial location-based services, it is critical to characterize the end-user experience of those applications. While the TIA-916 Minimum Performance Tests have only been designed for control plane (IS-801-1) transport mechanisms, PLTS offers user plane implementations of these tests as part of its user plane option.



TASKIT/PLTS automates all aspects of test execution, data collection, and results reporting and results analysis.



TASKIT/PLTS' graphical display capabilities facilitate rapid diagnosis of performance issues due to poor network geometry.



With pre-defined test suites, TASKIT/PLTS provide a simple, efficient approach to ensuring compliance with industry standards.

## FIELD SCENARIO TEST SUITES

The impairments option combined with specific test suites gives PLTS field-test-like functionality. PLTS emulates representative field conditions where propagation impairments, such as varying levels of GPS and CDMA signal blockage, multi-path interference and Doppler spreading, may be present. Rural, suburban, urban and highway environments as well as indoor vs. outdoor operation can present very different operating conditions to location-capable mobile devices.

PLTS can also import GPS field data to provide an extremely realistic snapshot of a real-world scenario.

Lab-based testing is not yet accepted as a substitute for the field test methodology described in the FCC's OET Bulletin No. 71. However, the test methodology described in the bulletin can be simulated by PLTS, which automatically performs all statistical analysis per E911 Phase II mobile-based solution accuracy and resolution requirements.



PLTS' flexibility allows a wide range of field test scenarios, diminishing the need for expensive, non-repeatable field testing.

## OVER-THE-AIR TEST SUITES

The PLTS OTA test package automates the CTIA-specified OTA testing standards for A-GPS devices. The package offers an open interface for seamless integration of the C2K-ATS system with existing radiated testing hardware.

The test pack is designed to interface with any commercial or custom anechoic chamber. The test pack provides a Software Development Kit (SDK), allowing users to quickly build up a custom interface to control their chamber (turntable, antennas, etc.) directly from the TASKIT/PLTS test executive software.

### Technical Requirements for Anechoic Chamber

- Turntable (or other method of changing angle of arrival)
- GPS OTA path loss range: 40-60 dB
- Linearly polarized GPS antenna, able to transmit two orthogonal polarizations
- Minimum of one cellular antenna
- An OTA-equipped system can also be upgraded to provide similar testing for UMTS devices



The Over-the-Air test pack includes an SDK for interfacing to chambers and turntables.

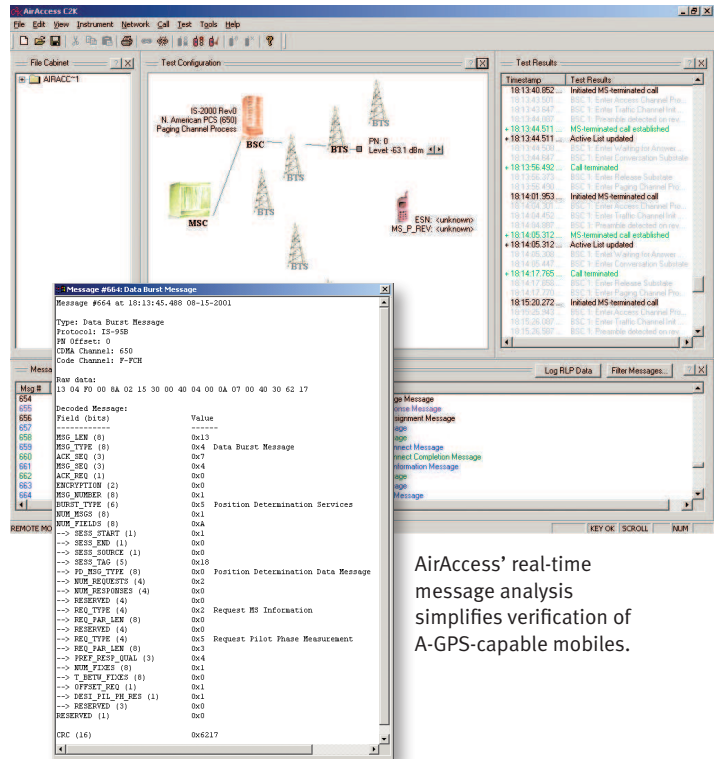
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### CDMA NETWORK EMULATION

AirAccess' dynamic state machine engine and interactive GUI make implementation of complex tests, such as handoffs, a simple task.

- No need to write complex programs or scripts
- Real-time emulation with response times representative of a real network
- Multi-sector and multi-BSC emulation with two independent carriers
- Comprehensive IS-801-1 message decoding
- Comprehensive control over critical network services, parameters and messages
- Real-time message and event analysis with comprehensive time-stamped Layer 2 and Layer 3 message logging



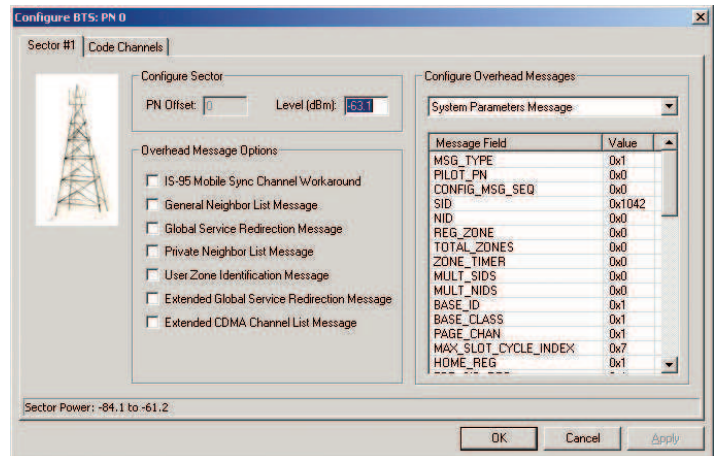
AirAccess' real-time message analysis simplifies verification of A-GPS-capable mobiles.

### NETWORK PARAMETERS

AirAccess' powerful state machine allows a CDMA mobile device to be tested as if it were interacting with real network infrastructure. Unlike a real network, however, the user is given complete control over network configuration parameters. Test parameters can be modified interactively in real time without the need to go offline to create individual test programs.

#### Key programmable network parameters include:

- Band classes
- Code channels
- Radio configurations
- All overhead message fields on a per-BTS basis
- Insertion of user-configurable IS-801-1 messages



AirAccess offers comprehensive control over network parameter settings

### STAND-ALONE MODE AND PREDICTED ORBITS

Recent developments have introduced stand-alone (autonomous) GPS device operation and predicted orbit algorithms to A-GPS receivers. These new features promise to let LBS applications grow in popularity without stressing networks. PLTS ensures that these features work as intended and without introducing new issues.

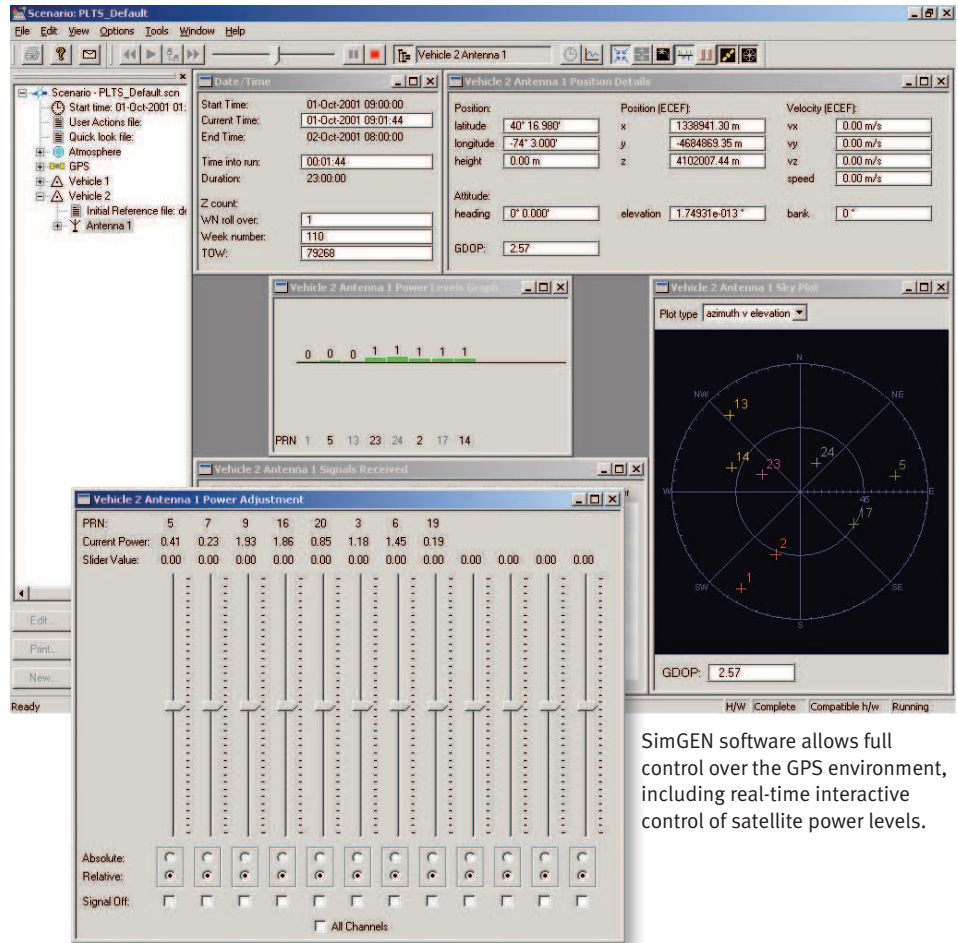


### GPS ENVIRONMENT EMULATION

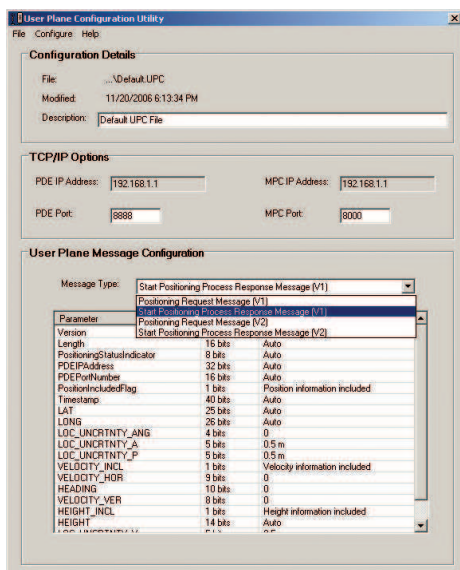
Spirent's world leadership position in GPS simulation is reflected in the capabilities of its GSS6560 and GSS6700 navigation-satellite simulators. These all-digital simulators employ advanced modulation techniques to offer exceptional repeatability, low phase noise and code/carrier coherence. Up to 12 signal channels support all-in-view and multipath environments.

#### SimGEN software features:

- An accurate and dynamic GPS environment
- Includes real-time models for satellite constellations, satellite errors, atmospheric signal degradation, terrain obscuration and multipath
- User-specified dates, times and geographic locations
- Comprehensive GUI displays real-time sky plot, date/time, vehicle and PDE reference receiver positions, received power levels, satellite signal details
- Full interactive control of individual satellite power levels
- Simultaneous simulation of two independent receiver locations, one for the PDE reference receiver, one for the mobile device under test



SimGEN software allows full control over the GPS environment, including real-time interactive control of satellite power levels.



The UPC emulator allows thorough performance analysis of commercial location services.

### USER PLANE NETWORK EMULATION

With the emergence of commercial location-based services (LBS), User Plane technologies are rapidly being deployed to support these next generation services. Instead of Control Plane implementations, where location-sensitive information is transferred between the mobile device and the network using standard CDMA signaling, User Plane implementations employ a TCP/IP connection between the MS and the location server.

The user plane option provides a software enhancement to the PLTS system, providing a platform for analyzing the performance and behavior of mobile

devices designed for interoperability with the QUALCOMM® User Plane (V1/V2) Architecture. This option adds test support for a wide range of LBS applications to PLTS, together with an integrated User Plane Configuration (UPC) utility that supports non-trusted LBS applications requiring authentication. With the user plane option, the performance analysis capabilities of the system are extended with a set of test suites based on the Control Plane TIA-916 Minimum Performance specification. Coupled with optional EV-DO support, a comprehensive platform is provided for analyzing 1xRTT and 1xEV-DO commercial LBS devices.

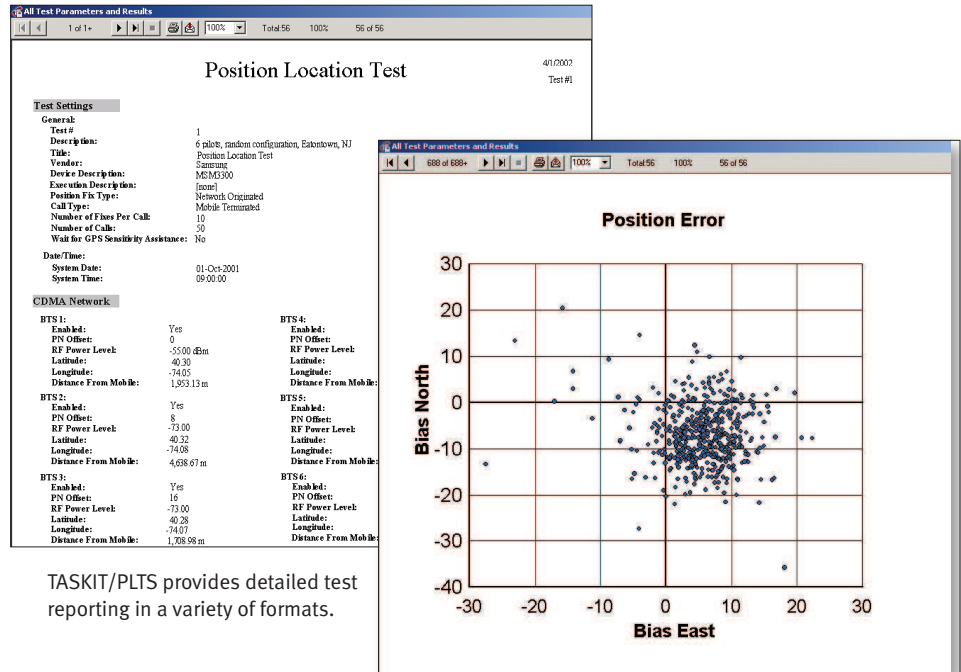
**COMPREHENSIVE TEST RESULTS**

TASKIT/PLTS makes it easy to collect and analyze mobile device test results and over-the-air message logs. All test parameters and results are stored in a Microsoft Access database for post-processing.

Storing a complete set of test data ensures the traceability of test results. This data includes detailed information describing the identity and characteristics of the device under test.

TASKIT/PLTS is equipped with a flexible and powerful report generation feature that uses the data to deliver results in a variety of user-friendly meaningful formats. Standardized results formats in TASKIT/PLTS enable service providers, test labs and manufacturers to make meaningful comparisons of mobile device performance.

For measurements that benefit from a graphical results format, TASKIT/PLTS captures, archives and displays detailed plot data.



TASKIT/PLTS provides detailed test reporting in a variety of formats.

**ORDERING INFORMATION**

SYSTEMS	
P/N C2K-CFG6-SYS-XX	C2K-ATS PLATFORM CONFIG 6 (SUPPORTS 1X SC/LBS)
P/N C2K-CFG7-SYS-XX	C2K-ATS PLATFORM CONFIG 6 (SUPPORTS 1X/EV-DO SC/LBS)
P/N C2K-CFG8-SYS-XX	C2K-ATS PLATFORM CONFIG 8 (SUPPORTS 1X MP/SC/LBS + EV-DO MP)
P/N C2K-CFG9-SYS-XX	C2K-ATS PLATFORM CONFIG 9 (SUPPORTS 1X/EV-DO MP/SC/LBS)
P/N C2K-CFG12-SYS-XX	C2K-ATS PLATFORM CONFIG 12 (SUPPORTS 1X/EV-DO MP/DATA + 1X SC/LBS)
P/N C2K-CFG13-SYS-XX	C2K-ATS PLATFORM CONFIG 13 (SUPPORTS 1X/EV-DO MP/SC/LBS/DATA)
P/N C2K-CFG14-SYS-XX	C2K-ATS PLATFORM CONFIG 14 (SUPPORTS 1X/EV-DO LBS)

**SPIRENT GLOBAL SERVICES**

Spirent Global Services provides a variety of professional services, support services and education services — all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at [www.spirent.com/gs](http://www.spirent.com/gs) or contact your Spirent sales representative.

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