

Conformance

Development & Conformance Test Solutions for Protocol and Performance Testing of A-GPS Mobile Devices

AEROFLEX
A passion for performance.



- Verification of Signaling and RF testing of A-GPS mobile devices
- Modular and flexible design for support of R&D and Conformance applications
- Solutions for ALL major cellular air interface
- Integrated 12 channel GPS Constellation Simulator
- 3GPP and 3GPP2 Wireless Standard Test Case packages
- Configurable Network Assistance Data Element (PDE / SMLC emulator)
- Support for MS-Based and MS-Assisted positioning methods
- Support for Control and User Plane techniques using LCS protocol
- Real time logging / full decode of all LCS protocol messages

As wireless location services extend beyond emergency services systems, wireless carriers are set to access wireless location functionality as value-added applications and services for their subscribers. Location Services (LCS) will be a powerful motivator for the development and marketing of location-enabled handsets and are set to be a valuable revenue generator for the carriers.

Time to market for mobile manufacturers is therefore critical. Sales volumes and profits are far higher for those that bring new products to market the fastest. To ensure rapid deployment of the new LCS features for their handsets, manufacturers have to reduce development time, however with the new feature set of LCS phones constantly evolving, this brings even greater complexity to the testing standards and with it the requirement for new compliance testing before a mobile terminal can be launched.

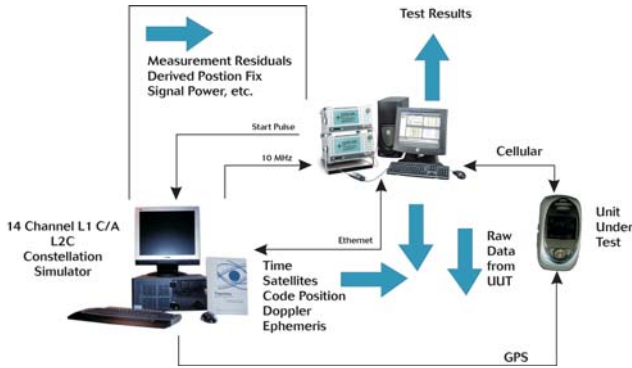
Designed to satisfy the rapidly emerging development and conformance test requirements of Assisted-GPS location services, the Aeroflex range of A-GPS Location Services test solutions are aimed at reducing time to market and the need for costly field trials by testing A-GPS implementation in the laboratory.

Using well-proven technology, the A-GPS test systems provide support for all the major cellular technologies - GSM (2G), GPRS/EDGE (2.5G), UMTS (3G) and CDMA (CDMA2000 to 1xEVDO). The Aeroflex A-GPS location services test systems provide a single solution for both the verification of signalling protocols and RF performance testing of A-GPS mobile devices.

SYSTEM OVERVIEW

Using the Racal Instruments Wireless Solutions ProCLAIME family of development and conformance test systems, the Aeroflex A-GPS solutions combine industry leading wireless air interface simulators with an advanced GPS constellation simulator solution from Navigation Laboratories.

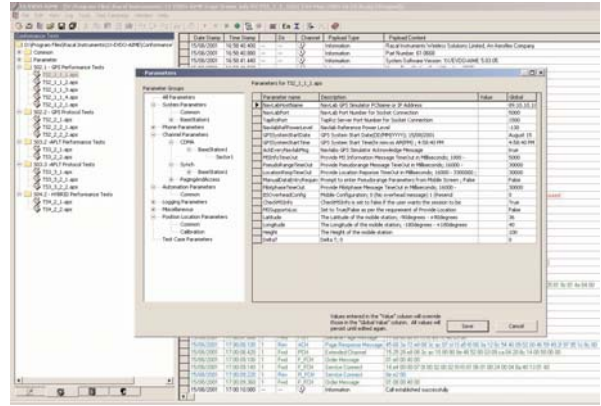
The fully integrated test environments have been developed for repeatable R&D and Conformance verification testing, with the systems being validated to the relevant wireless standards to ensure accurate synchronization between the wireless and GPS networks.



The wireless network emulation is based upon the leading Racal Instruments Wireless Solutions network system simulators such as 6103 AIME for GSM/GPRS, 6204 AIME for CDMA 2000 and 6401 AIME for UMTS. These well-proven technology platforms coupled with software environments for development and conformance testing provide the perfect solution for a user to observe the protocol behavior of a mobile station operating against a simulated wireless network.

Aeroflex has selected a GPS Constellation Simulator from Navigation Laboratories for integration into its A-GPS Location Services test solutions. The Navlabs simulator is widely used in global avionics, defense, and space applications, but exclusively by Aeroflex for A-GPS testing in wireless markets. The Navlabs simulator emulates the entire 24 satellite GPS constellation. The simulator provides high performance modelling of all associated GPS satellite and vehicle effects, providing a complete environment to develop and test A-GPS devices.

A software emulated Location Services network element has been developed by Aeroflex to provide ultimate flexibility and control over the LCS assistant data messaging content and call flow within the testing environment. The emulated Position Determination Entity (PDE) for CDMA, and Serving Mobile Location Centre (SMLC) for GSM and UMTS, provides support for all mandatory and optional LCS message exchange between the mobile and network. By providing a software-emulated element instead of one installed in a network, the operator is able to simulate a broader range of configuration possibilities, allowing comprehensive interoperability testing and protocol analysis of the LCS messaging without the limitations imposed by a commercial unit.



The systems support MS-Based and MS-Assisted positioning methods, and provide analysis of the pseudo-range and lat/long location response for the unit under test. Support for control and user plane techniques using the appropriate LCS protocol IS801 (CDMA), RRLP (GSM) and RRC (UMTS) allows simulation of the standard LCS call flow location requests for Control Plane, and for User Plane the capability to support TCP/IP wrapper, pre-SUPL and SUPL (Secure User Plane).

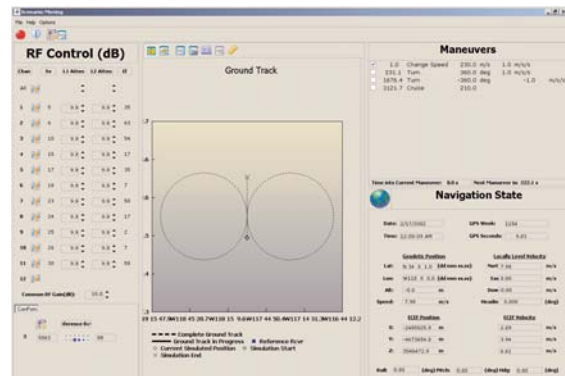
The standard real time logging and decode of the protocol signaling messages between mobile and simulated network has been enhanced to support the control and user plane messaging. A complete decode of the LCS message content is provided in an exclusive application window.

Fully compliant executable test cases developed and independently validated against the wireless standards definitions are available to support the appropriate 3GPP and 3GPP2 wireless standards. User modifiable versions of the test cases are available on the development system to allow testing beyond the test standards.

THE GPS SIMULATOR

This leading edge product provides a feature rich emulation environment that supports the complete modelling of the complex effects required for verification and evaluation of all characteristics of GPS equipment performance.

The Navlabs product is a computer-based simulator that combines/integrates an RF signal generator, with scenario development and modeling software within a Windows operating system. The flexible but intuitive user interface ensures that the software meets the needs of operators with varying levels of experience.



The simulator is supplied with pre-written GPS scenarios, developed to the appropriate 3GPP / 3GPP2 minimum performance standards. These scenarios include

- GPS Accuracy - Moving / Stationary
- GPS Sensitivity
- GPS Dynamic Range
- GPS Multipath

The Scenario Generation operating mode (supplied with the development solution) provides the operator with an interface that allows modification of the configuration, environmental and dynamic vehicle modeling in addition to the GPS system functions.

The constructed scenarios are inherently file based and can be repeatedly and deterministically executed. The graphical user interface provides simple to use pull-down menu bars and buttons within the modeling and scenario generation software to allow the operator to modify / develop their own scenarios to test beyond the conformance standards.

TEST ENVIRONMENTS

Aeroflex provides its customers with a fully scalable and upgradeable test platform that can be optioned with two software environments, Development and Conformance. These are designed to support the development lifecycle of the handset from R&D through to conformance validation.

The solutions can be quickly and simply converted to either environment with a straightforward software upgrade to allow users to move between R&D and validation.

Development:

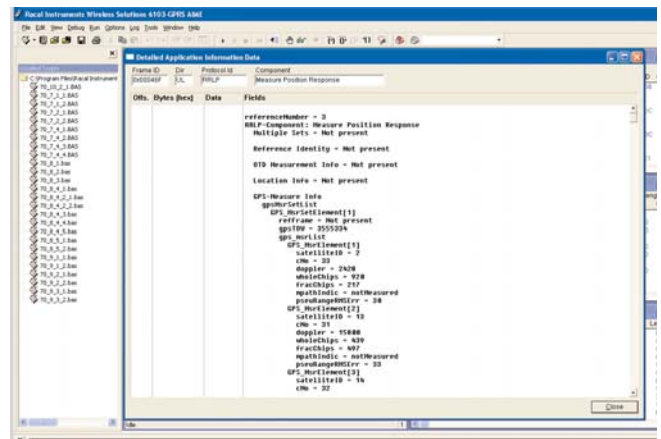
For integration and interoperability testing the development systems address the R&D requirements and are particularly focussed on:

- State machine debugging
- Protocol stack design
- Regression testing

Using the scripting environment, it is quick and easy for the operator to develop their own scripts and run a simulation, this allows development testing for specific LCS elements of the mobiles operation, through to generation of complex simulations to reproduce a field environment.

The powerful API provides the user with complete test flexibility. Examples of testing that can be carried out include:

- Access to each Layer of the protocol structure including the new LCS messaging
- Ability to define any LCS protocol message, including the configuration of the Assistance Data content



The user interface is designed to be easy to use and provides a number of features designed to support test requirements:

- Real time logging
- Decoding of detailed protocol signaling messages between the mobile and network
- LCS status analysis of the device under test
- Generation of log files to allow off-line protocol analysis
- Colour coding of information to improve readability
- Ability to synchronise traffic, layer 2, layer 3 and LCS protocol frames
- COM based API allowing example scripts to be written in any COM based language

Conformance:

The conformance solutions allow the operator to execute validated 3GPP / 3GPP2 conformance test cases, and are aimed at the latter stages of the development lifecycle.



For conformance testing Aeroflex delivers fully compliant test cases approved by the appropriate technical certification organisation. These test cases have been written to the associated technical standards of the wireless technology.

- GSM - 3GPP TS51.010 Section 70
- CDMA - TIA 916 (C.S0036)
- UMTS - 3GPP TS34.123 and TS34.171

Within the conformance environment, the automatic report generator and analysis software produces detailed results analysis defined to the conformance standards.

TEST CASE PACKAGES

For development and conformance testing, test scripts written to the 3GPP/3GPP2 standards are supplied. These test cases are fully automated ensuring that the network emulator hardware and the GPS simulator are configured to the operators' requirements. In the development environment, test cases are operator modifiable allowing parameters to be modified for testing beyond the test standards. In the conformance environment, test cases are supplied non-modifiable to ensure that every run complies with the test standard.

SUPPORT

Support of the system hardware is an essential element in maximizing efficiency and return on investment of the equipment. Aeroflex offers several comprehensive hardware support packages, which are tailored to typical usage profiles.

The solutions are delivered with a comprehensive worldwide hardware, software and test case support package. Three tiers of support packages are offered to the user: Standard, Silver and Gold.

Regardless of the level of support chosen, users have access to a helpdesk facility where any faults or issues can be logged, and are guaranteed to receive a response from Aeroflex within the next working day.

The support also covers issues such as specification tracking and any changes in the 3GPP versions of the standard. To fulfill specific support needs, the user is able to customize any of the support packages.

Further details about support can be found in the support section on the Aeroflex website.

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

ORDERING NUMBERS

GSM Operation

- 6103G GSM Digital Radio Test Set
- 6103G-009 Quad Band Operation (GSM 850,900,1800,1900)

Hardware

- 6103G-93 Controlling PC Workstation
- 6103G-95 GPS Simulator (NLC-LP-AGPS)

Software Environment

- 6103G-300 GSM AIME Software
- 6103G-361 A-GPS AIME (GSM LCS Software + RRLP/RRC Protocol)
- 6103G-378 A-GPS AIME/CT Software

Test Case Packages

- 6103G-695 A-GPS Test Case Package - 3GPP TS51.010 Sect 70.7.x
- 6103G-696 A-GPS Test Case Package - 3GPP TS51.010 Sect 70.8.x - 70.10.2.x

CDMA Operation

- 6204 CDMA Base Station Emulator Unit - Dual Carrier

Hardware

- 6204-171 GPS Simulator (NLC-LP-AGPS)

Software Environment

- 6204-111 CDMA2000 1x rel A AIME
- 6204-190 A-GPS (CDMA LCS Software + IS801 Protocol)

Test Case Package

- 6204-211 IS916 Location Based Services (Section 2, 3 & 4) Test Cases

UMTS Operation

- 6401-001 1 UMTS carrier/3 cells

Hardware

- 6400-250 Master PC for 6401 AIME
- 6400-280 GPS Simulator (NLC-LP-AGPS)

Software Environment

- 6401-100 UMTS software
- 6401-190 A-GPS (UMTS LCS Software + RRLP/RRC Protocol)

Test Case Package

- 6401-310 GCF WI-015 A-GPS Test Cases

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.