Protocol Test
6401 AIME/CT

UMTS Conformance and Protocol Analysis Test Solution
GSM/GPRS-UMTS Handover Conformance/Protocol Analysis Test Solution
3G AGPS Test Solutions

AEROFLEX
A passion for performance.

The 6401 AIME/CT is a 3GPP TS 34.123 and TS 51.010 UMTS Compliant mobile protocol analyzer and conformance tester. Features include:

- Support for HSDPA and HSUPA
- ISHO Option for GSM/GPRS-UMTS handover testing
- Upgradeable to WCDMA A-GPS test system
  - Protocol TTCN test support
  - Minimum performance testing
  - OMA SUPL testing
- Sample C++ and ETSI sourced TTCN test cases
- Independent third party validation
- 2/2.5/3G-combined integrated logs for ISHO testing
- Fully automated testing including mobile control
- Highly modular flexible design extends use to R&D
- User friendly Windows™ MMI for ease of use
- Full training and support packages included

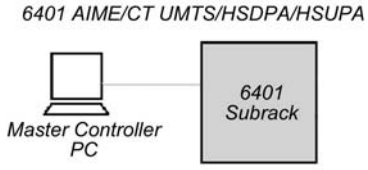
The 6401 AIME/CT solution enables UE protocol and conformance tests to be performed in-house prior to submission to the authorized third parties for certification thus accelerating the development process. The Aeroflex 6401 and 6103G, for UMTS and GSM respectively, are in widespread use by conformance test labs around the world. This considerably reduces the uncertainty, cost and time it takes to gain full certification and to deliver a product to the market.

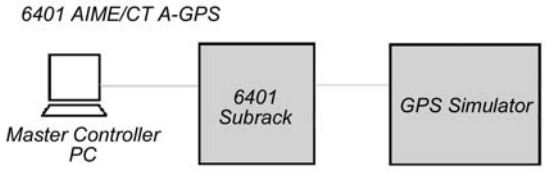
Introduction

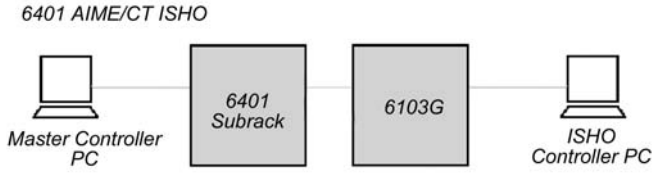
The Aeroflex 6401 provides a 3GPP UMTS/HSDPA/HSUPA protocol and conformance test solution. Using a completely modular platform, the 6401 uses industry proven DSP and baseband technology to provide a near 'software only' protocol test solution. This enables the 6401 to remain future proof as the UMTS standards evolve and new features are introduced, thereby protecting the investment made in the test system.

Aeroflex delivers a total solution where elements such as reliability, support and customization are recognized to be of equal importance. This approach enables solutions to be offered that can be tailored to meet the specific needs of the user.

For intersystem handover testing, the 6401 is combined with the mature industry validated Aeroflex 2/2.5G 6103G platform. Known as the 6401 AIME/CT ISHO, the solution leverages the capability of both platforms to deliver all required functionality from the outset. An Assisted GPS (A-GPS) option is also available for R&D and conformance testing of devices implementing this variant of location based services (LBS).







PLATFORM AND SOFTWARE ENVIRONMENT

The 6401 platform provides the protocol analysis capability to allow a user to observe the protocol behaviour of a mobile at the Uu interface whilst operating against a simulated 'perfect' UMTS network. The faithfulness of the network simulation is achieved within the 6401 by embedding a 3GPP compliant network protocol stack solution at Layers 1 and 2.

The AIME/CT software environment runs on the 6401 and can be used to address two distinct applications:

- Conformance testing
- Research and development

For conformance testing, the AIME/CT software environment can be used to run the various test cases and provides an independently validated fully compliant 3GPP UMTS mobile conformance test solution.

The AIME/CT software can also be used as a protocol test tool for those involved in research and development (R&D), system integration and interoperability testing for UMTS mobiles. A number of additional software components are available as options to extend the functionality and flexibility of the 6401 for these R&D applications.

AUTOMATION

The test system supports the automation of test campaigns. Test cases and scripts can be assembled into test campaigns and then automatically executed where separate log and report files are generated for each test in the campaign.

To fully automate testing, the mobile under test can be controlled via a serial interface. This improves the efficiency of testing as it removes the need for manual intervention.

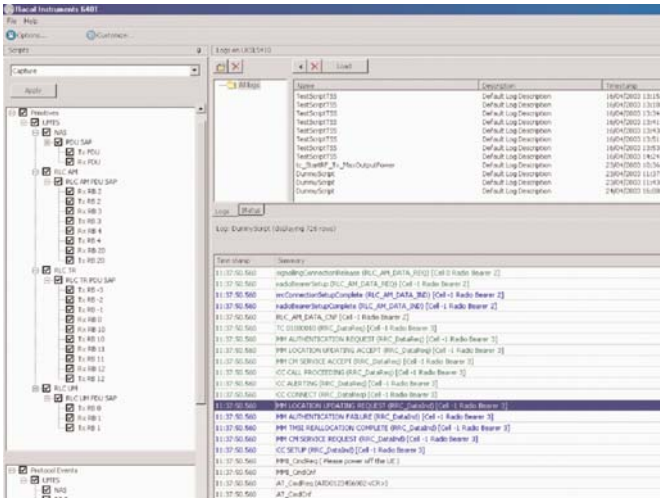
CONFORMANCE TEST APPLICATIONS

The AIME/CT software allows a user to execute validated 3GPP conformance test cases. Operation of the software is very simple. The MMI is built on core ProCLAIME customer proven features:

- Ease of use
- Clear display of pertinent information
- Separate on-screen windows to show information such as available test cases, system status and generated log files
- High level summary of the status whilst the test is being executed
- Dialog boxes 'pop-up' to prompt the user during test execution

The user selects the appropriate test case or test campaign. To run, only a single click action is required. A new test campaign is easily built through clicking and selecting on the desired test cases.

On test completion the test case verdict is displayed and a test report file generated. The report file contains summary information of the test conditions and test verdict. The report can be either printed or exported in a standard file format.

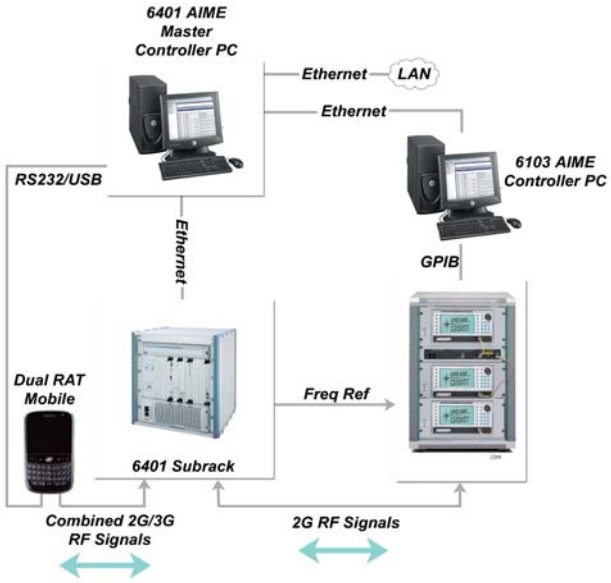


TEST CASE PACKAGES

For conformance testing Aeroflex delivers fully compliant 3GPP 34.123 and 51.010 Conformance Test cases approved by the Global Certification Forum (GCF) and the PTCRB (PCS Conformance Review Board).

The effectiveness of the conformance test solutions is defined by the integrity of the supplied test cases. The integrity of the test cases is ensured through a rigorous process including certification and pre-validation before delivery to external 3rd party validators.

Aeroflex supplies validated protocol conformance executable test suites to test the degree of compliance of a UMTS mobile. Only ETSI sourced TTCN is used thus avoiding the compliance issues associated with using TTCN independently derived from the specifications and therefore subject to misinterpretation and ambiguity.



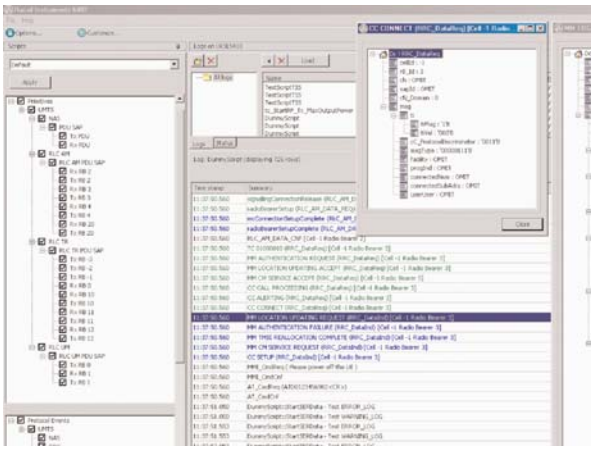
Intersystem Handover (ISHO) Test Solution

R&D APPLICATIONS

The AIME/CT software is also designed to address applications in R&D and interoperability testing. The powerful software environment provides access to features such as:

- Detailed protocol signaling exchange between the mobile and the network with diagnostic capability
- Real time logging, decoding and filtering of the information
- Filtering capability to capture desired information down to specific 3GPP primitives
- Colour coding of the information to improve readability of screens
- Generation of log files to allow off-line protocol analysis
- Modification of TTCN conformance test cases
- Development of TTCN test cases
- Development of new test cases in any COM based language

Thus, a user can configure the 6401 AIME/CT to emulate specific UMTS network configurations and Intersystem Handover (ISHO) to quickly identify incorrect protocol behaviour within the mobile. From either the on-screen display or the log-files detailed information can easily be understood.



INTERSYSTEM HANDOVER (ISHO)

As a consequence of the coexistence of UMTS and GSM networks, mobiles must have the capability to handover between the two. The test requirements to support handover between 2/2.5G and 3G are captured in test specifications 51.010 and ETSI TS 34.123.

The 6401 AIME/CT can be upgraded to support the handover conformance test cases. Aeroflex provides an integrated solution using the 6401 and GCF validated 6103 AIME/CT (2/2.5G platform). The solution leverages the capability of both platforms, to deliver all required functionality from the outset, to support mobile handover between a GSM/GPRS & UMTS network.

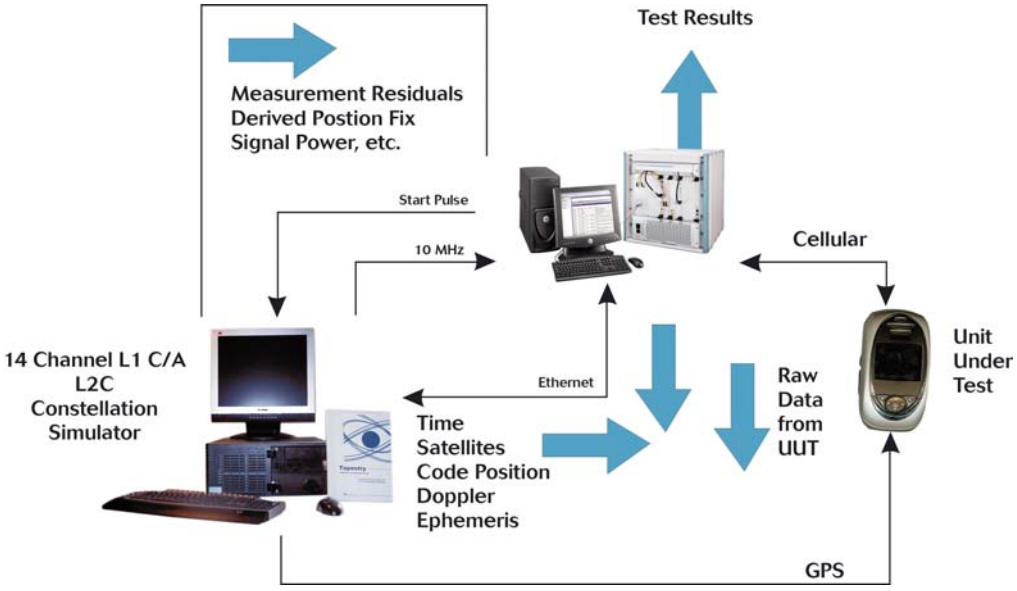
The 6103 AIME (E)GPRS mobile terminal protocol tester provides the 6401 AIME/CT ISHO user with full Layer 2 and Layer 3 monitoring and emulation capability for the Um interface. The features of this test and development tool allow the (E)GPRS software designer to monitor, debug and fault find protocol interchanges on the Um interface.

The master control is provided by the 6401 AIME/CT product (6401 AIME Controller PC plus 6401 chassis) within the ISHO solution. The 6401 AIME/CT combines its own RF signals with those from the 6103G test sets to provide a duplex connection to the UE.

The minimum configuration supports emulation of one UTRAN cell and 2 GERAN cells. The product allows simple hardware expansion to support emulations of multiple UTRAN and GERAN cells on different frequencies if required, up to the maximum of 3 UTRAN and 3 GERAN cells needed by the standard 3GPP Inter-RAT test cases.

A-GPS Test Solution

The 6401 AIME/CT system and Navigation Laboratories L1 GPS simulator are a fully integrated solution, providing both the cellular and GPS RF output coupled through a combiner within the GPS rack. The rack, as well as housing the GPS simulator, also provides either a single connection to a combined WCDMA/GPS connection or separate RF connections to the device's GPS receiver and the WCDMA antenna.



3G A-GPS Test Solution

GPS Simulation

Aeroflex has partnered with Navigation Laboratories, a leading provider of GPS test solutions, to provide an integrated 12 channel Constellation Simulator that is already widely used in global avionics, defense and space applications, but exclusively used by Aeroflex for A-GPS testing in wireless markets. The NavLabs satellite simulator emulates the entire 24 satellite GPS constellation and provides high performance modeling of all associated GPS satellite and vehicle effects, to provide a complete environment for developing and testing A-GPS devices.

Supported Features

The 6401 AIME/CT supports all three location methods defined in 3GPP.

Mobile-Assisted is where a device is sent via the network all the data concerning the location of the satellites (assistance data). The device then makes the measurements and sends these back to the network, so a position fix can be made on the network side.

Mobile-Based, the assistance data is again provided however the terminal calculates the position fix and sends it back to the network. This method is often favored by operators as infrastructure costs and complexity is reduced.

Conventional GPS, where a device supporting speech and a traditional GPS chipset, but not supporting any assistance data, instead using a traditional GPS fix, then sending the location back to the network over a simple RRC message. This is typically only used in emergency 911 or 112 situations.

Auto-assistance data is generated from the GPS simulator and sent through the AIME system and delivered over the control or user plane to the mobile terminal without any need for manual intervention.

To support the commercial LCS market, where location is becoming a key factor in mapping or 'where are you or your friends' applications, the 6401 AIME/CT system supports user plane location techniques, as specified by the OMA in their industry-standard SUPL specification. The 6401 AIME/CT A-GPS supports all classes of testing: Protocol/TTCN, Minimum Performance and the Open Mobile Alliance's (OMA's) Secure User Plane Location (SUPL) testing.

FUTURE PROOF

The 6401 hardware design uses compact PCI architecture, controlled and configured from an external PC. Baseband and RF transceiver modules are used to generate channels and RF carriers. The modular system architecture allows many different configurations. The result is a test solution easily upgraded if additional capabilities are required. The user has the capability to emulate highly complex network scenarios or generate multiple channels as test needs evolve.

For conformance testing, the 6401 is focused to first meet the higher priority GCF identified UMTS protocol conformance test cases. The more complex test cases that require emulation of up to 5 UMTS cells and generation of multiple RF carriers can easily be accommodated.

SUPPORT

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

Two tiers of support packages are offered to the user. 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 fulfil 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.

SPECIFICATIONS

Frequency Range

800 to 960 MHz

1,710 to 2,200 MHz

Frequency Bands

3GPP FDD I, II, III, IV, V, VI, VIII, IX, X

RF GENERATOR

FREQUENCY

Raster

5 kHz

Accuracy

As frequency standard

OUTPUT LEVEL

Range (RF Duplex Port)

-25 to –110 dBm

Resolution

0.25 dB

ACCURACY

Relative

+ 0.5 dB/1 dB step

Absolute

+5 dB

PORTS

RF Duplex Port

Connector

N type Female

Impedance/Coupling

50 Ω nom/DC

VSWR

<1.8:1

Max Reverse Power

36 dBm

RF RECEIVER

FREQUENCY

Raster

5 kHz

Resolution

<1 MHz

Tolerated Frequency Error

±300 Hz

INPUT LEVEL

Range (RF Duplex Port)

+36 to -60 dBm

Measurement Accuracy (>45 dBm)

Resolution

0.1 dB

Relative

<±1 dB/20 dB

Absolute

<±2 dB

TIMEBASE (FREQUENCY STANDARDS)

EXTERNAL REFERENCE INPUT

Connector

SMA female

Frequency

N x 1, N =1, 2, 5, 10, 12, 13 or 15

N x 1.2288, N = 1, 2, 3, 4, 6, 8, 9, 12 or 16

Level

-2 to +19 dBm

Impedance / Coupling

50 Ω nom / AC

Reference Output

10 MHz (internal standard) or

external reference input frequency or

13 MHz

Level

+9 dBm ±2 dB

Impedance/ Coupling

50 W nom/AC

Connector

SMA female

Internal Overall Stability

±0.05 ppm per year

Timing Markers

Timing Signals Provided

1.25, 2.5, 5, 20, 26.66 ms, 2 sec and a programmable marker

Accuracy

60 ns

SOFTWARE

CONTROL PC MINIMUM SPECIFICATION

Please contact Aeroflex for information about the recommended compatible PC.

CPU

Pentium 4 2.8 GHz

RAM:

1 GB

HDD

40 GB, with Ultra ATA/100

I/O Interface

100 Mbps Ethernet

CD

32 X CD-ROM

Graphics

SXGA (1280 x 1024) resolution

O/S

Windows 2000 Server + Microsoft SQL Server 2000

GENERAL INFORMATION

Dimensions (WHD)

562 mm x 526 mm x 420 mm

Weight

60 kg max

Power Consumption

1000 Watts max (excluding PC)

Voltage Range

85 to 130 V and 180 to 264V AC

Frequency Range

47 to 66 Hz

ENVIRONMENTAL AND SAFETY

Operating Temperature

10°C to 35°C

Humidity

5% to 85% RH (non-condensing)

Calibration

2 years

1 year for ISHO system (with 6103G)

EMC

Complies with EN61326-1 :1997+A1 : 1998 , Class A (emissions), EN61326-1 :1997+A1 : 1998 Table 1 (immunity)

Safety

Complies with EN61010-1: 2001

ORDERING INFORMATION

6401 MOBILE AIR INTERFACE TEST SYSTEM

6401-001	1 Carrier, 3 Cell capability
6401-002	2 Carrier, 4 Cell capability
6401-003	3 Carrier, 5 Cell capability

INTERSYSTEM HANDOVER SOLUTIONS

6401-007	1 UMTS Carrier, 3 cells plus 1 GSM/GPRS Cell
6401-008	2 UMTS Carriers, 4 Cells, plus 2 GSM/GPRS Cells
6401-009	3 UMTS Carriers, 5 Cells, plus 3 GSM/GPRS Cells

A-GPS AND LBS SOLUTIONS

6401-700	GPS Constellation Simulator (NLC-LP-AGPS) and RF Combiner unit
6401-700-C0	Standard calibration certificate ordered at the same time as the GPS simulator

CONTROL PC

6400-250	Master PC for 6401 AIME
6400-254	PC Workstation for ISHO (6103G-93)

SOFTWARE ENVIRONMENT

6401-100	UMTS Capability (AIME/CT)
6401-110	TTCN Target Adapter software
6401-115	A-GPS Minimum Performance Upgrade
6401-160	HSDPA Protocol Test Capability
6401-165	HSUPA Protocol Test Capability
6401-170	Internal Fading & AWGN
6401-190	A-GPS LCS (A-GPS software + RRC/RLP Protocol)
6401-502	ISHO software

TEST CASE DEVELOPMENT TOOLS

6401-111	TTCN Compilation Suite
6402-112	TTCN Editor/debug Suite
6401-120	TT Workbench Professional + Test Adapter
6401-195	A-GPS Development software

FUNCTIONALITY UPGRADES

6401-601	Adds 1 RF transceiver and 1 Baseband board
6401-602	Adds 2 RF transceivers and 2 Baseband boards
6401-603	Adds a 2 GSM carrier GPRS AIME system
6401-604	Adds one 6103G
6401-606	ISHO upgrade combiner and cable kit

OPTIONAL SOFTWARE

6401-150	Standalone Log Analyzer

3GPP 34.123 and 51.010 CONFORMANCE TEST CASES

6401-210	GCF W1-010 P1 Test Cases
6401-220	GCF W1-010 P2 Test Cases
6401-230	GCF W1-010 P3 Test Cases
6401-240	GCF W1-010 P4 Test Cases
6401-250	GCF WI-010 USIM Test Cases
6401-260	GCF WI-010 ISHO CS & PS GSM-UMTS Test Cases
6401-270	GCF WI-014 HSDPA Test Cases
6401-280	GCF WI-012 R99 Enhancement Test Cases
6401-290	GCF WI-012 R99 Enh. and WI-017 DTM ISHO Test Cases
6401-300	GCF WI-013 R4/R5 Test Cases
6401-310	GCF WI-015 A-GPS Test Cases
6401-320	GCF WI-025 HSUPA (Enhanced Uplink) Test Cases
6401-330	GCF WI-24 Rel-6 Enhancements Test Cases
6401-350	GCF WI-30 A-GPS Min Performance Test Cases
6401-360	GCF WI-58 OMA SUPL Test Cases
6401-380	GCF WI-47/51/52/53 FDD Inter band Test Cases
6401-390	Network Operator A-GPS E911 Performance Tests

Note. Please refer to separate Test Case product information for further details.

GPRS/EGPRS TEST CAPABILITY

Please refer to separate 6103 AIME/CT Conformance Test System product information sheet.

ACCESSORIES

6400-115	Flight case for 6401 sub-rack
6400-270	Printed User Manual
6401-520	Test USIMs for WCDMA testing
6401-630	Test USIMs for ISHO testing

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AEROFLEX
A passion for performance.

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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.

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