



Agilent N5973A IFT Automation for Verizon Wireless Compliance Test Plans

Technical Overview

Accelerate testing and reporting to Verizon Wireless Compliance Test Plans

COMPLIANCE TEST PLAN
LTE - CDMA INTER-RAT OPERATIONS

Test Summary

Manufacturer	Model Number	Serial Number	Hardware Version	Firmware Version	Software Version	Test Date	Start Time	Duration	Test Location	Tester
Agilent	30000000	ZZZZ	A	A3800	A-3800	09/23/09	09:21:42	05:24:42	Programmer's Workshop	Paul Miller

Test Execution Progress

Test Suite Completion	Total Tests Executed	Test Plan Results	Overall Test Suite Results
40.00%	20.00%	Pass Rate: 80.00%	Pass Rate: 75.00%
0.00%	0.00%	Fail Rate: 0.00%	Fail Rate: 0.00%
0.00%	0.00%	Unstable: 0.00%	Unstable: 0.00%

Test Case

Test Case	Test Description	Duration	Test Result	Comment	Log File
1.1	Test Case 1.1: Verify that the UE can successfully register to the network.	00:01:00	Pass		
1.2	Test Case 1.2: Verify that the UE can successfully perform a handover from 2G to 3G.	00:01:00	Pass		
1.3	Test Case 1.3: Verify that the UE can successfully perform a handover from 3G to 2G.	00:01:00	Pass		
1.4	Test Case 1.4: Verify that the UE can successfully perform a handover from 2G to LTE.	00:01:00	Pass		
1.5	Test Case 1.5: Verify that the UE can successfully perform a handover from LTE to 2G.	00:01:00	Pass		
1.6	Test Case 1.6: Verify that the UE can successfully perform a handover from LTE to 3G.	00:01:00	Pass		
1.7	Test Case 1.7: Verify that the UE can successfully perform a handover from 3G to LTE.	00:01:00	Pass		
1.8	Test Case 1.8: Verify that the UE can successfully perform a handover from LTE to 3G and back to LTE.	00:01:00	Pass		
1.9	Test Case 1.9: Verify that the UE can successfully perform a handover from 3G to LTE and back to 3G.	00:01:00	Pass		
1.10	Test Case 1.10: Verify that the UE can successfully perform a handover from LTE to 2G and back to LTE.	00:01:00	Pass		
1.11	Test Case 1.11: Verify that the UE can successfully perform a handover from 2G to LTE and back to 2G.	00:01:00	Pass		
1.12	Test Case 1.12: Verify that the UE can successfully perform a handover from LTE to 3G and back to LTE.	00:01:00	Pass		
1.13	Test Case 1.13: Verify that the UE can successfully perform a handover from 3G to LTE and back to 3G.	00:01:00	Pass		
1.14	Test Case 1.14: Verify that the UE can successfully perform a handover from LTE to 2G and back to LTE.	00:01:00	Pass		
1.15	Test Case 1.15: Verify that the UE can successfully perform a handover from 2G to LTE and back to 2G.	00:01:00	Pass		
1.16	Test Case 1.16: Verify that the UE can successfully perform a handover from LTE to 3G and back to LTE.	00:01:00	Pass		
1.17	Test Case 1.17: Verify that the UE can successfully perform a handover from 3G to LTE and back to 3G.	00:01:00	Pass		
1.18	Test Case 1.18: Verify that the UE can successfully perform a handover from LTE to 2G and back to LTE.	00:01:00	Pass		
1.19	Test Case 1.19: Verify that the UE can successfully perform a handover from 2G to LTE and back to 2G.	00:01:00	Pass		
1.20	Test Case 1.20: Verify that the UE can successfully perform a handover from LTE to 3G and back to LTE.	00:01:00	Pass		

Simplify Your Verizon Wireless Compliance Test Process

- Verizon Wireless-listed test solution
- Repeatable test execution and reporting
- Includes IMS-SIP server and client, supporting both IPv4 and IPv6
- Builds on Agilent IFT software and is expandable to other test plans
- Supports Agilent's established 8960 and PXT test sets

Developers and operators are increasing their focus on testing the real-world performance of user equipment (UE) before deploying the devices on live networks. While conformance test is necessary, it is not sufficient to determine the user experience during different handovers and user scenarios.

Testing handovers between different radio access technologies (RAT) is becoming increasingly important in the verification of LTE UE. When out of the LTE service area the UE typically reverts to the network's 2G or 3G infrastructure. For a positive end-user experience, the UE needs to transition smoothly between these technologies.

Additionally, delivering voice services on all-IP networks such as LTE (i.e. IMS-VoIP or VoLTE) presents a real challenge to developers and providers. Ensuring actual customer experience meets or exceeds the service users have come to expect on circuit-switched systems is critical.

The Agilent N5973A automation scripts implement Verizon Wireless Compliance Test Plans in Agilent's interactive functional test (IFT) software. Used in conjunction with Agilent PXT and 8960 (E5515C/E) wireless communications test sets, the solution brings real-world network test scenarios into the lab environment.



Anticipate increasing UE performance demands

Network operators are motivated to ensure that performance of UE on their network results in a positive end-user experience. While signaling conformance test addresses certain aspects of functionality, operators typically want to conduct more representative performance testing under different network conditions. Examples include verifying the UE behaves as expected after a base station signal is lost or when moving between different base stations, and in maintaining an active data connection through InterRAT handovers such as LTE to 3G. These real-world use scenarios supplement traditional conformance test and are commonly formalized into operator-specific test plans, requiring UE be subjected to demanding compliance testing before being approved for use on an operator's network.

Accelerate design and verification test cycles

Agilent has developed a number of test scripts based on the Verizon Wireless requirements for compliance test. Our measurement knowledge and experience of testing is built in to the pre-defined test cases, so you do not have to deal with the complexity associated with test development, instrument control, and data management.

Our test software allows you to create your own test plans in a drag-and-drop environment. You can run tests unattended and progress rapidly to deployment, providing reliable, repeatable measurements and automatically generating measurement reports to a Verizon Wireless-approved format.

Achieve compliance testing to Verizon Wireless test plans

The Agilent N5973A IFT automation for the Verizon Wireless compliance test plan allows you to focus on testing to the Verizon Wireless compliance standards without having to create complex code or program test equipment. Developed specifically for engineers engaged in design verification of LTE UE for use on Verizon Wireless networks, this solution supplements your wireless testing expertise with Agilent experience and measurement knowledge. Three options are currently available specifically for testing to Verizon Wireless compliance plans: N5973A-1FP CDMA InterRAT operations, N5973A-2FP CDMA InterRAT operations simultaneous voice and data, and N5973A-4FP IMS VoIP.

Get ahead faster

Agilent provides start-up assistance services to help you learn and harness the power of the N5973A software products. One day of start-up assistance is mandatory for the first-time purchase of the N5973A. Additional days of start-up assistance or productivity assistance can be ordered if required.

Efficiently test and report results

- Drag-and-drop environment for sequencing pre-defined test cases into test plans
- Customizable UE control
- Generated results reported to a Verizon Wireless-approved format

Keep your test plans productive and current

Software and technical support contracts (STSCs) entitle you to software updates and feature enhancements, as well as direct access to technical experts. These contracts are designed to increase your productivity by delivering software updates and providing a formal technical support channel for any operational difficulties you may encounter.

Our technical support engineers are experts on the N5973A test plans and related hardware. They have instant access to software and test sets enabling them to resolve your issues quickly. Agilent will investigate all software defects and operational problems reported through the technical support channel. Upon completion of the investigation, we will advise you of possible solutions or functional alternatives. Where possible, Agilent will provide software releases to address problems caused by defects in the software.

The N5973AS STSC covers all automation scripts you have purchased for the N5973A and also provides you with updates to the related IFT and IMS-SIP software. Contracts run for a fixed period, usually one year. An STSC will be required for each PC on which you are running N5973A automation scripts.

Support for Agilent's established 8960 and PXT test sets

LTE, cdma2000® (eHRPD and 1xRTT) base station emulation is achieved using the Agilent PXT and 8960 wireless communication test sets. Already established in the world of 2G, 3G, and 4G performance and conformance test, these leading test sets now support both IPv4 and IPv6 addressing, neighbor cell advertisement, and the

required security configuration to implement the Verizon Wireless test plan. The PXT includes an emulation of the evolved packet core (EPC)—an all-IP mobile core network required by 3GPP in the standards for LTE.

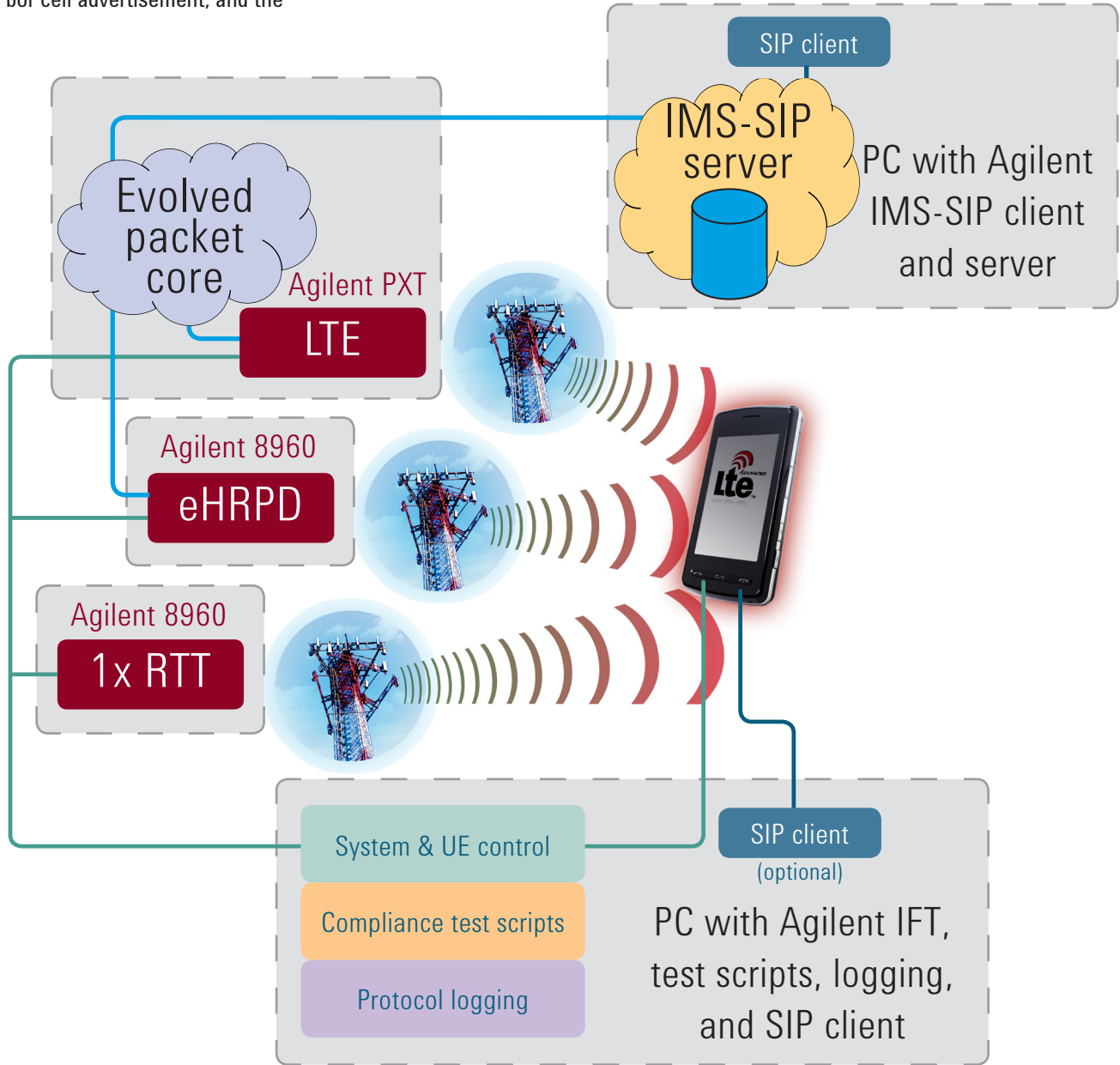


Figure 1. Schematic showing Agilent test implementation of Verizon Wireless InterRAT test plan

Automated IMS-SIP server and client

Agilent has developed an IMS-SIP server and client specifically for the purpose of UE testing. The server and client support both IPv4 and IPv6 communication protocols and are used to exchange SMS messages with the UE.

Both server and client have an application programming interface (API) so they can be fully automated in each of the relevant test cases to trigger actions and record outcomes.

The IMS-SIP server implementation includes a call flow log and ladder diagram to capture and represent the handshaking between server and client. This is used to verify operation and aid debugging.

Agilent gives you greater confidence in your LTE designs. We do this by providing greater insight into complex LTE technology, evolving LTE standards and how to test to them, and deeper insight into the root causes of your design problems.

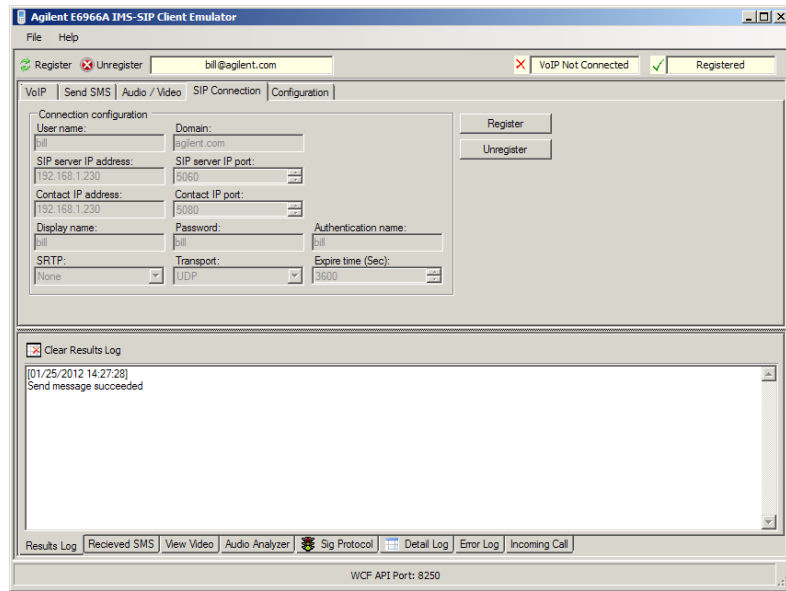


Figure 2. IMS-SIP client showing connection settings and results log

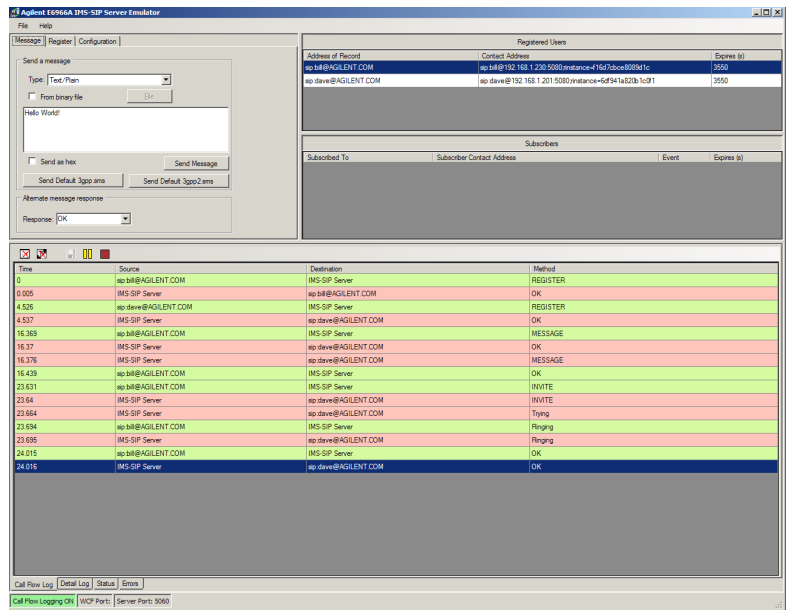


Figure 3. IMS-SIP server showing call flow diagram

Configuration information

Interactive functional test software

- N5973A-1FP IFT scripts for LTE - CDMA InterRAT operations
- N5973A-2FP IFT scripts for LTE - CDMA InterRAT operations, simultaneous voice and data (requires presence of -1FP)
- N5973A-4FP IFT scripts for LTE - IMS VoIP
- N5973AS software and technical support contract
- PS-S20 startup assistance
- PS-S10 remote scheduled productivity assistance (optional)

The following software must also be installed

- N5972A interactive functional test software
- E6966A IMS-SIP server emulator
(both are automatically enabled by the N5973A; no separate purchase is necessary)

LTE cell (including EPC emulator)

- E6621A PXT wireless communications test set with Options 2D2 and 503 or 506
- N6050AS LTE mobile test software: software and technical support contract
- N6050A-7FP LTE FDD base station emulation
- N6052A-1FP LTE enhanced BSE and IP data test
- N6061A LTE protocol logging and analysis

cdma2000 eHRPD cell

- E5515C or E5515E 8960 wireless communication test set with Option 003
- E6706E (or later) 1xEV-DO lab application
- E6720A-006 annual contract for 1xEV-DO
- E6584A wireless protocol adviser

cdma2000 1xRTT cell (required for the majority, but not all tests)

- E5515C or E5515E 8960 wireless communication test set with Option 003
- E6702E (or later) cdma2000 lab application
- E6720A-002 annual contract for cdma2000

PC requirements for running IFT, protocol logging

Hardware/operating system

- 1.8 GHz Pentium dual core processor or better
- Windows 7 Professional or Windows 7 Enterprise
- 2 GB RAM
- 2 GB of available hard disk space
- LAN port
- 2 available USB ports
- Port for controlling UE (e.g. additional USB)
- One installed, configured, and tested Agilent Technologies or National Instruments IEEE 488.2 GPIB interface

Software

- Microsoft Internet Explorer version 6.0 or later
 - Microsoft Excel version 2007 or later
 - The latest version of VISA (virtual instrument software architecture) from the manufacturer of your GPIB interface
- Optional: Visual Studio 2010 is required for changing UE interface project and for script modification

PC requirements for running IMS-SIP server

Hardware/Operating system

- 1.8 GHz Pentium dual core processor or better
- Windows 7 Professional or Windows 7 Enterprise
- 2 GB RAM
- 2 GB of available hard disk space
- LAN port
- 1 available USB port

Miscellaneous items

- Verizon Wireless test UICC (available from Gemalto only with Verizon Wireless approval)
- Agilent 82357B (or similar) USB/GPIB interface
- 8-way Gigabit LAN switch/hub, LAN cables
- Three 6-dB RF splitters/combiners
- RF cables

For more information

On the N5973A: www.agilent.com/find/N5973A

On IFT and associated products: www.agilent.com/find/IFT

On the PXT and associated products: www.agilent.com/find/PXT

On the 8960 and associated products: www.agilent.com/find/8960

On Agilent LTE solutions: www.agilent.com/find/LTE

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