Keysight Technologies
E6965A Location Server Emulator

Technical Overview

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Introduction

Keysight offers the first commercial bench-top solution supporting SUPL functional test using an air-interface connection to a SUPL-enabled device

Global Positioning System (GPS) receivers are becoming increasingly common in mobile devices. The demand is not only driven by the desire for personal navigation, but also by regulator-led initiatives such as the US Federal Communications Commission (FCC) E911 requirement to report the location of callers to the 911 emergency service. Assisted GPS (A-GPS) services provide a device with approximate location information, which can significantly shorten the time for that device to obtain an accurate GPS fix. Testing of these features is mandated by the Global Certification Forum (GCF) and PCS Type Certification Review Board (PTCRB) handset certification bodies.

Overview

Location services implementations based on control plane architecture may require significant updates to the mobile network infrastructure. As the popularity of A-GPS services grows, there is potential for control-plane capacity in these systems to become exhausted.

In contrast, Secure User Plane Location (SUPL) is a technology which utilizes existing infrastructure and standards to transfer Location Services (LCS) data over a *user plane* bearer, such as Internet Protocol (IP). A centralized SUPL Location Platform (SLP) connects to the system, enabling networks and mobile devices to offer A-GPS capability. Detailed specifications exist today which enable the use of SUPL in GSM, UMTS, CDMA, LTE, UMB, and WiMAX™ networks.

The Keysight Technologies, Inc. 8960 Wireless Communications Test Set with appropriate Lab Applications already supports testing of A-GPS via control plane RRLP or RRC messaging. The Keysight E6965A complements this solution, facilitating A GPS/location-service testing via the user plane (IP data) by emulating a SUPL Location Platform (SLP). This makes it possible to test a SUPL Enabled Terminal (SET) on the bench.
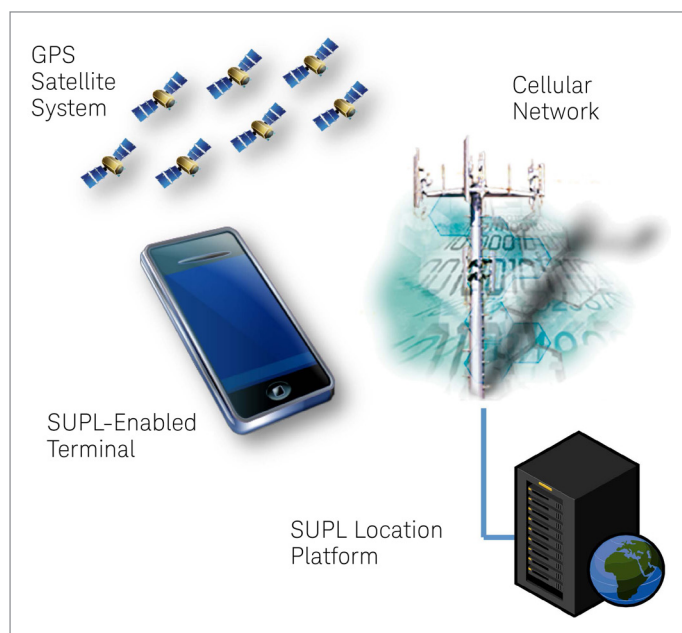
GPS Satellite System

Cellular Network

SUPL-Enabled Terminal

SUPL Location Platform

Figure 1. Key elements of SUPL-based Location Services

Standards

SUPL v1.0 became an approved OMA enabler release in June of 2007. SUPL v1.0 is compatible with 3GPP Release 6 specifications and version 1.1 of the OMA Mobile Location Services (MLS) specifications. Currently approved versions of SUPL allow for a MLS Application resident on the SET to query the SLP at any time for assistance in calculating, or to provide calculation of, the SET's own current location. Recent candidate versions of SUPL add support for more advanced forms of network and SET-initiated location requests.

The relevant standards are found in the 3rd Generation Partnership Project (3GPP) and Open Mobile Alliance (OMA) documentation.

Testing SUPL

E6965A provides the elements of the SUPL Location Platform that are required for testing SUPL-enabled terminals.
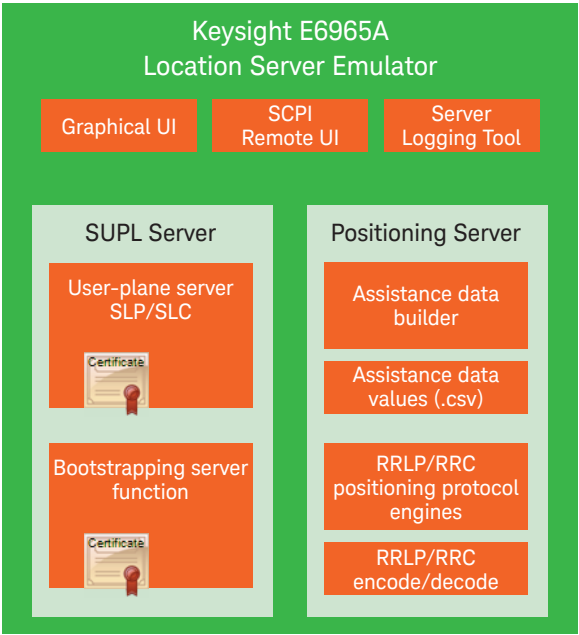

Figure 2. Components of Keysight E6965A Location Server Emulator

Keysight offers additional components to facilitate testing of SUPL-enabled terminals. The Keysight 8960 Wireless Communications Test Set, with appropriate Lab Application, is used as the cellular base-station emulator. A Keysight ESG Vector Signal Generator may be used as a GPS satellite simulator. The E6965A is also capable of operating with alternative GPS satellite simulators, as long as assistance data for the GPS scenarios is known and available to the E6965A using a .csv file format.
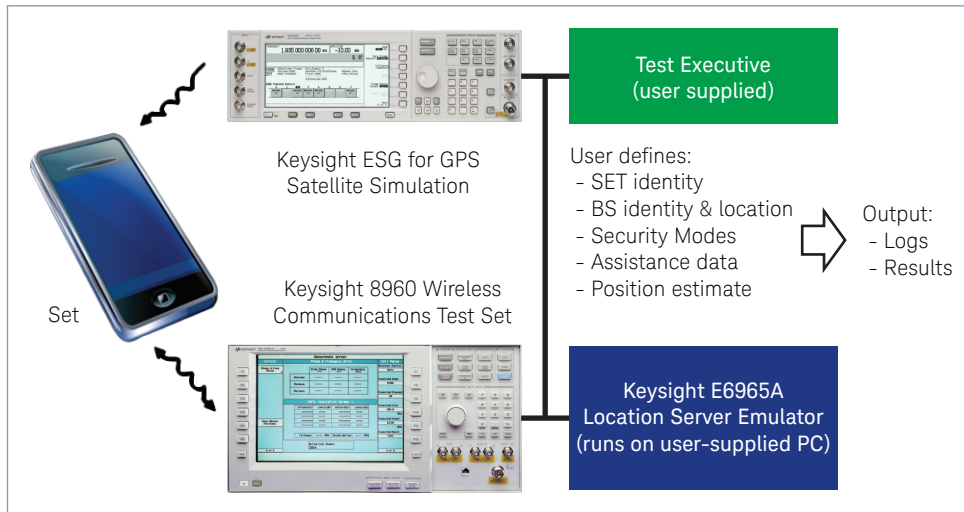

Figure 3. Solution for testing a SUPL-enabled terminal (SET) over the air interface

E6965A Capability

The location server emulator includes:

– SUPL Location Platform (SLP) emulator
– LCS Positioning Server emulator
– Bootstrapping Server Function (BSF)
– Automated RRC and RRLP positioning message encoding/decoding
– Server logging tool (decrypted messages)

The location server emulator supports:

– SUPL v1.0 network-initiated and SET-initiated SUPL sessions
– Proxy flows for 2G GSM/GPRS/EGPRS and 3G W-CDMA / HSPA
– SET-based and SET-assisted A-GPS and Autonomous GPS positioning
– Authentication using PSK-TLS, 3GPP GBA, TLS and certificate
– Test automation through SCPI interface

Protocol logging

The built in protocol logging capabilities provided in E6965A allow for basic logging and decoding of all User-plane Location Protocol (ULP) messages sent between the Location Server and connected devices. Any embedded positioning protocol messages (RRLP or RRC) contained within such ULP messages are also independently decoded and logged by the E6965A.
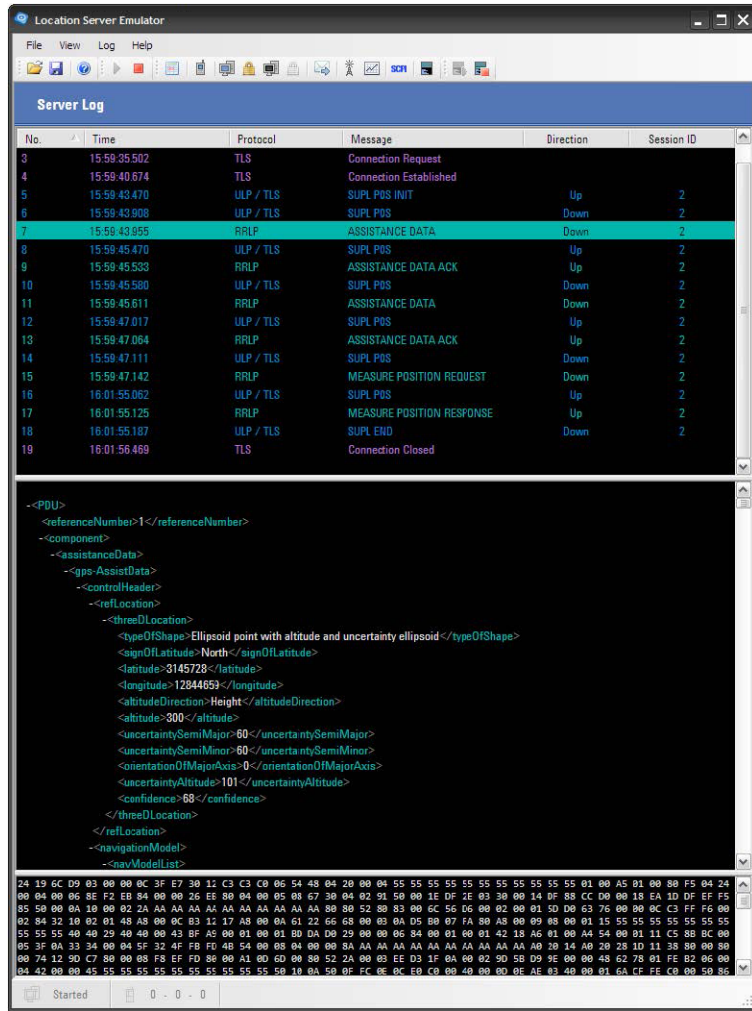

Figure 4. E6965A protocol logging tool displays decoded ULP messages

Note that if using PSK-TLS based security mechanisms for a given device connection it is not currently possible to use standard protocol logging tools to decrypt and log communication between the device and Location Server. The E6965A protocol logging tool is able to provide the necessary decryption.

PC Requirements

The E6965A software application may be run on a PC with the following specifications
  – Operating system: Microsoft Windows XP Professional Service Pack 2
  – Microsoft Internet Explorer Version 7.0 or later
  – 1 GHz Pentium III or higher
  – 1 GB RAM or higher
  – 200 MB free hard drive space
  – LAN port for instrument control
  – Screen resolution 1024x768 or higher

Required and included with the E6965A installer
  – Microsoft Visual C++ 9.0 Service Pack 1 Runtime Libraries
  – Microsoft .NET Framework 3.5
  – Keysight IO libraries

A test executive may be run on the same PC (consider adding a GPIB card or converter with VISA drivers, if needed for instrument control).

Other than as outlined above, it is recommended that the PC is dedicated to the E6965A software. This will avoid potential conflict in the assignment of internet services ports.

Ordering

SUPL Location Platform

  – E6965A Location Server Emulator
  – E6965A-1FP SUPL Server
  – E6965A-2FP Positioning Server

Base Station Emulator

Keysight 8960 Wireless Communications Test Set (including test SIM)
  – E5515C
For 2G GSM/GPRS/EGPRS
  – E5515C-002 (2nd RF Source)
  – E6701G (GSM/GPRS Lab Application)
For 3G W-CDMA / HSPA
  – E5515C-003 (CDMA base station emulator)
  – E6703F (W-CDMA/HSPA Lab Application)
Lab Application Annual Contract for the 8960
  – E6720A

Satellite Simulator (1 to 8 satellites)

  – E4438C ESG Vector Signal Generator
  – E4438C-409 GPS Personality
  – E4438C-005 6 Gbyte hard drive
  – E4438C-502 or 503 or 504 250 kHz to 2 GHz or 3 GHz or 4 GHz
  – E4438C-601 or 602, Internal baseband generator, 8 Msample or 64 Msample
    memory with digital bus capability

Additional Services

  – PS-S20 Daily productivity assistance
  – PS-X10 Custom services

For More Information

Further information on the E6965A and related products is available at
www.keysight.com/find/e6965a

For details of Keysight's 8960 Wireless Communications Test Set for cellular
technologies, please visit **www.keysight.com/find/8960**

Keysight's portfolio of Assisted-GPS solutions may be found at
www.keysight.com/find/agps

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