



# AGPS Network Solutions

AGPS Server and Worldwide Reference Network™

## FEATURE BRIEF



The WWRN provides AGPS coverage in both the home network and the visited network, allowing a subscriber to roam with their LBS services anywhere in the world.

*--Worldwide AGPS Coverage*

**Our Assisted-GPS (AGPS) Server and Worldwide Reference Network (WWRN) provide the network elements for mobile operators to launch AGPS services in their networks**

### OVERVIEW

Using GPS satellite data collected from the WWRN, the AGPS Server generates assistance data supporting both MS-based and MS-assisted modes, processes measurements from handsets to compute location, and seamlessly connects with control-plane or user-plane location servers. In addition, the AGPS Server, using Long Term Orbits (LTO™), supplies future ephemeris assistance data to handsets that is valid for up to a week. This enables the benefits of AGPS technology when temporarily out of mobile operator network range.

### SERVER FEATURES AND BENEFITS

- Superior AGPS position accuracy
  - Proven in commercial deployment and worldwide field trials.
- Flexible timing requirements
  - Positions can be computed from handset measurements without GPS time tags.
- Proven Interoperability
  - Successfully deployed and operational with standards-compliant AGPD handsets.
- Long Term Orbits (LTO)
  - Provides accurate ephemeris assistance data valid for up to seven days in the future.
- Real-time data delivery
  - GPS constellation is continually monitored, ensuring time-critical assistance data is up to date, providing near instantaneous satellite integrity updates.

- Worldwide terrain model
  - Server includes billion-data-point terrain model referenced to WGS84 and covering the entire earth. Terrain altitude can be used to enhance MS-based initial position, and is automatically used in the MS-assisted position solution.
- GSM/UMTS standard compliant
  - Supports messaging in RRLP format, supports PCAP interface and OMA SUPL v1.0
- Operational Worldwide
  - Linked with the WWRN, AGPS Servers can determine location or generate assistance data for a subscriber located anywhere in the world.
- Well-defined interfaces
  - Detailed documentation explains integration of the AGPS Server into location servers. The Broadcom API defines access to the AGPS Server via TCP/IP and binary interfaces. Broadcom is ready to assist in integration efforts.

### WWRN FEATURES AND BENEFITS

- Outsourced solution
  - Commercially launched in 2002, the WWRN is a turnkey GPS satellite data feed capable of providing service to any operator in the world. WWRN data connection is established by secure frame relay links or VPN Developers' connections available via internet through VPN or SSH.
- Roaming
  - WWRN can deliver assistance data to any mobile operator or subscriber in the world, enabling subscribers to roam with LBS services.

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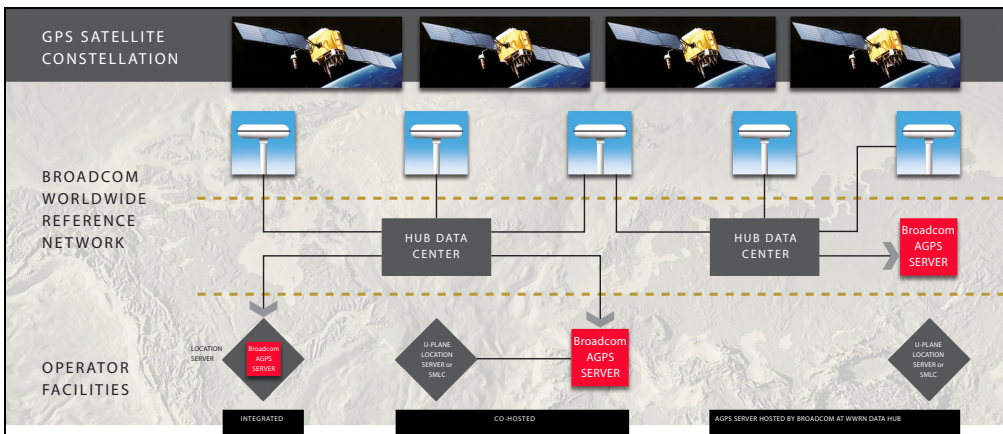
## FEATURE BRIEF



- High Availability
  - Service level agreements guarantee up to 99.999% availability.
- Fault tolerance design
  - Full redundancy is built into every layer of the WWRN, ensuring high availability. Solaris™, Linux®, Windows® platform redundancy ensures maximum OS immunity to downtime.
- Proven Interoperability
  - Data feed can be used by any standards-compliant control-plane or user-plane location service.
- Secure
  - Network equipment is hosted in multiple WWRN hub data centers at secure co-location centers. All facilities have seismically braced server racks, backup generation, secured premises, and other features guaranteeing uninterrupted operation.
- Standards based Operation and Management (O&M)
  - HP® OpenView, SNMP v2-based monitoring, 7x24x365 Broadcom NOC.
- System Integration
  - Architecture, planning, procurement, installation, integration, acceptance testing, upgrade and maintenance support available. Our North American, EU, and Asia-Pacific offices facilitate rapid onsite support.
- Support
  - Calls are answered at a live operator center 7x24x365, with response times under 15 minutes.
- Developers' Program
  - Broadcom can provide Internet access to the WWRN for development and technology trials.

### WWRN ARCHITECTURE

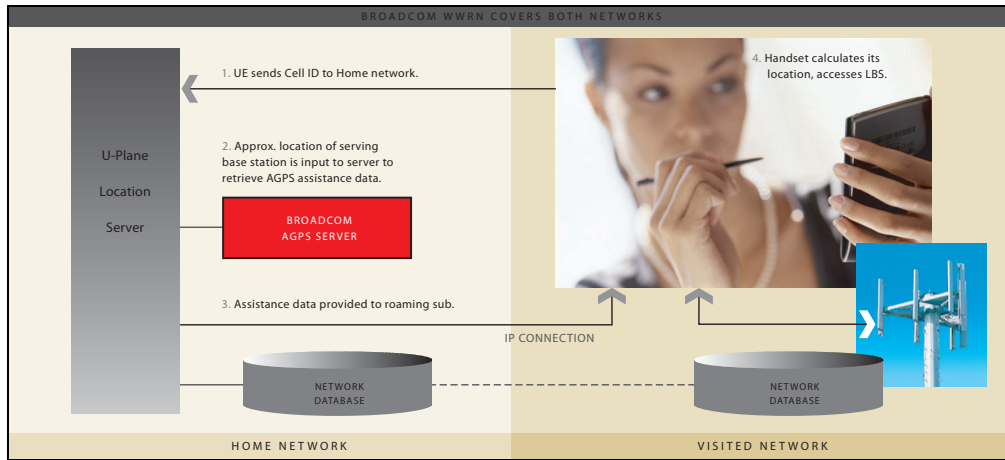
Broadcom's WWRN ensures the highest levels of availability, reliability, and performance. The WWRN's distributed architecture and layers of redundancy remove the possibility of single points of failure. The robust WWRN design anticipates failure, automatically redirecting or adjusting the system to prevent GPS data feed interruptions. The WWRN includes GPS reference stations located around the world, optimally sited so that all GPS satellites are monitored by several stations at all times. Data streams from these reference stations are aggregated at geographically distributed hub data centers, which connect via redundant frame relay links to mobile operator facilities to enable turnkey AGPS data feed.



DEPLOYMENT OPTIONS FOR AGPS SERVERS

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## FEATURE BRIEF



### SERVER HARDWARE PLATFORM AND PERFORMANCE

- Configuration
  - Sun® Sunfire V245 with Sun Solaris 9
  - 1-GHz Ultrasparc IIIi
  - 1 GB memory
  - 4x73 GB hard drives
  - Other Sun platforms also qualified and supported
- Capacity benchmarked at 310-850 transactions/sec per AGPS Server, depending on data requested
- SNMP-compliant O&M interface
- Three modes of deployment
  - Standalone beside u-plane or c-plane location server
  - Integrated into u-plane or c-plane location server
  - Hosted by Broadcom
- Supported Standards
  - 3GPP 04.31, 04.35, 25.453, and OMA SUPL 1.0
- Supported GPS Aiding Elements
  - Navigation model (can be supplied for up to seven days in advance with LTO)
  - Reference time, including Time of Week (TOW) assist with real-time Telemetry Word (TLM) bits
  - Reference location
  - Acquisition assistance
  - Ionosphere
  - UTC information
  - Almanac
  - Real Time Integrity

### NETWORK COVERAGE

The figure above illustrates an example of a subscriber using LBS services when traveling, even in networks without AGPS infrastructure.

Steps:

1. The handset transmits subscriber information to u-plane location server in home network over IP connection (e.g., GPRS).
2. U-plane location server performs database dip to retrieve approximate latitude/longitude, which is transmitted to the AGPS Server.
3. AGPS Server generates assistance data for subscriber in visited network, transfers this data to u-plane location server, which sends this assistance data to handset over established IP connection.
4. Handset calculates its location, which is combined with content to get location-based services.

#### BROADCOM CORPORATION

5300 California Avenue

Irvine, California 92617

Phone: 949-926-5000

Fax: 949-926-5203

E-mail: info@broadcom.com

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