



Friend finder is one of the many popular location-based services that benefits from the high accuracy positioning provided through gpsOne™ technology

Overview

Wireless position location capabilities enable far-reaching and exciting wireless location-based services, such as productivity enhancement, entertainment, position-based advertising, navigation, asset management and geographic information access.

These applications are dramatically enhanced, and in some cases only made possible, with precise positioning. To enable reliable, precise positioning for the wireless market, QUALCOMM developed the gpsOne™ position location technology. The gpsOne technology is a unique approach to wireless position location, using wireless network information, satellite-based GPS information and location servers to directly improve positioning availability, sensitivity, accuracy and time-to-first-fix.

This approach takes advantage of the complementary nature of the network and QUALCOMM's advanced Assisted GPS (AGPS) location solution. Because these solutions combine to work as one, it is referred to as a hybrid solution. QUALCOMM's gpsOne AGPS hybrid position location technology is the first commercially available, integrated wireless AGPS technology; it has been field-tested and proven in location-based service (LBS) deployments with carriers around the world. In fact, the gpsOne solution is the most widely deployed positioning technology in the world today, opening a vast market for revenue-generating entertainment and security-based applications and services.

QUALCOMM's gpsOne position location technology supports a wide variety of air interfaces, including IS-95 A/B, CDMA2000 1X, 1xEV-DO, 1xEV-DV, WCDMA (UMTS) and GSM. Select QUALCOMM Mobile Station Modem™ (MSM™) wireless modems and radioOne® direct conversion wireless receivers include integrated gpsOne position location technology, a key feature of the QUALCOMM Launchpad™ suite of technologies.

gpsOne Position Location Applications

Numerous revenue-generating position-location applications exist for QUALCOMM's gpsOne AGPS hybrid location solution — navigation, location-sensitive billing, location-based information services, emergency response to meet the US Government's E911 mandate, network planning and management, asset tracking, personal location services and of course, entertainment.

gpsOne Position Location Technology Features

- The first commercially-deployed, integrated GPS-based positioning solution available for 3G wireless
- Position location capability is fully integrated into most QUALCOMM MSM chipset solutions
- Unique AGPS hybrid solution provides industry-leading precision and maximizes system availability
- Advanced positioning algorithms include multipath mitigation and signal enhancement
- Compatible with QUALCOMM's QPoint™ positioning software for location servers

gpsOne Position Location Technology Benefits

- Offers high accuracy, availability and coverage, even in concrete-and-steel high-rises, convention centers, shopping malls and other areas where traditional GPS will not work
- Enables position location application development and revenue-generating opportunities
- Provides a fully-integrated solution that minimizes material cost, board size, parts count and power consumption in the handset
- Requires no wireless infrastructure hardware modifications, leading to shorter development times and quick time-to-market
- Provides a reliable, optimized and commercially-proven system that speeds deployment, reduces operator risk and minimizes LBS service costs

gpsOne™ Position Location Technology

gpsOne-Based CDMA Chipset Architecture

The QUALCOMM gpsOne position location solution illustrated in the gpsOne chipset architecture diagram directly leverages inherent CDMA capabilities and architecture to enable tight integration. In contrast with the expensive, discrete, conventional GPS solutions commonly found in the wireless industry, the gpsOne technology is integrated directly into the MSM wireless modem and wireless RF chipsets. This means that no additional ASICs or memory are required to implement the gpsOne location capabilities in wireless handsets.

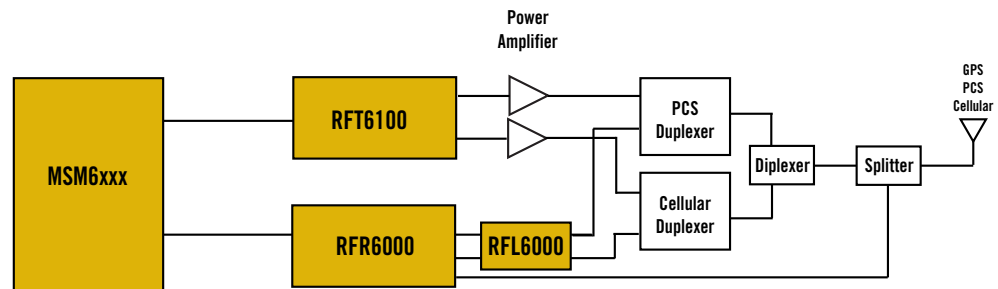
QUALCOMM's MSM-based solutions leverage location server technology as well as special algorithms for multi-path mitigation and signal enhancement. These leading-edge algorithms, combined with the high level of integration, provide unmatched GPS acquisition availability, speed and sensitivity while minimizing cost, space and power.

gpsOne and QUALCOMM's radioOne RF solution

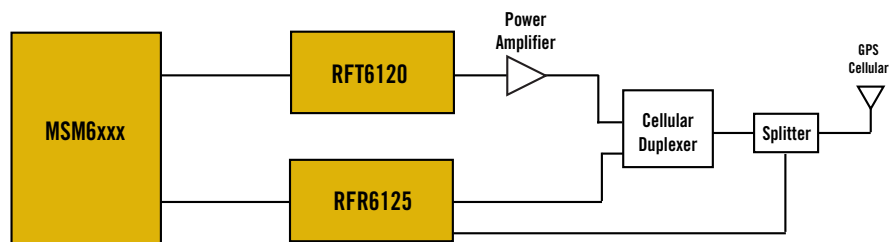
The QUALCOMM radioOne wireless receiver chipsets include integrated GPS band support. By enabling a complete baseband and RF solution for GPS, integrated MSM and RF receiver support for gpsOne delivers low-cost, low-power position location capability while eliminating the need for discrete GPS baseband and RF chipsets.

The MSM6xxx™ wireless modem solutions feature QUALCOMM's radioOne Zero Intermediate Frequency (ZIF) architecture, which eliminates the need for Intermediate Frequency (IF) components. With the radioOne technology, the MSM6xxx chipset requires less printed-circuit-board area than previous generations and reduces time-to-market development and BOM costs.

Dual-Band



Single-Band



gpsOne Chipset Architecture

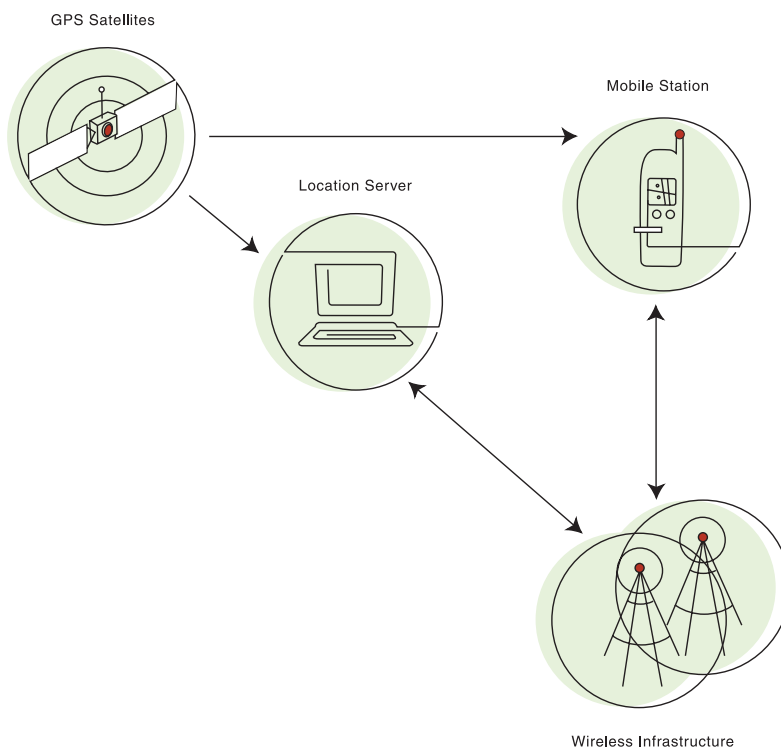
How Do QUALCOMM's AGPS Hybrid Location Solutions Work?

QUALCOMM's AGPS technology uses a location server to help the GPS receiver find weak GPS signals. The enhanced sensitivity provided by the location server results in significant increases in availability, sensitivity and position fix start times versus conventional GPS receivers, enabling the handset to quickly detect GPS satellites in indoor and blocked environments at signal levels not detectable by conventional GPS receivers.

The mobile station (i.e. the wireless handset) collects measurements from both the GPS constellation and the cellular/PCS network. These measurements are combined by the location server to produce an

accurate position fix, even in situations where a GPS solution or network solution alone would have insufficient information to calculate a fix. By combining the two information sources, gpsOne AGPS hybrid position location solutions can provide a fix with just one satellite and one cell site.

These unique capabilities enable QUALCOMM's gpsOne AGPS hybrid location solutions to work deep within steel-and-concrete structures or in urban canyons where other solutions fail. Field trials and commercial deployments confirm that these solutions provide unmatched sensitivity as well as the availability necessary for commercial location-based applications.



QUALCOMM'S Compatible Position Location Products

An effective AGPS hybrid solution requires GPS technology in the wireless handset, a location server in the wireless network and GIS- and application-related servers and tools to help handset manufacturers and system integrators develop, test, validate, deploy and support the AGPS hybrid system. QUALCOMM's gpsOne technology-enabled chipsets, servers and tools comprise a suite of compatible products that provide critical components of the overall end-to-end LBS system.

QUALCOMM's QPoint LBS solution in the network server, coupled with the gpsOne position location technology in the handset; together provide the first commercially available, integrated LBS technology. This commercially-tested offering speeds time-to-market, reduces operator risk and provides for effective ongoing system maintenance — all critical to enabling operators to quickly launch low-cost, revenue-generating LBS services. In fact, the gpsOne technology has been successfully deployed at multiple carriers worldwide, including the US, Japan, Korea, China, Canada and Thailand.

The Launchpad Suite of Application Technologies

The Launchpad suite of application technologies offers wireless operators and manufacturers a cost-effective, scalable and timely solution for providing advanced wireless data services and multimedia entertainment. This seamlessly integrated solution enables advanced next-generation applications and services that incorporate multimedia, position location, connectivity, customized user interface and storage capabilities. Launchpad features are available for each QUALCOMM chipset, closely matching the specific functionality and cost-target objectives agreed upon in joint product planning with manufacturers and wireless service operators worldwide.

QUALCOMM'S Complete Solution — Our Commitment to Our Partners

QUALCOMM CDMA Technologies is enabling the future of communications. We work closely with our manufacturer and operator partners to develop solutions that meet market needs today and provide the technology foundation for the wireless communications of tomorrow. Our world-class CDMA engineers create detailed reference designs to accelerate testing and deployment for our partners. And our chipsets and system software are fully integrated and able to bring advanced features and functionality to today's wireless devices. With QUALCOMM CDMA Technologies, manufacturers and operators can offer sophisticated wireless solutions that succeed in the global marketplace.

Copyright © 2004 QUALCOMM Incorporated. All rights reserved. QUALCOMM and radioOne are registered trademarks, and gpsOne, QPoint, Mobile Station Modem, MSM, MSM6xxx and Launchpad are trademarks of QUALCOMM Incorporated. All other trademarks and service marks are the property of their respective owners. Data subject to change without notice.
 Printed in the USA 4/2004 gpsOne-FB X15