Location-based services
Consumer research findings from HP and Openwave
Overview

The wireless world
Wireless communications constitute one of the most vital and dynamic areas of the technology market. More than 500 million cellular phones were sold last year and 425 million the year before. Much of this market growth is being driven by new and expanded capabilities—color screens, camera phones, and higher speeds—which in turn create a demand for better and more varied voice and data services. Location-based services in particular offer enormous potential for wireless service providers.

Location-based emergency services
Emergency services and safety concerns have driven the development of location-based services. Nearly one-third of emergency calls in the United States are made from mobile phones. In the United States and the European Union, laws require wireless service providers to implement emergency location services. These services communicate the precise geographic location of a wireless device to the proper authorities when it is used to make an emergency call.

New opportunities
With the resources for location-based emergency services in place, additional applications become possible. The rapidly growing demand for consumer-oriented location-based services creates new opportunities for wireless service providers.

Added value
Location-based services offer tremendous opportunities for wireless service providers:

• Enhance existing services with locality, for better functionality and customer satisfaction
• Generate new revenue with new consumer-oriented services
• Position service providers as market leaders by providing innovative new services to their subscriber base
• Differentiate service providers from their competition through service options that increase subscriber acquisition and retention

The HP advantage
HP delivers competitive advantage to wireless service providers in the form of a complete location-based services solution—from the infrastructure and applications to integration and ongoing support and maintenance. Service providers can expect:

• An end-to-end solution from infrastructure to implementation and support
• An industry-standard solution that helps to ensure interoperability
• Proven market leadership with industry awards and recognition
  – Innovative Solutions Award (wireless e911 solution) from the Call Division Multiple Access (CDMA) Development Group (CDG)
  – First solution in service to meet the FCC mandate for wireless e911 phase II emergency services
  – First solution to integrate Position Determination Entity (PDE) and Mobile Positioning Center (MPC) on a single platform

Location-based services build on the positioning capabilities of wireless service providers to deliver innovative new functionality to mobile users.
Consumer research
HP and Openwave recently commissioned an independent study involving twelve focus groups in three cities—New York, Chicago, and San Francisco—to explore the potentials of different location-based service concepts for wireless phones. Each focus group included six to eight end users from one of four target segments: mobile professionals, young adults, parents, and teens.

Innovators and early adopters
Meet your market—demanding mobile users with a growing interest in quality location-based services. Typical users acquire their first mobile phones to improve their accessibility to friends and family, to enhance their productivity at work, or for emergency calls. They quickly come to view cellular phones as a necessity, discovering additional capabilities and applications, and growing to depend on their usefulness and broad functionality.

Mobile professionals
Many mobile professionals (25 to 40 years) use cellular phones primarily for business purposes—mobile communications are convenient tools for professional as well as personal availability. They come to depend on broader capabilities including e-mail and appointment calendars, even replacing the desk phone as a preferred point of contact. Mobile professionals are interested in wider coverage areas, compatibility with other devices (notebooks, Pocket PCs), and enhanced capabilities (camera, video).

Young adults
Students and young professionals (20 to 25 years) tend to adopt mobile phones for social reasons, connecting with friends and making long-distance family calls. Information availability—news, sports, e-mail—becomes a priority for these subscribers.

Teens
Most teenagers (15 to 18 years) originally pursue mobile phones to keep pace with their peer group. They develop interest in using the mobile device for entertainment, via interactive games and text messaging. The teenage market shows interest in options for personalizing devices with custom ring tones, music, and easy Internet access.

Parents
Parents often acquire mobile phones for practical reasons—the ability to reach family members and make emergency calls when necessary. In terms of new capabilities, parents demonstrate interest in safety alerts, amber alerts, and enhanced roadside assistance.
Location-based services

**Get directions**
The market research sponsored by HP and Openwave revealed an overwhelming interest in this type of location-based service—it clearly addresses an unmet need in the wireless subscriber base. With positioning capability, this service would provide precise directions from the mobile user’s current location. Text instructions accompanied by a customized map guide mobile users to their destination. Content quality is crucial to a successful implementation. Directions should account for mode of transportation (e.g., pedestrian, public transit, private vehicles) and address safety concerns—voice input and verbal instructions facilitate use by drivers.

**Find nearest**
This service combines aspects of the “get directions” feature with the functionality of the yellow pages. Subscribers can identify a resource of particular interest close to their current location and obtain directions and other relevant information about it. Mobile users can find the closest movie theater, check its schedule, and purchase tickets; or they can search for a particular type of restaurant, review its menu, and make reservations. Hotels, hospitals, ATMs, gas stations, parking, and more—all there for the asking. Again, content quality is crucial—information must be accurate and thorough.

**Concierge**
Of particular interest to frequent travelers and mobile professionals, this service automatically provides a variety of local information when the subscriber arrives in a new city—local weather, travel tips, restaurants, games, events, and other items of interest. Some users would subscribe to this service regularly, others might prefer to adopt it only for short periods while traveling.

**Alerts**
This service automatically provides the subscriber with information updates on topics requested by the user. There is specific interest in commuter information, especially updates about traffic conditions. Entertainment also drew significant interest—announcements of concerts, shows, and other special events, ticket sales and special deals. Other alert categories include school closings, flight delays, weather, and sports news. Alert services show the most promise in cities with traffic problems and extensive entertainment options.

HP has established collaborative partnerships with leading application developers, system integrators, and service providers to deliver the most competitive portfolio of end-to-end, location-based service solutions in the industry today.
Friend finder
This service provides position information for other mobile users, allowing subscribers to locate their friends or share their own location. Position information can be plotted on a map or displayed as an address. Privacy and security issues are paramount for this type of service—individual subscribers must be able to define their own preferences regarding who is authorized to know their position, and when.

Child finder
Similar to “friend finder,” this service allows parents to keep track of their younger children. It periodically compares the location of a small child (or specifically, a mobile device carried by the child) against a schedule and geographic area set by the parent. The service alerts the parent if the mobile device is not where expected. In this manner, parents are reassured that their small children are safe and where they’re supposed to be. Because of sensitive trust and privacy issues, however, it may not be appropriate for teens.

Bundled safety package
Research showed considerable interest in bundled safety services. Location information enhances roadside assistance and emergency calls; and traffic alert and child finder services add value to basic safety functionality.

Additional services
Opportunities exist for further expanding and enhancing these location-based services. Interactive games have a measure of appeal for young adults and teens. Other possibilities include a service for tracing lost or stolen phones, bookmarking locations as landmarks for directions, even location-based dating services.

Conclusions
Willingness to pay
Most participants in the survey expected an additional charge to their monthly bill in the amount of $2–$10 per location-based service. They preferred a flat monthly fee over a pay-per-use plan. They indicated that they would be more willing to try a new service if it were offered free for the first month. Collective offerings like the bundled safety package—multiple location-based services offered together at a reduced overall cost—also offered incentive to subscribe to more services.

Deployment recommendations
• The directions and find nearest services demonstrate the broadest appeal, and should be the first deployed. The availability of traffic alerts will drive consumer interest.
• Development resources should be concentrated on general usability and on quality of content.
• The single greatest area of concern among survey participants centered around privacy issues. It’s vitally important that users have easy on/off and opt-in control over their location-based services.
• Location-based services should be promoted with a top-level menu placement, positioning them as core capabilities of the mobile phone more than an added benefit.
• Bundled services should be offered for a flat monthly fee with no hidden costs.
• Cities with an existing cell-ID infrastructure offer the best opportunities for early deployment, expanding to more remote regions as GPS phones penetrate the consumer base.
• Once the find nearest service has an established customer base, additional revenue opportunities such as location-based targeted brand coupons can be explored.
The HP solution

Platforms
HP location-based solutions reside on HP OpenCall carrier-grade platforms, proven for the development and deployment of next-generation voice, data, and converged services.

Positioning
HP provides position determination solutions for both GSM (Global System for Mobile Communications) and ANSI-41 networks. The HP Serving Mobile Location Center (SMLC) is based on the Cambridge Positioning Systems (CPS) application, which relies on Matrix Enhanced Observed Time Difference (EOTD) technology. The Matrix technology offers a low-cost alternative to Uplink Time Difference of Arrival (UTDOA) solutions—it requires no additional phone hardware (only an easy software download to the handset), is more accurate and reliable than simple EOTD (within 100 meters), and provides low latency for positioning (approximately two seconds).

The HP OpenCall Framework supplies the Position Determination Entity (PDE) function, using wireless assisted global positioning system (WA-GPS) technology. Deployed on OpenCall SS7 and call processing software, WA-GPS technology uses satellites to achieve the high degree of location accuracy mandated by the FCC, even in remote outdoor locations. Position is established by X and Y coordinates at ground level, and soon by a vertical Z coordinate as well (available in 2005). By utilizing wireless-assisted GPS, service providers reduce the high costs, complexity, and time associated with deploying and maintaining other base-station-based position determination technologies.

Location enabling infrastructure
In partnership with Autodesk Location Services and Webraska, HP provides the geoserver—or geospatial platform—which provides geoservices such as routing, mapping, proximity alerts, spatial searching, and geocoding functionality for location-based services.

Autodesk LocationLogic provides wireless network operators with a complete infrastructure solution featuring a scalable location platform, geospatial and integration services, and the content and subscriber management capabilities needed for location-based services. A carrier-grade platform, LocationLogic features a scalable J2EE architecture, support for continental databases, and the ability to handle high-volume transaction loads. Unlike GIS servers, LocationLogic’s capabilities include location-sensitive alerts (“spatial triggers”), multi-modal routing, and user zones which support tracking and notification services such as fleet management.

Availability and security
HP protects the operator network and responds to subscriber location requests with the Mobile Positioning Center/Gateway Mobile Location Center (MPC/GMLC). After the PDE locates the mobile device, the MPC/GMLC stores the location information and makes it available to location-based services applications. As a common access point for location information, the MPC/GMLC makes the deployment of additional services easier, faster, and more cost-effective. It incorporates Openwave Location Manager and Location Studio applications with HP OpenCall middleware and HP hardware. The MPC/GMLC supports options for subscriber privacy and control, third-party authentication, and call detail records for simplified billing.

Services
HP Communication Solutions and Integration Services integrate and deploy competitive wireless communication solutions swiftly and affordably. With a comprehensive portfolio of value-added services, a team of 65,000 skilled service professionals worldwide, and more than 60 years of experience in the communications industry, HP offers you the resources you need to manage your critical information technologies and to help ensure the consistent, reliable performance of the infrastructure and applications supporting your location-based services.
Industry-leading partnerships
The HP location-based services (LBS) solution portfolio combines a suite of location-enabled consumer and emergency services, position determination infrastructure, location-enabling infrastructure software, OpenCall carrier-grade platforms, and HP Services. HP partners with market-leading location application providers—Autodesk Location Services, Cambridge, Openwave, and Webraska—to deliver a comprehensive offering that addresses both the emergency and consumer-oriented services marketplace. Autodesk Location Services and Webraska deliver innovative consumer-oriented LBS applications; Cambridge and HP OpenCall supply position determination infrastructure; and Openwave provides location-enabling gateway infrastructure software which is powered by HP OpenCall service control platforms.

Openwave is the leading provider of open software products and services for the communications industry—including wireless providers, broadband providers, and device manufacturers worldwide. Openwave Location Manager and Openwave Location Studio are integral building blocks for HP’s safety and commercial location-based services.

Autodesk Location Services, a division of Autodesk Inc., provides the location enabling infrastructure solution that enables wireless carriers and mobile operators to offer location-based services to their subscribers quickly and reliably. Autodesk Location Services offers a highly scalable open-standards-based platform, market-ready applications, content integration, and professional services.

Cambridge Positioning Systems produces a high-accuracy location enabler for GSM carriers. Through persistent innovation, Cambridge has developed and refined technologies that enable people to pinpoint their locations using a standard mobile handset. Cambridge’s Matrix location technology product family offers high precision, low cost, low latency, and high yield to support LBS applications that demand a high degree of accuracy.

Webraska provides advanced software solutions to develop, integrate, and deploy wireless location-based and telematic services.

SnapTrack, a subsidiary of Qualcomm, provides the most precise and flexible location solution in the industry, using a hybrid of satellite and terrestrial signals for reliable operation in the most challenging coverage environments—from remote regions to dense urban areas. A pioneer of Wireless Assisted GPS technology, SnapTrack plays a vital part in the HP portfolio of location-based services.