



## Location-based services: Amplifying ARPU for carriers

In the world of wireless telecommunications, new technologies seem to come and go with dizzying speed. Selecting the capabilities that consumers truly want, need, and will pay for can often seem like an impossible challenge. Within this fast-changing sphere, location-based services (LBS) – services that deliver value-added information to users based on the users' geographic location – are only just now beginning to create significant revenue opportunities for carriers worldwide. As these services evolve and expand, operators now see in LBS a new way to reduce churn while they expand ARPU by adding monetized location services to their repertoire.

The growing maturity of LBS has led ABI Research to project that from 2005 to 2010, global positioning system (GPS) penetration into handsets will reach 1 billion units, while Qualcomm puts this number at 2 billion. Berg Insight projects LBS growth in Europe at 83% per year, creating a 5 billion Euro market by 2010.

Within wireless telecommunications, location-based services include:

- Spoken Turn by Turn Driving Directions
- Traffic Alerts and Updates
- Speed Camera Alerts
- Friend and Family Finder
- Child Tracking Services
- Asset Tracking
- Workforce Management
- Enhanced 411 Services by location
- Point of Interest location and navigation
- Geo Tagged Photo's
- Geo Blogging

A sampling of carriers that have rolled out LBS services includes:

- Chunghwa Telecom (CHT) in Taiwan
- Bell Mobility in Canada
- KDDI in Japan
- Movistar (Division of Telefonica) in Spain
- Orange in France
- South Korea Telecom (SKT) in South Korea and Holland
- Sprint-Nextel in the USA
- T-Mobile in Germany
- Verizon in the USA
- VIVO in Brazil
- Vodafone in the UK and Italy

### LBS: A COMPULSORY START

Although some operators have been experimenting with location-based services for quite a few years, the 1996 FCC mandate in the U.S. generated the first real push toward giving mobile handsets and networks the core capabilities needed for providing location awareness. This mandate, which has since been modified to adjust compliance goals, required that 95% of all mobile initiated emergency 911 calls must be performed on phones capable of providing an accurate location to local Public Safety Answering Points (PSAP's).



Initially, some carriers opted to comply with the mandate by adopting network-based location technologies such as UTDOA (Up Link Time Difference of Arrival) – essentially using cell towers to triangulate a user's location. This method is increasingly giving way to leveraging built-in GPS chips in each handset, mostly because these chips have become dramatically more cost-effective and less power consumptive while improving location availability over the last several years. Today, Verizon Wireless (>50 million users), Sprint-Nextel (>50 million users), and Alltel (>10 million users) use GPS technology to provide E-911 services. When they began adopting GPS, these carriers worked with handset providers such as Motorola, Nokia, Samsung, LG and with network SMLC/PDE vendor's such as Openwave, Andrew and Autodesk to enable GPS capabilities. Through the proliferation of handsets and network elements, a well-tested, low-cost platform has evolved, which can now be leveraged to provide high-ARPU location-based services.

In Europe and Japan, a similar emergency services mandate, dubbed E112, has been put forward. E112 in Japan is more advanced than in Europe with all three of the large operators (NTTDoCoMo, KDDI and Softbank) supplying A-GPS enabled handsets by the end of this year. In looking at the way the US market has unfolded, analysts expect a similar if not a more aggressive trend to occur in Japan.



## THE NEXT STEP

“By the end of 2006, the majority of new handsets will support LBS services.”

— Lee Daniels, Director of business products and solutions,  
Verizon Wireless

With mature handsets and network elements available in the US, carriers began experimenting with LBS in 2002/2003 to offset the costs of meeting the E911 mandate. Nextel (now merged with Sprint) was the first to conduct a large-scale LBS rollout. Nextel primarily marketed its solutions to enterprise clients and used its push-to-talk, A-GPS enabled ruggedized phones as key differentiators. Before the merger with Sprint, Nextel consistently posted the highest ARPU among its peers in the US. Examples of services offered were fleet and workforce tracking, time cards, turn by turn directions and security.

In the past 12 months, Sprint-Nextel has continued to launch and advertise new LBS services aimed at consumers, such as the Sprint Family Locator service. As the name suggests, Sprint Family Locator is designed to let families keep tabs on each others' whereabouts. With the new service parents can use either a phone or PC to pinpoint the location of a child. The location is given on a map with the nearest address and surrounding landmarks along with the accuracy of the location. The new application also includes the ability for a parent to be notified when the child reaches a destination (school for example). Each time the handset is located it shows a text message letting the user know that it has been tracked to ensure "open communication". Family Locator costs \$9.99 per month and can be used at that price level to track up to four handsets.

Another location solution offered by Sprint enhances 411 directory services and roadside assistance. Location-based enhancement will be offered on an opt-in basis for no additional charge for the two current voice applications, Sprint PCS Directory Assistance (411) and Roadside Rescue. Pricing will remain \$1.25 per directory assistance call (plus air-time) and \$4.00 per month for Roadside Rescue subscription.

Meanwhile, the most-popular U.S. cell phone carrier, Cingular, introduced its first navigation phone in October. In January, Verizon Wireless introduced a new Motorola Inc. GPS handset with software that can generate driving instructions for a traveler in any part of the

United States served by Verizon. The service, dubbed VZ Navigator, is offered at \$9.95 per month or \$2.95 for a daily subscription. The company has since added a second GPS phone made by LG Electronics of South Korea. The company says this is all part of its plan to eventually introduce all of its customers to location-based services.

## ANOTHER CASE IN POINT: SKT

Beyond the U.S., SK Telecom of Korea has launched the NATE Drive service to its nearly 20M subscribers. The service, which is available to their 5M subscribers with GPS-capable handsets, provides spoken turn by turn driving directions, traffic updates, speed camera alerts, and a family finder feature, has increased SKT's ARPU by approximately \$70 across all LBS users. Launched in 2003, the service is enjoying a 20% adoption rate and now accounts for just under 1% of SKT's revenues, which compares favorably to music (1.5%) and games (1.5%), given the smaller subscriber base for LBS. Reviewing the year over year growth for its LBS services, SK has found 10% growth in the family finder service and 60% growth in telematics/navigation revenues. With LBS subscribers showing 50% improvement on ARPU over non-LBS subscribers, SKT has determined that LBS gives the company a significant boost both in revenues and in customer loyalty. As the costs of A-GPS chips come down, SKT plans to ramp up its LBS services and increase penetration of LBS handsets through the end of this decade.

## THE EVOLVING LBS INFRASTRUCTURE

These and other LBS success stories have been made possible by recent, dramatic improvements in the underlying technologies and standards for delivering location data reliably and cost-effectively. Through 3GPP, OMA and OGC critical standards that provide for common location interfaces have been established worldwide. In addition to accelerating the time to market and reducing the carrier's burden in defining how to implement location, these interfaces enable the global carrier community to source cost effective and interoperable network and handset elements from multiple vendors. Today's accepted location standards include:

- RRLP (Radio Resource LCS Protocol – TS 44-031) the specification covering LCS in the GSM/GPRS networks.
- RRC (Radio Resource Control – TS 25.331) the specification covering layer 3 UMTS protocols including LCS.
- IS-801A -- the 3GPP2 location specification for CDMA.
- SUPL (Secure User Plane) as defined by OMA a standard used to encapsulate RRLP, RRC and IS-801A.
- MLP (Mobile Location Protocol) an application level definition between the Location Server and the Location Services Client.
- OpenLS (Open Location Services) as defined by Open Geospatial Consortium – an open definition for location interfaces used in wireless internet infrastructure

In addition to these global standards, location services depend on LBS-capable handsets, and here, improvements have been rapid and multiplying. As A-GPS is adopted at a greater rate into handsets, A-GPS chip vendors such as SiRF and Qualcomm have had to continue to reduce power drain, size and cost while improving sensitivity and the time it takes to return a location response. The result is that every Tier 1 handset supplier and many of the tier 2 and tier 3's have multiple SKU's with A-GPS which do not directly limit the size, battery life or the form factor while still providing for a positive user experience. Example handsets would be the Motorola i530 and RAZR v3m,

the Samsung V850, the Research in Motion 7100i and the Mitac A701. Simultaneously, LBS-capable accessories that broaden carriers' ability to deliver LBS services to a wider array of end-users have come on the market. Examples include cradles which when connected to handsets offer elements such as navigation and hands free support while charging the phone. SKT in Korea provides a hands free, GPS-enabled phone cradle that powers SKT's first edition of NATEDrive for the services listed above. In Europe, companies such as TomTom, Wayfinder, Nokia and Route66 deliver GPS and BT accessories which when combined with navigation packages support and enhance Symbian or Windows Mobile powered handsets. In North America, Garmin, Palm, HP and Microsoft jumped into the accessory game by offering cradles and GPS/BT devices in combination with navigation and traffic applications.

Meanwhile, application specific devices -- such as machine-to-machine (M2M) devices from Siemens, Falcom and Telit -- incorporate location and a modem connection (i.e. GPRS) for fleets and enterprises to track and monitor assets. For tracking children or the elderly, services and application-specific devices include the SECOM safety product on the Chungwha Telecom network, Wherifone from Wherify, iKids from SKT and most recently the Disney Mobile MVNO offering in the U.S.

## NETWORKS EVOLVE

The early adopters of location in the mobile operator segment had to work with or define proprietary interfaces to allow them to launch location centric services. Hutchinson worked with SiRF, NEC, Motorola and TCS with their 3G networks based on an Over the Air interface called X1. NTTDoCoMo defined their own end to end platform called the DoCoMo Location Platform (DLP) to prod vendors into supplying LBS capable platforms. Fortunately, in the background, telecom organizations such as GERAN, 3GPP, 3GPP2 and OMA have been working on industry interface standards for location. Results include location standards for GSM, CDMA, WCDMA, CDMA2000 as well as for control plane and user plane implementations. In addition, companies such as TruePosition, Openwave, Autodesk, SKT, Intrado, and Ericsson have been busy developing and deploying the necessary network elements such as SMLC's to location enable networks. The result is that carriers now have knowledgeable tier 1 suppliers of network elements to work with when deploying LBS.

## THE LBS FUTURE

"In MIT's version of the future, you'd head to that meeting downtown and the city would route you around traffic. You'd get into town and the city would guide you to a parking space. And if the meeting has moved, you'd get to the room and your phone would buzz with a note telling you where to go."  
— *USA Today*

"With mobile location as the driving enabler, the mobile Web has the potential to change from an abstract virtual place where subscribers view portal pages of content and downloadable applications (often referred to as Web 1.0) to an immersive world where subscribers discover content-in-context through known localized constructs in and through their real life travels, experiences and daily whereabouts."  
— *OpenWave white paper, 2006*

What's next for location based services? Many industry pundits predict that in the not-too-distant future, location will be as ubiquitous as time in the mobile consumer and enterprise market. As a key piece of data easily accessible to consumer devices, location will be consumed by everyday applications starting, many believe, with search. The first step in this migration could well be Google's new Google Mobile offering, which the Visiongain group predicts will soon offer LBS-based search, along with local advertising. In this scenario, users could easily search for local points of interest, and when they retrieve the search results they also receive targeted ads from businesses that are right on their route to the point of interest.

Other applications that could leverage LBS data include address books, IM lists, photo libraries, internet links, social networking entries, and localized applications such as traffic and weather helpers. In this paradigm, location is an invaluable filter for enhancing and enabling richer user experiences. For example, a mobile device could access location for its Push to Talk or Instant Messaging application to notify users that a "buddy" is in close proximity, allowing the mobile user to connect with friends or friends of friends in person when convenient. Another example: Bloggers could annotate their personal blogs or social networking applications with a review of a show or a restaurant whereby like-minded subscribers to the blog would be notified on their mobile device if/when they pass by that show or restaurant.

Beyond these applications is an entirely new paradigm for the mobile experience that OpenWave, among others, calls the "mobile Web 2.0." In this vision, a subscriber's mobile device can be transformed into a geographically smart accessory with location-aware business logic that can decide what contextual content the subscriber will most want to access, based on the subscriber's location and perhaps also on his or her preferences and schedule. By combining location data with other key pieces of subscriber and Web information, the mobile Web 2.0 will enable subscribers to interact with one another and with the mobile Web itself in an "immersive" contextual environment.

Now that the infrastructure for incorporating location data into mobile handsets has been established, and the costs of doing so are coming down, LBS offers today's carriers a broad range of new ways to increase ARPU and reduce churn, all while rolling out exciting new applications to end users.