

Location, Location, Location: The Killer App of Mobile E-Commerce?

Brenda Lewis

Abstract

Location defines and uniquely differentiates the mobile device user. As a result, location services may well become the "killer app" of mobile e-commerce. Spurred by the FCC's wireless E-911 mandate, R&D investment in new location technologies has triggered an array of solutions suitable for both wireless carriers and B2B mobile location services. However, unlike E-911, these services are not designated loss leaders, but high value-added services expected to generate profits.

Wireless location services revenues will reach \$7 billion and those in Western Europe \$9 billion by 2005, according to Strategy Analytics, with tracking applications generating the highest Average Revenue Per User (ARPU) from the smallest cellular user penetration rates. This paper examines new technologies allowing service vendors to address "for profit" market segments as diverse as high value cargo tracking, inventory management, kidnapping protection, logistics support and location based-billing.

Location services carry a powerful message to wireless carriers: Tracking remains the single largest revenue generator. Carriers should establish a beachhead early in the B2B mobile commerce sector with its critical tracking applications and use the cash flow to promote the growth of the low margin, slower growing mass market location services.

Brenda Lewis is Principal of Transactions Marketing Inc., Greenwich, CT.

The Power of Location-Based Services

In a February 2000 report from Strategy Analytics, Location-Based Services : Revenues and Applications, author Cliff Raskind says: "Assuming the vast majority of m-commerce transactions are small denominations in thin margin retail businesses, it will be difficult to assume that network operators will be able to command anything other than transport costs. However, augmenting the network with superior location-finding technology that is robustly interoperable with downstream applications may differentiate network operators, allowing them to command a premium."

The premium at stake is very large. Excluding E-911, the Strategy Analytics study projects total North American wireless location services revenues will reach \$7 billion and those in Western Europe \$9 billion by 2005, with tracking applications generating the highest Average Revenue Per User (ARPU) from the smallest cellular user penetration rates. "For profit" market segments are as diverse as high value cargo tracking, inventory management , kidnapping protection, logistics support and location based-billing. Vendors utilize a variety of satellite and cellular networks to deliver services (sometimes both) and employ a mix of transactions charges, set-up fees and subscriptions.

Conspicuously missing from the revenue mix is advertising. For purposes of assessing the potential of B2B mobile commerce, it's fair to say that advertiser sponsored "concierge services" are unlikely to play a large role. A business user might tolerate a coupon or a one-line special notice from Staples as the price of having the nearest store location sent to a mobile device. But even the most hardened "netheads", let alone business professionals with low tolerance for web clutter, will bridle at having their limited mobile device screens filled with advertising. To quote Cliff Raskind: "Even a few unsolicited and unwelcome generic advertisements to a business power-user's phone without his/her explicit consent could seriously tarnish a hard-won customer relationship."

Benefits for Field Sales and Service

Field sales and field service productivity remains one of the oldest real-time wireless data applications and is being rapidly transformed into on-line, real-time mobile e-commerce through enterprise application integration. Integration allows wireless devices to interact securely with legacy systems. In fact, a location-enabled phone for commercial and professional users was introduced at CeBIT in

March 2000. Benefon's LOCUS, a GPS/GSM integrated phone, permits a salesman to find a specific address on a display map, to receive driving directions and (yes) to receive advertisements.

With just-in-time inventory and extensive outsourcing greatly extending the supply chain, asset monitoring and control has become increasingly important to the enterprise. Location-based inventory management is moving away from on-premises applications to both hybrid and wide area network solutions. On-premises systems allow location of parts, packages, pallets, instruments, containers and other assets within the confines of real estate controlled by a corporation and its suppliers. Typical installations include factory floors, railheads, marshalling yards, warehouses, container terminals, truck stops, etc.

Traditionally, these systems have used infrared spectrum and the RFIDs (radio frequency identification devices) and were each proprietary. Today, however, smart tags, RFIDs and even bar codes are increasingly enabled for two-way communication, so that instead of waiting to be scanned, the transponder equipped device can send a location, which can then be captured, transmitted via the Internet and displayed on a web-based tracking system. Several companies have tackled the integration issues related to the 60 odd types of RFIDs and are offering systems which can identify signals from multiple types of "tagged" devices, a prerequisite for wide area tracking. Also promising for the future is Motorola's recently announced passive Bistatix chip, which will be incorporated in "smart" packaging materials manufactured by International Paper. The chips will contain programmable routing information and other data well beyond traditional bar codes and downstream might be unified with GPS for continuous wide area tracking.

For today, Pinpoint Systems of Bedford, MA has developed a patented "indoor" GPS-like real time asset management system it calls Local Positioning System™. Unlike infrared systems and bar codes that require the asset to be "in view," Pinpoint can report positions of tagged objects up to 250 feet away from the antenna. Nortel Networks Wireless Development Centre is using this system to track digital signal processors, spectrum analyzers and other high value instrumentation over its 6 labs in Calgary. Developed from pseudo noise research by the US Department of Defense, unlike older systems, Pinpoint's is designed with open APIs to corporate networks. It can be paired with off-premises GPS-powered tracking systems for continuous inventory location beyond company-controlled premises.

Cost-effective wide area asset tracking services are part of the reason tracking revenues are estimated by Strategy Analytics to reach \$2 billion in location service revenues in North America and \$1.8 billion in Western Europe by 2005. Wide area asset management applications utilizing GPS (Global Positioning System, a worldwide network of 24 satellites transmitting location data, owned and operated by the US Government) have been available since the mid-1980s. Primarily used for fleet management, these proprietary systems have typically involved heavy, power-hungry, purpose built units attached to trailers, containers and railcars. The units relay not just location data to a central office, but perform a vital array of functions, including monitoring container temperature (especially for refrigerated or "reefer" units), arming trailer door locks and reporting engine operating condition. Such systems are now being supplanted by IP based services which use standard two-way devices to report the location of the asset, monitor its condition and provide data via the Internet to the company's own systems. A leader in this group is Wireless-Link Corporation, which recently announced it will work with Lojack to produce a car location system not limited to central police stations, but available over the web in real time to owners.

A GPS tracking system is already in operation covering New England Electric System's entire 420 vehicle fleet. Developed by Outerlink Corporation and based on location technology advances since the Gulf War, it is a proprietary two-way, real time GPS system utilizing miniaturized antennas and spread spectrum to transmit continuous tracking data to Outerlink network operating centers. Information is then relayed to clients via the Internet.

Pot of Gold: Cargo Tracking

If there is a pot of gold for location services providers, it lies not in vehicles, but in cargo. Cargo losses amount to \$12 billion annually in the US alone. These losses result when cargo is removed from the pallets, containers, trucks and railcars which are today the assets being tracked. The goods are stolen or diverted outside the controlled premises of supply chain partners, often by insiders who carefully reseal the containers. The problem is so pronounced in Europe that the European Union has funded TRACAR, a consortium of truckers, rail companies, shipping lines, satellite operators, tracking service providers and RFID manufacturers, all developing a massive, inter-modal end-to-end system incorporating GPS, GSM, satellite and VHF radios. TRACAR is in pilot stage and has required significant investment in passive (powerless) ground-embedded devices triggering a GPS location transmission to central base stations in

Denmark as a railcar or truck passes over them. There, location data is converted into tracking information and is available to authorized users via the Internet. The system is awkward, expensive and unlikely to be replicated outside the EU.

In the US, a near-term solution capitalizing on the reduced scale, lowered power consumption and increased signal retention being achieved in newer GPS chipsets is under development. Vector Communications, a Silicon Valley-based start-up, unifies the GPS chipset with a two-way radio under a single IP compliant processor. This system utilizes the Internet and ubiquitous two-way paging networks (Skytel, PageNet and Weblink Wireless) for real-time location data delivery. In volume production, costs are expected to be less than \$200. The extremely small form factors and long battery life in this platform permit cost-effective delivery of such critical business location services as high value cargo location, mobile asset control (laptops, PDAs, cell phones) and kidnapping protection, in addition to such executive perks as GPS-equipped luggage tags. Because both GPS and paging networks are widely deployed, this customizable platform offers hope for addressing real-time tracking and location problems which have been resistant to cost effective solutions. Medical institutions might utilize this platform woven on garments for tracking Alzheimer's patients; law enforcement agencies might incorporate the system in a monitor for home-incarcerated offenders. Already small two-way GPS receivers are being used to track and locate endangered humpback whales via the Internet as they migrate throughout the North Pacific.

Beyond GPS integrated with pagers, cellular and satellite phones, Kanwar Chadha, founder of SiRF Technology, Inc. reports that in Europe and Asia there are even a few location projects being developed for trunked radios (like police and fire units) and for walkie-talkies. Another, as yet unfunded venture here in the US claims a patent pending device which can "wake up" a sleeping RF circuit after a period of up to two years, triggering a GPS location report should the asset to which it is attached be reported missing. Also under development is a microchip funded by the CIA's venture group , In-Q-Tel , which incorporates two-way telemetry and can emit a location signal based on chemical and temperature changes, as well as other triggers.

As dramatic as the location services developments in GPS technologies may be, there has been an even greater breakthrough in technology aimed at delivering location services within the cellular network footprint, especially in urban environments. A patent pending technology from PPM, Inc., a Silicon Valley-based start-up, utilizes a technique called RF Signatures™ to locate a caller within 125 meters 75-80% of the time. Dr. Henry L. Bertoni of Polytechnic University in New York, one of the world's leading experts in radio wave propagation, explains this technique as follows: "Clutter in a radio signal is composed of both shadow fading due to blockage and multi-path fading (the distortion from waves bouncing off surrounding objects and structures). In the RF Signatures™ approach, the multi-path fading can actually be used to more accurately determine the location of the cellular user within the carrier's service area."

The appeal and business potential of PPM's solution is that it does not require modification to existing handsets, nor does it require changes to the carriers switch. In addition to having no impact on the network infrastructure, this technology is air interface independent, which means it can operate with any of the US cellular networks (TDMA, CDMA, GSM). Such a standard location services solution will enable the US wireless carriers to offer truly national location services to enterprises, something they cannot do with other types of mobile e-commerce today because services are typically air interface, carrier or handset specific. In Europe, a common location services solution will permit carriers to offer high value-added services to businesses across national boundaries; for example, location-based billing. Finally, this technology keeps control of the location information within the carrier network in an already secure data base.

Conclusion: Advice to Carriers

Although Strategy Analytics estimates that tracking applications excluding E-911 will achieve penetration rates of only 5% and 9% of cellular subscribers by 2005 in Western Europe and North America respectively, because of the critical need for such services, they will initially yield ARPU four (4) times higher than is expected from the most popular consumer services segment, notifications and alerts. Tracking applications ARPU starts out in 2000 at \$12 in North America, \$10 in Western Europe and declines to a projected \$6.33 and \$5.90 respectively in 2005. However, it remains the single largest revenue generator. For the wireless carriers, there is a powerful message here. Establish a beachhead early in the B2B

mobile commerce sector with its critical tracking applications and use the cash flow to promote the growth of the low margin, slower growing mass market location services. This is a path well worn by telecommunications titans: this is how MCI grew its long distance business to surpass AT&T.