

Global Telephony

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GlobalXtra April 1, 2000

LOCATION, LOCATION, LOCATION

New technologies help Finland's Radiolinja cash in by pinpointing where subscribers are

Cellular phone companies are racing to deploy a new generation of value-added services that exploit their knowledge of a mobile phone user's location at any given moment -- assuming the phone is switched on. By knowing where a customer is to an accuracy of up to 50 meters, for example, carriers can offer weather, travel, restaurant or shopping information on demand that is location-specific and therefore directly relevant to wherever the user may be.

The data can be delivered either via a short text message based on short message service (SMS) technology to the handset display or through the user calling a number to hear an audio recording of text information.

Mobile location services (MLS) offer a new means of differentiation, a way for cellular providers to reduce churn, and a potential fresh revenue stream as markets become increasingly competitive with falling prices and margins in the voice market.

Technological improvements have been made on several fronts, including back-office infrastructure as a new generation of powerful server platforms can cost-effectively support the computing-intensive demands of MLS.

The global market for such services is potentially about to explode with deployment now imminent due to regulatory changes such as in the United States where the Federal Communications Commission is requiring cellular operators to use these technological developments primarily to enhance the effectiveness of emergency services.

The development is being helped internationally by Radiolinja of Finland. The Finnish company, 67 percent-owned by Elisa Communications (formerly Helsinki Telephone Corp.), is Finland's second largest cellular phone company, with 1.1 million customers and a 38 percent share of the country's mobile market. Finland has a mobile customer penetration rate of 65 percent, the highest in the world and still rising. So the carrier already has a sufficient number of base stations and some clever software to identify the position of a handset to within an accuracy of about 300 meters in metropolitan areas and about 2.2 km in the countryside, depending on the size of the cell. With higher market penetration, and more base stations, cell sizes will shrink and this accuracy can only improve.

There are numerous technological methods or algorithms

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that a mobile phone company can deploy to fix the position of a mobile phone. For example, it can use global positioning system (GPS); time of arrival (TOA), a technique popular in the U.S. market; or enhanced observed time difference (EOTD), a system made popular by equipment manufacturers for the European market. Radiolinja chose a positioning methodology that largely uses existing network infrastructure, although some particularly robust servers, customised software and some minor mobile handset modifications are required. The point of MLS technology from a customer's viewpoint must be to enrich the services that he can access in ways that the mobile phone companies and the subscribers have not thought of. The concepts behind some of these enhanced services are, in some cases, borrowed from Internet entrepreneurs.

The most obvious position-based services might involve a subscriber strolling into a town or part of a town or city that he is unfamiliar with and wanting to know the location of the nearest cash dispenser, theater, supermarket, barbershop, or Thai restaurant. Or, he may want to know the time of the next intercity train service.

Letting a phone do the legwork

With this type of requirement in mind, Radiolinja operates AskIT, a service allowing users to call the cellular network's databases and tap them for such consumer-oriented information. Although it has been running for two years and is being used by more than 20 percent of the company's subscribers -- a number that is steadily growing -- it does not yet use MLS positioning and is therefore still fairly basic in terms of its functionality because it relies on the knowledge and patience of the customer to key in some crucial data accurately in order to get the information he wants.

At present, AskIT requires the caller to provide one of three pieces of information to enable the network to fix his position and then provide a useful, local answer: the name of a street; the name of the suburb, town or city; or longitudinal and latitudinal coordinates. However, street names are often repeated in large cities or provinces, users might not know which town they are in, and not everyone knows their coordinates. The user might also unintentionally get the information wrong or wrongly input it into the network.

But with MLS in place, if the customer is looking for a near-



by McDonald's, he types in the company name -- thereafter treated as a "keyword" by the network -- on his handset display, presses the "option" button followed by "send position" function. Data is sent as an SMS message to one of six SMS centers. The information arrives via one of the mobile switching centers that serve a network of more than 100 base station controllers, including the controller that is the network entry point for the data transmitted from the handset.

This data is then handled by two Hewlett-Packard 9000 K-series servers typically costing around \$200,000 each for an application of this kind. Housed at Radiolinja's operations and maintenance center in Helsinki, these are similar machines with different software loaded to share the workload by performing their respective tasks.

A SmartLocation server converts one portion of the received SMS data into longitude and latitude coordinates to fix the caller's position, and collects the other part of the information packet from a Nokia netgate server, which has taken the keyword, in this case McDonald's, and converted it into a Web format and then forwarded it on.

These two pieces of data are then passed to an information broker server with sufficient capacity to store enormous amounts of data equivalent in size to the contents of a large Yellow Pages directory or more. This computer then matches the user's keyword request with the data and sends a message with the address of the three nearest McDonald's restaurants to the caller's coordinates back to the handset within 8 seconds of the initial request.

All the servers need to be sufficiently resilient and scalable to be able to handle the increased inflow of data requests as customer usage grows. The network might easily need to cope with perhaps several hundred hits per second from many thousands of callers on the move around the clock wanting to access the latest weather forecast for the locality, for example.

At present, the information broker server has around 250 different categories of keywords or key phrases that it can draw upon such as "stock prices," "bus timetable" and "weather," together with the pages of information that those phrases act as labels for. This data is remotely transmitted to the server in Web format from the servers of content providers drawn from a range of industries and services.

MLS capability could also spawn a range of other uses, too. Just as ICQ --an acronym for "I seek you" -- software allows Internet users to know when their friends are on line. That means positioning software for mobile networks could enable "buddy" services, whereby your phone alerts you that some of your friends are less than a mile away from you and you can then send an SMS message inviting them to join you at the nearby Thai restaurant.

The same positioning technology, with some relatively minor modifications, will also allow parents to use the Internet to monitor the whereabouts of children carrying mobile phones. Radiolinja is already using the technology to monitor the location of its maintenance engineers so that it can select the nearest one to a faulty base station at any time.

From a revenue standpoint, the benefits of this work could become crucial for carriers. In an increasingly competitive market, Radiolinja will earn a premium for these MLS-based services - charging around \$0.40 a query for location-based weather information, for example, compared to existing standard query tariffs of \$0.30, significantly enhancing the average revenue per user that the company can generate. It should also reduce churn as the subscriber increasingly views his handset as an information tool rather than merely a telephone.

A potential stumbling block for the take-up of the MLS service based on AskIT will be the need for users to load software upgrades onto their existing handsets in order to access the data they want, but Radiolinja has been working with manufacturers such as Benefon, Ericsson, Nokia and Siemens to embed the software in new phones and plans to launch the service commercially in mid-2000. Radiolinja owns the intellectual rights to its version of this service concept and intends to export the service to other cellular carriers in overseas markets. Although the service has been developed for GSM handsets, it could also work on cellular networks based on other air-interface standards, such as TDMA and PDC. Other commercial benefits of this type of technology include the ability of a carrier to offer call tariffs linked to the user's location, meaning domestic mobile phone calls could be charged at a comparable or cheaper rate when the user is at home to compete with fixed-line service.

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