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Carriers Struggle To Meet Location Services Deadlines

By Sally Ruth Bourrie TWICE 1/6/2001

This year, the wireless industry opens a new chapter, maybe even a new book. Call it *2001: A Place Odyssey*.

It will be about networks that pinpoint a subscriber's location in an emergency much more closely than a cell sector, as it's done today. And it will be about subscribers who no longer have to punch a ZIP code into a phone keypad or say their location to let a network know where they are.

Phones will determine their location automatically so people can easily find the nearest ATM or movie theater or hear about a nearby store's sale.

This new chapter in wireless-location services is driven by the FCC's Enhanced 911 Phase II mandate.

The mandate: To meet the mandate, carriers have the option of implementing handset-based systems, network-based solutions, or hybrids of the two. The FCC's accuracy requirements depend on technology choice.

"Automatic Location Information (ALI)-capable" handset-based solutions, which provide specific latitude and longitude information, must be accurate to 50 meters for 67 percent of calls and to 150 meters for 95 percent.

These solutions can be handset-only solutions or hybrid solutions that require a combination of ALI-capable handsets and a network upgrade.

Network-based systems, on the other hand, don't require the purchase of specific phones to implement, so they can be used with legacy handsets. Network-based solutions must locate handsets within 100 meters for 67 percent of calls and 300 meters for 95 percent.

Missed mandate: Nov. 9 was the FCC's deadline for wireless operators to outline their Phase II strategies, including their choice of technology and technology vendor, and plan of action. Of the major carriers, however, only Sprint PCS fully complied. AT&T Wireless Services submitted a 10-page "we haven't decided" report.

"E-911, or location technology, is in such flux that people were waiting until the last minute," said Leo Fitzsimon, director of regulatory affairs for Nokia, which has petitioned to extend the FCC deadlines.

Will new handsets reach the market by the fourth-quarter selling season? Most filings expressed concern about volume equipment and handset availability by October. ALI handsets don't exist today, and neither does much network-based E-911 infrastructure equipment.

The FCC, however, isn't swayed by such concerns. Said Daniel Grosh, an attorney for the FCC's Wireless Technology Bureau's Policy Division, "The rules have been in place for four years, and the schedule has been set for that long, so there has been time for manufacturers and carriers to

work through the process and be compliant."

Sprint seems to agree. The carrier is knocking itself out to be first to market, understanding that E-911 Phase II itself might not only save lives, but the technology outgrowths can generate revenue. Launching location-based services with E-911 will give Sprint an edge, said spokesman Dan Wilinsky.

Carriers with handset-based plans: Most operators have chosen handset-based and hybrid handset/hybrid solutions. One hybrid solution, network-assisted GPS, has been chosen by CDMA players Alltel Communications, Leap Wireless, Sprint PCS and United States Cellular. For its GSM properties, Cingular Wireless has chosen a network-assisted GPS solution, as has iDen carrier Nextel Communications.

"The handset-based solution is the path of least resistance," said Cliff Raskind, senior industry analyst at Strategy Analytics. Faster and less expensive handset-based solutions require fewer infrastructure changes than their network-based counterparts, he pointed out.

For handset-based solutions, Global Positioning System (GPS) technology is the most popular approach, either as a stand-alone handset-based technology or with network assistance.

As a stand-alone handset-based technology, GPS-equipped handsets determine their location when three or four GPS satellites in the 24-satellite GPS constellation are within their line of sight. Waiting for enough satellites to be in line-of-sight range, however, sometimes takes up to 15 minutes.

On the other hand, network-assisted GPS technology, in which specially enabled handsets communicate with GPS receivers in base stations, is more accurate and finds devices within seconds.

Handset-based pros, cons: For privacy-concerned subscribers, handset-based solutions are reassuring. Users will be able to activate location services by turning their handsets or GPS capabilities on or off as desired.

But such GPS solutions, whether handset-only or hybrid handset/network-based, enable carriers to find only new location-enabled phones, not legacy phones operating in their networks. Both solutions also reduce battery life if a subscriber keeps the GPS mode on whenever the phone is on. Another drawback to handset-only and hybrid handset/network solutions is that a subscriber's location services might not follow them if they roam into a network that uses an incompatible handset-only or hybrid handset/network solution.

CDMA carriers Alltel Communications, Leap Wireless, Sprint PCS and United States Cellular plan to rely on network-assisted GPS, but whether they'll choose the same implementation to allow for interoperability of phones isn't certain.

Only Sprint PCS has named its supplier: Qualcomm/SnapTrack, which is the only vendor to publicly announce integrated GPS chipsets that are near commercial production.

Those chipsets will integrate numerous handset functions on one chip, so handset size and weight won't be affected, the company contended.

SnapTrack's MSM3300 chipset will be in handsets in Asia this spring, said Qualcomm

spokeswoman Anita Hix. Multiple foundries will ensure volume production. Technology will add about \$10 to a handset manufacturers' cost if the handset maker uses Qualcomm's chip solution for CDMA phones, said Hix.

Sprint, which will use the 3300 to launch service, reported that the 3300 located 67 percent of test calls within 30 meters in controlled trials.

Nokia, which does not purchase Qualcomm chips, is developing CDMA Phase II handsets and might become a Sprint supplier.

Carriers with network-based plans: The network-based camp includes CDMA carriers Verizon Wireless and Qwest Wireless. For its TDMA properties, Cingular will also implement a network solution.

In a network solution, which relies on a network overlay, legacy and future handsets transmit to multiple base stations. For increased accuracy, Angle of Arrival (AOA) technology will often be partnered with Time Difference of Arrival (TDOA) technology.

Under AOA, network antennas in at least three cell sites use triangulation to determine the relative angles of the handset's transmissions from the cell site in which the handset is located. The angles intersect at the handset's approximate location.

TDOA, on the other hand, calculates the difference in time for a signal to arrive at three or more cell sites. This produces arcs that intersect near the handset's location. Woodland Hills, Calif.-based SigmaOne Communications' AOA/TDOA technology is said to provide accuracy within 300 feet.

Network-based pros, cons: The upside to a pure network-based solution is that legacy handsets can be located.

Presumably, phones equipped with a handset-based or hybrid network/handset solution would also be located when they roam into a market that uses a network-only solution.

However, whether that roaming phone would be able to access its home network's location-based services, such as ATM locator, isn't certain, according to phone and infrastructure manufacturers contacted by TWICE.

There are some downsides to the technology. For subscribers in rural areas with fewer cell sites, network-based systems are less accurate.

For carriers, the downside is that network solutions require more deployment time and can cost \$25,000 to \$30,000 per tower to implement. It takes a day to upgrade two to four base stations, or 10 to 12 weeks to complete a medium-sized market of 200 cell sites, according to Cingular's filing to the FCC.

The time line: Despite all of the activity, few believe Phase II compliance will happen on time.

"It's going to be a couple years off," said Gartner research director Phillip Redman, because many solutions aren't accurate enough and network modification is expensive.

In fact, with no across-the-board FCC penalty for noncompliance, "Phase II is more of a suggestion at this point," said Bryan Prohm, Gartner Dataquest senior analyst.

Underscoring the fluidity of the situation, Qwest's filing stated that handsets cannot even be

tested until fourth-quarter 2001.

Bjorn Hjelm, Alltel network planning and advanced technology engineer, stated flatly, "We have yet to get a solid assurance from a vendor saying, 'I'm going to deliver this phone at this time.'"

According to U.S. Cellular's filing, Motorola, Audiovox and Ericsson plan TDMA and CDMA Phase II handsets, and Kyocera will supply CDMA phones. Kyocera and Audiovox "preliminarily indicated" that devices could be available in the third quarter, assuming chip supplies are adequate, the filing said.

Given the amount of hedging going on, analysts said, retailers shouldn't expect many of their carriers this year to deliver location services that could potentially give them another selling point.

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