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April 4, 2001

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

94-102

By Hand

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 - 12th Street, SW
Washington, DC 20554

Re: **REDACTED--FOR PUBLIC INSPECTION**

AT&T Wireless Services, Inc. - Request for Waiver of the E911 Phase II Location Technology Implementation Rules

Dear Ms. Salas:

Transmitted herewith on behalf of AT&T Wireless Services, Inc. ("AT&T"), is an original and four copies of the above-referenced request for waiver of the E911 Phase II location technology implementation rules ("Waiver Request"). Pursuant to Section 0.459 of the Commission's rules, 47 C.F.R. § 0.459, AT&T seeks confidential treatment of certain material in the body of the Waiver Request and the following exhibits attached to the Waiver Request: Exhibit A, Lockheed Martin Geolocation Technology Evaluation; Exhibit B, Lockheed Martin Geolocation Vendor Assessment; Exhibit C, TruePosition Test Report; Exhibit D, Grayson E-911 Trial Technical Summary; Exhibit E, Grayson E-911 Trial (Urban Denver, CO): Technical Summary; Exhibit F, US Wireless Location System Field Evaluation; and Exhibit G, AT&T TDMA (IS-136) Feasibility Study - Phase 1 (collectively "Exhibits").

AT&T is voluntarily submitting to the Commission the confidential version of the Waiver Request and the Exhibits, which contain proprietary and confidential trade secret and commercial information that would not otherwise be available to the public. In this regard, each of the Exhibits is subject to a non-disclosure agreement entered into by AT&T and the relevant vendor or report preparer. Because the information submitted consists entirely of materials specifically protected from public disclosure under Section 0.457(d), AT&T respectfully requests confidential treatment as set forth herein. 47 C.F.R. § 0.459(b).

The confidential version of the Waiver Request and the Exhibits are being filed in a sealed envelope. Accordingly, these documents should not be placed in the public record of this proceeding. In the event that this request is denied, AT&T requests notification and immediate return of the enclosed information, as provided for in the Commission's rules. 47 C.F.R. § 0.459(e).

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A copy of the public version of AT&T's Waiver Request with the confidential material redacted and without the confidential Exhibits is being filed simultaneously herewith to provide notice for the public record; the confidential Exhibits have been redacted in whole from the public filing. All confidential documents bear a legend identifying them as confidential and the confidential material in the body of the Waiver Request is clearly marked confidential.

If you have any questions concerning this filing, please do not hesitate to contact the undersigned.

Respectfully submitted,

Douglas I. Brandon / by STL

Douglas I. Brandon

Enclosures

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Before the
FEDERAL COMMUNICATIONS COMMISSION
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OFFICE OF THE SECRETARY

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket 94-102
To Ensure Compatibility with	)	
Enhanced 911 Emergency	)	
Calling Systems	)	

AT&T WIRELESS SERVICES, INC. REQUEST FOR WAIVER OF THE E911 PHASE II LOCATION TECHNOLOGY IMPLEMENTATION RULES

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Before the
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In the Matter of	)	
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To Ensure Compatibility with	)	
Enhanced 911 Emergency	)	
Calling Systems	)	

AT&T WIRELESS SERVICES, INC. REQUEST FOR WAIVER OF THE E911 PHASE II LOCATION TECHNOLOGY IMPLEMENTATION RULES

AT&T Wireless Services, Inc. ("AT&T") hereby requests a waiver of the Phase II E911 location accuracy provisions of Sections 20.18(e), (g), and (h) of the Commission's rules, 47 C.F.R. §§ 20.18(e), (g), and (h), to permit AT&T to deploy Enhanced Observed Time Difference of Arrival ("E-OTD") technology throughout its GSM network and Mobile-Assisted Network Location System ("MNLS") technology for its TDMA customers.

The Commission recently granted VoiceStream Wireless Corporation ("VoiceStream") a conditional waiver of these rule sections so that VoiceStream could implement E-OTD (with an interim network software solution ("NSS") for legacy, non-E-OTD compliant handsets) in its GSM system. AT&T faces circumstances very similar to those that led the Commission to approve VoiceStream's waiver. Moreover, the extensive investigations AT&T has conducted into multiple Phase II E911 technologies demonstrate that E-OTD and MNLS are, by far, the best systems for both its GSM and TDMA customers. Accordingly, a waiver of the location accuracy requirements to allow use of these technologies would serve the public interest and is otherwise justified under the standards applied to such requests.

INTRODUCTION AND SUMMARY

On November 30, 2000, AT&T announced a strategic alliance with NTT DoCoMo, Japan's leading mobile communications company, to develop the next generation of mobile multimedia services on a global-standard, high-speed wireless network.[1/] To speed the introduction of these new data services, AT&T will overlay a Global System for Mobile Communications ("GSM")/General Packet Radio Service ("GPRS") platform on its existing nationwide TDMA network. This will give AT&T's GSM network higher speed data capabilities and its GSM customers a wider array of mobile devices from the world's vendors, thereby advancing the Commission's oft-stated goal of expediting the provision of the next generation of advanced wireless services to customers.[2/]

As AT&T noted in its amended Phase II E911 report,[3/] rolling out this new air interface will seriously complicate AT&T's efforts to comply with the Commission's Phase II rules. Implementation of GSM alone will require AT&T to deploy new mobile switching centers, modify, and in some cases add, new cell sites, and provide new handsets to GSM customers. The move to Phase II E911 service also is a monumental task, far exceeding the substantial resource demands associated with Phase I E911. To accomplish these two projects simultaneously, AT&T has devised a creative solution that will bring Phase II E911 service to all of its customers (on both its TDMA and GSM air interfaces), as well as roamers, more quickly and more ubiquitously than with alternative technologies.

E-OTD for GSM. For its GSM network, AT&T intends to deploy E-OTD technology, which is a hybrid handset and network-based solution like that the Commission recently approved

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1/ See Press Release, AT&T and NTT DoCoMo Announce Strategic Wireless Alliance (November 30, 2000).

2/ See, e.g., News Release, Press Statement of Chairman William E. Kennard on Spectrum Requirements for Advanced Wireless Services (rel. October 13, 2000) ("We look forward to working with the Executive Branch in our respective spectrum management roles to ensure that the American public has widespread and timely access to the next generation of advanced wireless services."); News Release, Industry Settlement Advances Standards Process for Third Generation Wireless Services (rel. March 26, 1999) (Chairman Kennard noted that settlement of a patent dispute "will allow for a speedier deployment of exciting wireless broadband services for the benefit of consumers.").

3/ Carrier Reports on Implementation of Wireless E911 Phase II Automatic Location Identification, CC Docket No. 94-102, AT&T Wireless Services, Inc. Amended E911 Phase II Report, at 2 (filed December 6, 2000) ("Amended Phase II Report").

in a waiver to VoiceStream.[4/] In contrast to VoiceStream, however, AT&T has the unique opportunity to make E-OTD available in its GSM network upon deployment of the GSM air interface. AT&T is working with its GSM vendors to require contractually that the GSM infrastructure be E-OTD equipped when installed and that GSM handsets sold to AT&T subscribers will be location-capable. As the Commission noted when granting VoiceStream's waiver request, use of E-OTD technology will provide substantial public safety benefits, "including rapid initial deployment of ALI capability with a relatively brief transition to even more precise levels of accuracy."[5/] While E-OTD ultimately will meet and even exceed the Commission's location accuracy requirements,[6/] at this point, AT&T, like VoiceStream, requires a temporary waiver of the Commission's accuracy rules for handset-based location technologies.

MNLS for TDMA. In its existing TDMA network, AT&T plans to deploy MNLS, which is a standards-compliant network-overlay Phase II E911 solution. AT&T has conducted extensive tests of the most viable available and potential Phase II technologies for the TDMA air interface, and has concluded that using MNLS will bring Phase II E911 service to its customers in the shortest possible timeframe. AT&T's initial deployment of MNLS in its TDMA network, including to some PSAP jurisdictions that have not yet requested Phase II E911 service, should occur by the end of this year. It intends to complete system-wide deployment of the technology by the end of the first quarter 2002, making the service available to all PSAPs in AT&T's TDMA service footprint, including those PSAPs that have not yet requested Phase II E911 service.[7/]

MNLS has a number of advantages over the other solutions AT&T investigated for its TDMA air interface, including the fact that it will work with existing TDMA handsets (eliminating the need to upgrade or replace handsets) and will support roamers and callers using uninitialized phones. Moreover, because MNLS uses functionality already required by the wireless network, deployment of the system will not require extensive network changes. This makes MNLS highly

[4/] Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, Fourth Memorandum Opinion and Order, FCC 00-326, at ¶ 56 (rel. Sept. 8, 2000) ("Fourth MO&O").

[5/] Id. at ¶ 59.

[6/] VoiceStream Wireless June 22, 2000 Ex Parte Presentation at 6.

[7/] Phase II location information will be available to all PSAPs, but can only be used by those PSAPs that have chosen to deploy Phase I E911 service.

reliable and, more importantly, available on an extremely short time frame to AT&T's TDMA customers. Although MNLS will not satisfy the Commission's location accuracy requirements for network-based location technologies, it is comparable to the accuracy range demonstrated by other network-based solutions in the trials conducted by AT&T. As described below, the numerous benefits of MNLS plainly warrant grant of the requested waiver.

I. LEGAL STANDARD FOR WAIVERS

Generally, the Commission's rules may be waived when there is good cause shown and when "special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest."[8/] In the context of the Phase II E911 rules, the Commission has recognized that there may be instances in which "technology-related issues" or "exceptional circumstances" make it impossible for a wireless carrier to deploy Phase II by October 1, 2001, and individual waivers could be granted in these circumstances.[9/] The Commission indicated that a request for such a waiver of the Phase II implementation rules should be "specific, focused and limited in scope, and with a clear path to full compliance."[10/] As demonstrated below, AT&T's request satisfies these standards.

II. E-OTD TECHNOLOGY IS THE BEST PHASE II E911 SOLUTION FOR AT&T'S GSM NETWORK

AT&T has selected E-OTD technology because E-OTD is the best solution for the subscribers on its GSM networks. First, as the Commission recognized when it granted VoiceStream's waiver request, E-OTD is the standardized location method for GSM.[11/] Moreover, unlike other dead-end or short-term solutions that have been proposed, E-OTD is included in the current GSM standards and will also be included in future releases.[12/] As a result, AT&T's handset manufacturers can be expected to include E-OTD capability in all future GSM handsets. In addition, the fact that E-OTD is included in the GSM standards ensures that E-OTD capability will occur in a

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[8/] Fourth MO&O at ¶ 43 (citing Northeast Cellular Telephone Co. v. FCC, 897 F.2d 1164, 1166 (D.C. Cir. 1990) and WAIT Radio v. FCC, 418 F.2d 1153, 1159 (D.C. Cir. 1969)).

[9/] Id. at ¶ 43.

[10/] Id. at ¶ 44.

[11/] Id. at ¶ 56.

[12/] Id. at n.100.

manner fully compatible with the expected eventual incorporation of global positioning system ("GPS") technology in the handset.

Second, using an E-OTD solution will ensure rapid initial deployment of ALI capability to all of AT&T's GSM subscribers. In contrast to VoiceStream, whose GSM network is already in place, AT&T will not have to implement an interim solution (such as VoiceStream's NSS) to accommodate legacy GSM handsets.[13/] AT&T currently is working with handset vendors so that it can provide E-OTD-compatible handsets to GSM customers when AT&T's GSM network comes online. In addition, to ensure that AT&T's GSM network is Phase II capable from day one, AT&T is working with its infrastructure vendors to require contractually that the GSM infrastructure be E-OTD equipped when installed.

Using E-OTD technology also will provide much improved ALI capability. Initially, E-OTD technology will be able to satisfy the accuracy standards required for network-based location solutions -- 100 meters/67 percent of the time.[14/] As the Commission recognized in granting the VoiceStream waiver, however, the accuracy of the E-OTD solution will "improve over time, as the software is refined, experience is gained, and additional cell sites are added to serve increasing traffic."[15/] Moreover, E-OTD is expected to improve further in accuracy performance as carriers such as AT&T advance along the path to the wider-band third generation ("3G") technologies. Like VoiceStream, AT&T will commit to meeting the accuracy requirements for handset-based solutions of 50 meters/67 percent of the time by October 1, 2003, or will adopt another ALI methodology that comports with the Commission's requirements.[16/]

As noted above, E-OTD will be implemented simultaneously with the market-by-market roll-out of the GSM network and thus will be available to all GSM subscribers.[17/] In contrast, an attempt

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[13/] VoiceStream is deploying NSS to "make use of existing network capabilities to provide immediate location information for all 911 calls on the network." Id. at ¶ 53.

[14/] Id. at ¶ 59. In a recent ex parte filing, VoiceStream stated that test data from its Houston trials "lends support to VoiceStream's belief that E-OTD ultimately will meet or exceed the FCC 50 meter accuracy standard." VoiceStream Wireless February 5, 2001 Ex Parte Presentation at 1.

[15/] Fourth MO&O at ¶ 59

[16/] Id. at ¶¶ 59, 64.

[17/] Although at least one vendor represents that it is developing a network-overlay system that will work on the GSM air interface, the E-OTD solution AT&T proposes to use will better serve the needs of AT&T's customers. Moreover, AT&T is not convinced that, given the proposed delivery

by AT&T to build two overlaid systems at the same time (GSM and network-overlay Phase II location) would be extremely complex and, without doubt, would delay the provision of Phase II E-911 service. In light of the substantial customer and public safety benefits that using E-OTD technology in its GSM network will provide, and the fact that the Commission already has granted a waiver to VoiceStream under similar circumstances, the Commission should grant AT&T a waiver of the location accuracy requirements for handset-based solutions set forth in section 20.18(h) of its rules.[18/]

III. MNLS IS THE BEST PHASE II E911 SOLUTION FOR AT&T'S TDMA NETWORK

To determine the most viable Phase II location solution for its TDMA network, AT&T devoted lengthy, focused efforts to identifying, investigating, analyzing, and in some cases conducting field trials of, multiple potential location service technologies, including network-overlay solutions (MNLS, Time Difference of Arrival ("TDOA"), Angle of Arrival ("AOA"), and combinations of TDOA and AOA); radio frequency pattern matching technology; handset-based solutions (GPS standalone, and GPS Assisted); and hybrid solutions (E-OTD). In addition to these location technology investigations, AT&T technical staff members (including senior engineers, project managers, and radio-frequency engineers) have been devoted to the development of industry standards to allow the interoperability of those technologies when available. AT&T also has conducted countless vendor meetings, technology conferences, and site visits during 1999, 2000, and 2001 in pursuit of the best possible Phase II E911 technologies.

These efforts, the results of some of which are summarized below, demonstrate that MNLS is overwhelmingly the most beneficial solution for its TDMA customers and the public safety community. Because it uses functionality already present in the wireless network, MNLS can be deployed expeditiously and does not require new or upgraded handsets. In addition, its location

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date of the second quarter 2001, and the need for further testing, that this network-overlay solution for GSM will be available in time for AT&T to satisfy the Commission's Phase II deadline. In this regard, VoiceStream recently reaffirmed its belief that "no vendor can provide A-GPS or TOA technology for its GSM networks in sufficient time to meet the Commission's E911 Phase II requirements." VoiceStream Wireless February 5, 2001 Ex Parte Presentation at 2.

[18/] 47 C.F.R. § 20.18(h). See Melody Music, Inc. v. FCC, 345 F.2d 730 (D.C. Cir. 1965) (holding that the Commission must ensure comparable treatment of similarly situated parties).

accuracy levels, while not fully compliant with the Commission's rules, are comparable to those of the other network-overlay solutions AT&T has investigated.

******Confidential Material Redacted******

A. Lockheed-Martin Analysis

In July 1999, AT&T contracted with Lockheed-Martin Corporation ("L-M") to conduct a comprehensive assessment and analysis of all potential location service providers. L-M was selected for its depth of resources and technical expertise. Over a four-month period, L-M evaluated the products/technologies being presented by fourteen different location technology vendors operating at that time.[19/]

L-M evaluated each vendor, including company background, future product and business plans, manufacturing capability, depth of staff and experience, and likely ability to support market trials. In addition, L-M analyzed each vendor's technology, including strengths and weaknesses, product maturity, trials conducted, market discriminators, air interface support, performance in different environments, likely network impact, likely accuracy performance, support for roaming customers, and expected ability to support future network enhancements. L-M's evaluation included bid reviews, vendor interviews, site/test environment tours, and trial analysis.

In October and November 1999, L-M provided AT&T with a detailed evaluation of various location technologies and vendors. Those documents, confidential copies of which are attached hereto, provided guidance to the AT&T Technology Development Group (TDG) for reviewing potential location service technologies.[20/]

B. Redmond Location Technology Vendor Trials

During 1999 and 2000, AT&T conducted two trials of network-overlay location technologies in Redmond, Washington, to which the company committed very substantial resources, time, and

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[19/] Those vendors are KSI, Grayson Wireless, SigmaOne, Cambridge Positioning, SnapTrack, IDC, LMS Comm.net, US Wireless, TruePosition, Navox, Centraxx, Harris, Cell Loc, and Radix Technologies.

[20/] See Lockheed Martin Geolocation Technology Evaluation, attached hereto as Exhibit A (October 25, 1999); Lockheed Martin Geolocation Vendor Assessment, attached hereto as Exhibit B (November 8, 1999).

manpower. The results of these trials have been periodically reported in detail to the Commission's Wireless Telecommunications Bureau in a series of ex parte meetings with Bureau staff, and confidential summaries of the results are attached.[21/]

The first trial was conducted in partnership with TruePosition, with testing designed to demonstrate the capabilities of that vendor's TDOA technology. TruePosition's equipment was deployed in seven AT&T base stations, and included both the AMPS and IS-136 TDMA air interfaces. More than 1,500 test calls were placed from stationary points, including indoor test locations, and were placed on standard commercially available handsets.

******Confidential Material Redacted******

The second trial was conducted in partnership with Grayson Wireless, with testing designed to demonstrate the capabilities of that vendor's TDOA technology. As in the TruePosition trial, Grayson's equipment was installed in seven AT&T base stations of Grayson's choice, and included both the AMPS and IS-136 TDMA air interfaces. More than 2,200 test calls were placed on standard commercially available handsets from stationary points and mobile routes, including indoor test locations.

******Confidential Material Redacted******

Following completion of these two trials, and after analysis of the performance of both vendors' technologies, AT&T's technical team selected one vendor for participation in an expanded trial in Denver, Colorado.

C. Denver Location Technology Vendor Trial

Grayson Wireless was selected to participate with AT&T in an expanded Phase II E911 trial in the Denver metropolitan area. The selection of Grayson was based largely on the availability of AOA antennas, which when used in conjunction with TDOA antennas, were expected to improve accuracy performance, particularly in rural areas. The trial involved the installation of Grayson equipment in 23 AT&T base stations, 19 with TDOA antennas and four with AOA antennas.[22/]

[21/] See TruePosition Test Report, attached hereto as Exhibit C; Grayson E-911 Trial Technical Summary, attached hereto as Exhibit D.

[22/] A confidential copy of the Grayson Denver Technical Summary is attached, which contains a comprehensive analysis of the test results. See Grayson E-911 Trial (Urban Denver, CO): Technical Summary, attached hereto as Exhibit E.

******Confidential Material Redacted******

The expanded Denver trial yielded some important information for the AT&T team. Most significantly, the trial demonstrated that there are substantial challenges associated with use of AOA antennas. AOA antennas are physically large (4' by 4' panels), and caused substantial loading/capacity problems for some existing base stations, requiring removal and replacement of the support structure. Certain towers, particularly those on which multiple wireless carriers have collocated in order to reduce tower proliferation in communities, cannot accommodate additional large antennas. In addition, the size of AOA antennas generated opposition and concern on the part of property owners (the landowners from whom AT&T rents land for its base stations) and zoning authorities. Typically, AT&T's existing permits do not allow the installation of additional large antennas without securing new zoning approval (not guaranteed because of potential opposition) and the corresponding building permits.

To prepare for these challenges, AT&T conducted an exhaustive review of local zoning requirements and attempted (in cooperation with the vendor) to select sites for the AOA antennas that would encounter minimal delay. Nevertheless, experience in the Denver trial indicated that the zoning necessary for placement of AOA antennas typically requires a minimum of five months (four months of zoning clearance and one month for securing the necessary building permit). Moreover, the uncertainty associated with landowner-related delays introduces additional challenges to timely deployment. Unforeseen complexities such as these have arisen in every AT&T Phase II trial, and AT&T believes this experience is not unique to its testing scenarios.

D. Seattle Location Technology Vendor Demonstration

In December 2000, US Wireless Corporation provided a demonstration of its RadioCamera [TM] Location System in the Seattle area. The goal of the demonstration was to evaluate the performance of the US Wireless technology, and it included calls from both stationary points and mobile routes. A confidential analysis of the demonstration results is attached.[23/]

******Confidential Material Redacted******

[23/] See US Wireless Location System Field Evaluation, attached hereto as Exhibit F.

E. Handset-Based Location Technologies

In addition to the network-overlay Phase II trials discussed above, AT&T issued a request for information to its major handset vendors to obtain their input on potential handset-based solutions. AT&T also engaged in detailed follow-up discussions with each vendor on a number of issues regarding the vendor's preferred handset-based location technology, including timing, model availability, network impacts, 3G wireless plans, and cost trends.

The feedback AT&T received from handset vendors indicated that upgraded handsets would not be available in timeframes compliant with the Commission's Phase II mandate. In addition, the fact that AT&T's TDMA customer base likely will be declining in the coming years reduces manufacturers' incentive to devote significant development work to TDMA handsets (as the potential market for such handsets will decrease).

F. E-OTD on the TDMA Air Interface

In light of the results described above, AT&T stated in its amended Phase II Report that it would investigate the use of E-OTD for both its GSM and TDMA networks.[24/] AT&T noted that use of a common solution across both air interfaces could speed the deployment of Phase II services to all customers by permitting AT&T to devote its resources to developing and deploying one system with one set of vendors.[25/]

Based on these beliefs, AT&T spent considerable time and effort in studying the use of E-OTD technology for TDMA and sought input from all relevant vendors (both infrastructure and handset). In addition, AT&T hired the world's foremost E-OTD experts -- Cambridge Positioning Systems ("Cambridge") -- to conduct an in-depth feasibility study.[26/] Although the results of the study were in many ways promising, Cambridge identified one major and, in AT&T's view, insurmountable flaw with deploying E-OTD in a TDMA environment. In particular, because of TDMA's limited bandwidth, E-OTD can generate location information only when the phone is in the idle mode (i.e., before call set-up). This means that information could not be updated during the course of the call,

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[24/] Amended Phase II Report at 3-4.

[25/] Id.

[26/] A confidential copy of the Cambridge Study is attached hereto as Exhibit G.

even if the customer moves from one location to another. In light of this significant problem, AT&T does not intend to pursue this Phase II solution for its TDMA network.

G. Mobile-Assisted Network Location Systems (MNLS)

During its technical investigations, AT&T recognized the possibilities associated with utilizing MNLS to provide Phase II information. As the attached white paper describes, MNLS is a network-based technology that uses signal strength measurements made by the handset to determine the location of the mobile unit.[27/] The MNLS technique, sometimes referred to as mobile-assisted-handoff- or MAHO-based location, uses an existing mechanism of TDMA IS-136 and IS-54B handsets to make measurements on the control channel transmitted from the base station to the mobile unit. The measurements are transmitted to the wireless system, which determines the location of the mobile unit by matching it to a predetermined grid location in the E911 database. That information then is forwarded to the PSAP during call set-up (without a prior delay) and can be updated as the call progresses.

MNLS has numerous advantages compared to the other Phase II solutions -- network, handset, and hybrid -- that AT&T has investigated over the past four years. First, the system works with all TDMA handsets in AT&T's TDMA network. Therefore, no handset changes, upgrades, or replacements will be necessary. Second, MNLS will support all TDMA handsets roaming on the AT&T TDMA network, as well as non-valid and uninitialized handsets. Third, because MNLS uses functionality already required by the network, the system is highly reliable. In contrast, other network-overlay systems, which are independent from the network's normal call flow, make problems very hard to detect. Fourth, the system will permit PSAPs to request updated location information during the duration of the emergency call. Fifth, the accuracy of the solution likely can be improved with on-going enhancements to the algorithms and the location grid. Finally, MNLS is a fully standards compliant solution, currently in the process of being adopted by TR45.2 AHES (Ad-Hoc on Emergency Services), the industry-PSAP body overseeing wireless E911 standards.[28/]

[27/] See Mobile-Assisted Network Location System (MNLS) Overview ("MNLS White Paper"), attached hereto as Exhibit H.

[28/] Id. at 7.

MNLS also will eliminate the need to site additional antennas and the corresponding conflicts with local communities and delays that have resulted from use of other network-overlay solutions.[29] Further, because MNLS does not require new handsets, AT&T's existing TDMA subscribers will be able to enjoy the benefits of Phase II service as soon as the solution is implemented. Given that AT&T plans to initially deploy MNLS by year end 2001, and throughout its entire TDMA network by the end of the first quarter 2002, whether or not it has received a Phase II PSAP request, this solution clearly offers customers and the public safety community the best Phase II E911 option available.

The testing AT&T has conducted, together with the information it has received from vendors, shows that MNLS will offer accuracy levels slightly below those required under the Commission's rules for network-based technologies. In particular, the estimated MNLS accuracy levels are 250 meters/67 percent of the time and 750 meters/95 percent of the time.[30] Based on AT&T's trials of other network-overlay technologies, however, the difference in accuracy performance among the various options is not substantial enough to outweigh the overwhelming customer and public safety benefits offered by MNLS (i.e., swift deployment, service for all customers without the need for new handsets, service to roamers and uninitialized callers, and prevention of the negative community impacts associated with additional antenna siting).

Moreover, the unique circumstances facing AT&T as a result of its deployment of the GSM air interface make it highly impractical for AT&T to implement a traditional network-overlay solution on its TDMA network. As noted above, the enormous outlay of resources that would be required to accomplish two complete network overlays at the same time simply is not justified by the minimal difference in location accuracy levels offered by other network-based technologies in comparison to MNLS. Because MNLS provides the best alternative for TDMA customers and the public safety community, the Commission should grant AT&T's requested waiver.

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[29] As discussed above, antenna siting issues presented tremendous obstacles during all of AT&T's Phase II network-overlay trials. See supra p. 9.

[30] MNLS White Paper at 7. Notably, the accuracy levels of MNLS are substantially better than those of NSS, which the Commission has determined VoiceStream may deploy on an interim basis.

CONCLUSION

AT&T's extensive research and testing has demonstrated that the two best Phase II E911 solutions for its GSM and TDMA customers are E-OTD and MNLS, respectively. Both of these solutions eliminate the problems raised by legacy TDMA handsets and will permit AT&T to begin offering Phase II E911 service to PSAPs and customers expeditiously. As the Commission is aware, the lengthy deployment period associated with network overlays, not to mention the negative community impacts associated with additional antenna siting, make the solutions proposed by AT&T much more viable. Similarly, AT&T's handset vendors have advised that the pure handset-based solutions, while perhaps offering somewhat improved accuracy, are not available today. E-OTD for the GSM air interface and MNLS for the TDMA air interface will best meet the Commission's public safety goals. Accordingly, AT&T respectfully requests that the Commission expeditiously grant the waivers requested herein.

Respectfully submitted,

AT&T WIRELESS SERVICES, INC.

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April 4, 2001

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PUBLIC VERSION

AT&T WIRELESS SERVICES, INC.
REQUEST FOR WAIVER OF THE E911 PHASE II LOCATION TECHNOLOGY IMPLEMENTATION RULES
EXHIBITS

CONTENTS

Exhibit A Lockheed Martin Geolocation Technology Evaluation - October 25, 1999 (Confidential)

Exhibit B Lockheed Martin Geolocation Vendor Assessment - November 8, 1999 (Confidential)

Exhibit C TruePostion Test Report (Confidential)

Exhibit D Grayson E-911 Trial Technical Summary (Confidential)

Exhibit E Grayson E-911 Trial (Urban Denver, CO): Technical Summary (Confidential)

Exhibit F US Wireless Location System Field Evaluation (Confidential)

Exhibit G AT&T TDMA (IS-136) Feasibility Study - Phase I (Confidential)

Exhibit H Mobile-Assisted Network Location System (MNLS) Overview (Non-Confidential)

Exhibit A

Confidential Material

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Exhibit B

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Exhibit C

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Exhibit D

ALL STATE LEGAL 800.222.0510 SDDEAC RECYCLED

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Exhibit E

ALL-STATE LEGAL 800-222-0510 EDITEAC RECYCLED

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Exhibit F

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Exhibit G

ALL STATE LEGAL 800.222.0510 EDITEAC RECYCLED

Confidential Material

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Exhibit H

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Mobile-Assisted Network Location System (MNLS) Overview

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AT& T Wireless Services
Technology Development Group
March 30, 2001

Introduction:

Mobile-assisted Network Location System (MNLS) is a network-based technology that utilizes signal strength measurements made by the wireless handset to determine the location of the mobile while on an emergency (911) call. AWS has been investigating MNLS for possible use for Phase II E911 service since 1997. During this time we have conducted, participated in or reviewed multiple trials and simulations on TDMA technology networks. As outlined below, MNLS appears to offer significant advantages to all TDMA customers in terms of:

- based on existing and well known TDMA functionality,
- no need for handset upgrade or replacement
- ubiquitous service to all customers (including roamers),
- superior reliability (due to integral nature of the solution within overall network)
- consistency with TR45.2 AHES standards.
- potential swiftness of implementation due to minimal development

Overview:

The MNLS technique makes use of an existing mechanism of TDMA IS-136 and IS-54B handsets, in which the mobile handset makes measurements to assist the wireless system in determining the best cell site to handoff the mobile. In this technique, often referred to as MAHO (mobile-assisted handoff) the mobile is commanded by the wireless system to make signal strength measurements of up to 24 neighboring base stations. The mobile makes these measurements on the continually transmitting strong control channel broadcast from each base station sector to the mobile. In TDMA, the MAHO list is controlled by the operator, and makes measurement on every MAHO candidate channel regardless of signal strength. This provides a list of the broadcast power from multiple cell sectors to a mobile in its current position. Since the MAHO measurements can be made down to the minimum sensitivity level of the phone (-113 dBm), the mobile is able to "hear" sites within a large radius.

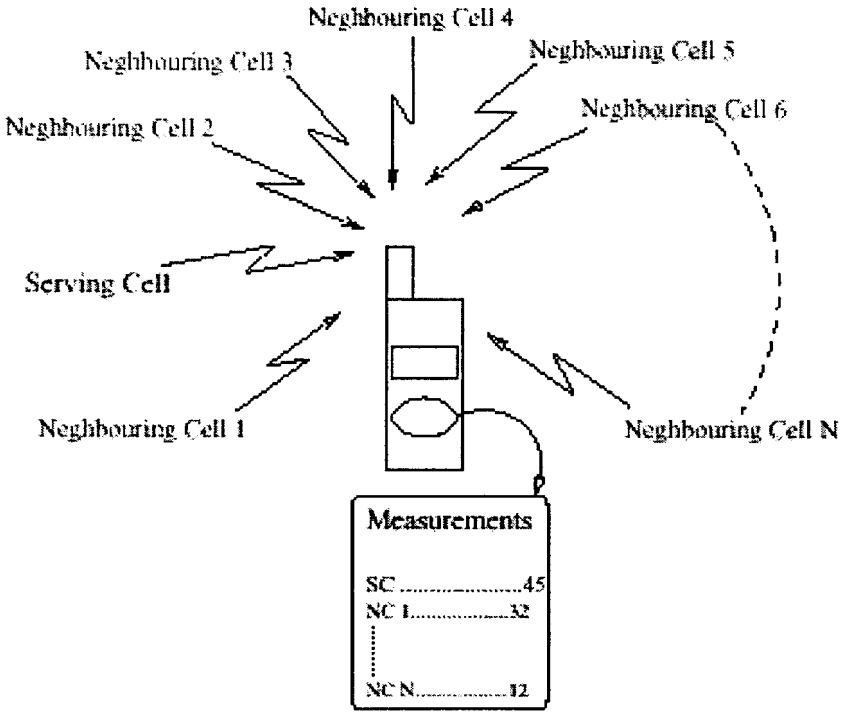


Figure 1: Mobile measures neighboring base stations signal strength

After making these signal strength measurements, the mobile will transmit these reports back to the wireless system. These reports will be sent to the position determining equipment (PDE) while the 911 voice call is being setup to the PSAP. (Note: The 911 call is not held or delayed prior to call setup.) Unlike some other network solutions, an advantage of the MNLS system, is that MAHO reports are transmitted from the phone every 1 second during a TDMA call, consequently, this technology could provide the ability to track the 911 call, rather than just an initial location at call setup.

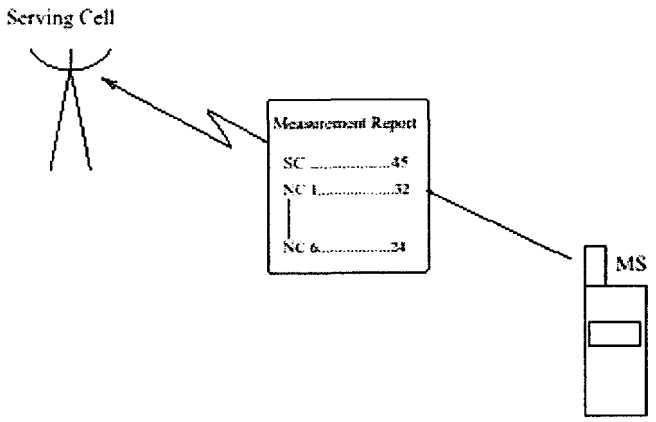


Figure 2: Mobile reports the measurements it made back to the wireless system

The MAHO lists and cell site information are delivered to a processor that can determine mobile location with either, or a combination, of two techniques. AT&T Wireless will initially utilize the second ("contour matching") technique, but will investigate the possibility of using the first ("triangulation") technique, either in place of or in combination with triangulation, as a means for improving accuracy.

In the first technique, termed "triangulation", the signal strength from multiple MAHO channels is associated to their cell site location. This then produces a geometric triangulation mathematical problem that can be solved to determine the mobile's location.

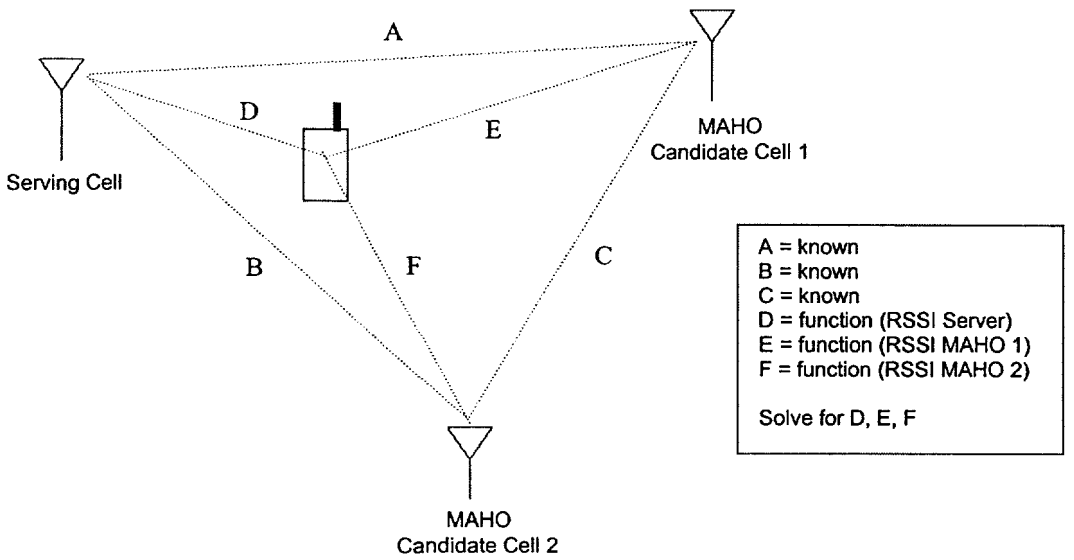


Figure 3: Example of "triangulation" to determine location, 3 site example.

In the second technique, termed "contour matching", the wireless system receives these measurements and compares these relative signal strength measurements to a specially-developed database of stored relative signal strength measurements within the cell serving the call. The wireless system will then determine the location of the mobile by matching it to one of these predetermined grid locations in the database.

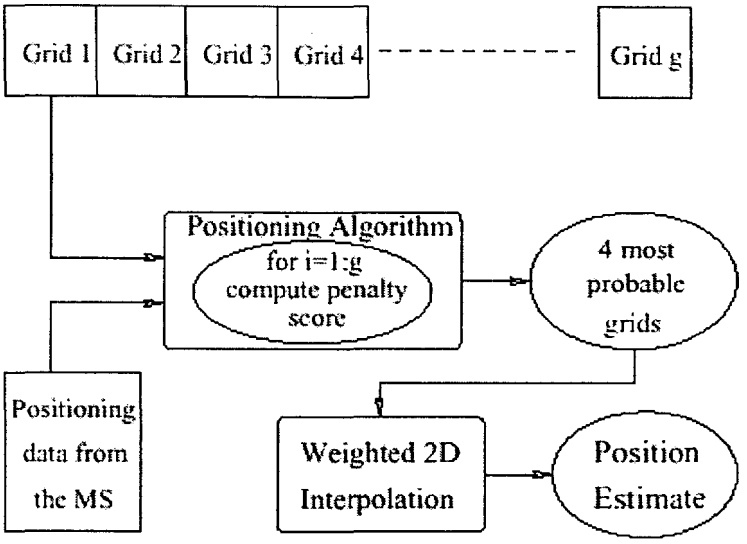


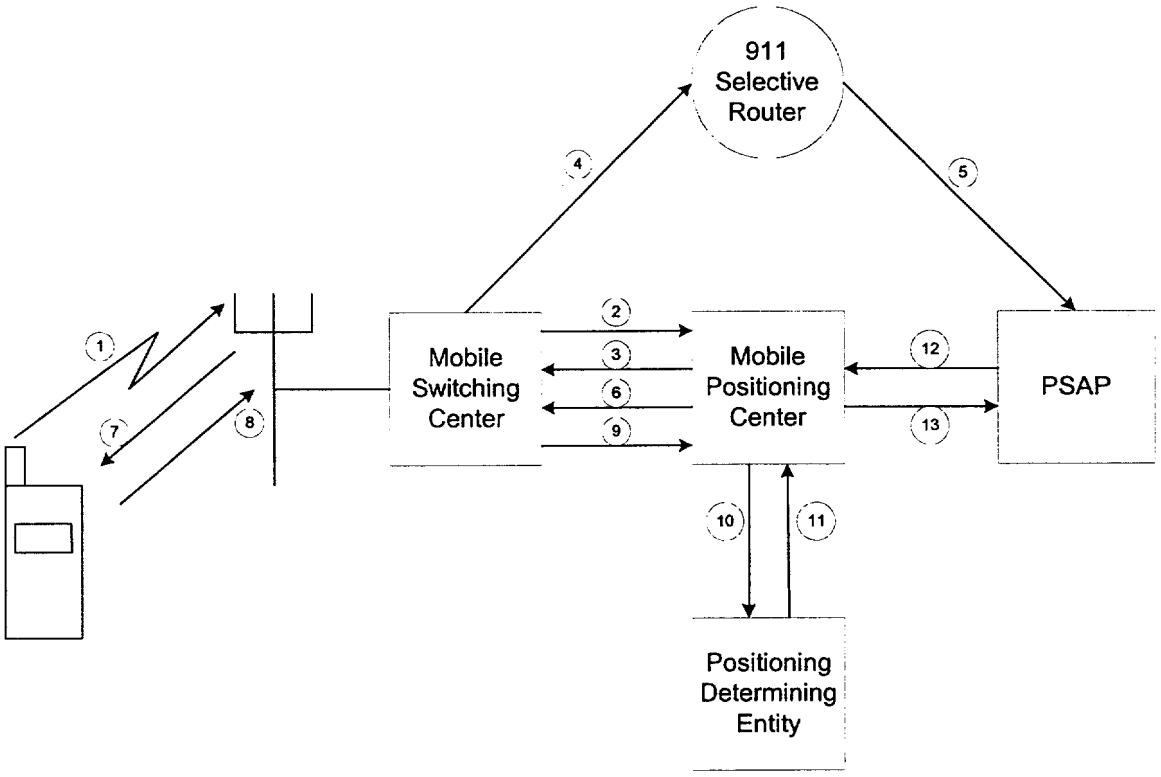
Figure 4: Wireless system determines location by matching DB grids to mobile report

The database for the grid measurements can be created in several different methods. The best method is to use available RF engineering tools to predict the expected received signal strength (RSS) measurements within grids as small as 50 meters. These engineering tools take into account antenna height and type, down-tilt, beam width, effective radiated power, and ground clutter. These predictive measurements can then also be augmented with real world measurements to increase accuracy in difficult areas.

It is possible to use both the triangulation and contour match techniques in combination. In combination, it would allow for the most flexibility.

Overall Location Processing Flow:

The following is the flow of the call through the network.



1. The mobiles places a call to 911
2. The MSC sends a J-STD-036 compliant message to the MPC indicating that a 911 call was placed, that the MSC is capable of doing MNLS and that the mobile is TDMA.
3. The MPC returns routing instructions to the MSC directing the call to the proper PSAP.
4. The MSC routes the voice portion of the call to the Selective router.
5. The selective router routes the call to the proper PSAP.
6. The MPC queries the MSC for the signal strength measurements, using a J-STD-036 compliant message, necessary for MNLS.

7. The MSC commands the mobile to make the measurements.
8. The mobile responds with the measurement report.
9. The MSC forwards the measurement report to the MPC.
10. The MPC sends the measurement report to the PDE to compute the exact location.
11. The PDE matches the location of the caller within the grid of the serving cell and returns the X/Y of the caller to the MPC.
12. The PSAP queries the MPC for the location of the call that it has just received.
13. The MPC returns the location of the caller to the PSAP.

(Steps 6-13 can be repeated for additional updated locations. Note: One of the advantages of the MNLS system is the fact that locates can be completed repeatedly on the same 911 call, in order to allow PSAPs additional information, such as direction of travel, etc.)

Status of Standards Efforts:

MNLS is a fully standards-compliant solution that is currently being adopted by TR45.2 AHES (Ad-Hoc on Emergency Services), the industry-PSAP body overseeing wireless E911 standards.

Advantages:

The MNLS has many advantages over other alternate solutions investigated. These advantages include:

1. Legacy handsets – The systems works with all TDMA handsets in the AWS ANSI-41 network. No changes, upgrades or replacements are necessary to these handsets.
2. Roaming support – MNLS will support all TDMA handsets roaming into our network.
3. Non-valid/uninitialized handsets – MNLS will support TDMA phones that do not have a valid account or phone number.
4. High Reliability – MNLS is using the same functionality normally required by the network. Therefore, if problems arise, they will be detected immediately. The integral nature of the MNLS solution to the overall network dramatically increases the reliability of the system. [Note: Conversely, network-overlay solutions, which by definition are independent from the normal call flow, make problems very hard to detect due of very low 911 call volume (relative to non-emergency calls). Trial experience has demonstrated that a complex low traffic system is extremely difficult to properly maintain and in which to detect problems.]
5. Standards compliant – MNLS is a fully standards compliant (see above).
6. Updated Location – One of the advantages of the MNLS system is the fact that locates can be completed repeatedly on the same 911 call, in order to allow PSAPs additional information, such as direction of travel, etc.

7. Improvement – The accuracy of the system can most likely be improved with ongoing enhancements to the algorithms, and to the location grid database.
8. One of the advantages of the MNLS system is the fact that locates can be completed repeatedly on the same 911 call, in order to allow PSAPs additional information, such as direction of travel, etc.

Trials:

AWS has been investigating MNLS since early 1997 as a possible solution to locating E911 callers. We have conducted, participated in or reviewed multiple trials including the following:

1. Trial in Kirkland, WA by AT&T Wireless in 1997
2. Trial by Nortel Networks in 1998
3. Trial in Stockholm by Ericsson in 2000
4. Trial in Redmond, WA by AT&T Wireless in 2001

Accuracy:

The following are the approximate accuracies expected:

All Environments	67%	95%
All Calls	Approx. 250 meters	Approx. 750 meters

CERTIFICATE OF SERVICE

I, Andrea Willis, hereby certify that on this 4th day of April 2001, I caused copies of the foregoing "AT&T Wireless Services, Inc. Request For Waiver Of The E911 Phase II Location Technology Implementation Rules" to be sent to the following by hand delivery:

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