

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Revision of the Commission's)	CC Docket No. 94-102
Rules To Ensure Compatibility)	
With Enhanced 911 Emergency)	
Calling Systems)	

**VOICESTREAM WIRELESS CORPORATION
APRIL 2002 SEMI-ANNUAL REPORT ON
E911 PHASE II IMPLEMENTATION PLAN**

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FOURTH SEMI-ANNUAL REPORT ON
E911 PHASE II IMPLEMENTATION PLAN**

VoiceStream Wireless Corporation (VoiceStream),¹ pursuant to the *Fourth Memorandum Opinion and Order* issued in this proceeding,² submits this Fourth Semi-Annual Report regarding its deployment of Enhanced 911 (E911), including Network Software Solution (NSS) and Enhanced Observed Time Difference of arrival (E-OTD) technologies.

I. SUMMARY

VoiceStream has begun actual deployment of Phase II location identification, having installed the necessary hardware and software for its Phase II NSS solution in its

¹ VoiceStream, combined with PowerTel, Inc., is the sixth largest national wireless provider in the U.S. with licenses covering approximately 96 percent of the U.S. population and currently serving over seven million customers. VoiceStream and PowerTel are wholly-owned subsidiaries of Deutsche Telekom, AG and are part of its T-Mobile wireless division. Both VoiceStream and PowerTel are, however, operated together and are referred to in this request as “VoiceStream.”

² *See Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Fourth Memorandum Opinion and Order, 15 FCC Rcd 17442, 17464 (¶ 67) (2000) (“*Fourth Memorandum Opinion & Order*”).

Ericsson switches in Rhode Island.³ VoiceStream is currently also in the process of installing the necessary hardware and software for its Phase II NSS solution in its Dallas, TX (Denton County) area Nortel switches and its Rhode Island Ericsson switches. VoiceStream's first office applications (FOA) of its Phase II NSS solution for its Nortel and Ericsson switches will begin in mid-April. The FOA for Phase II NSS for Nokia, which will take place in Harris County (Houston) Texas, should begin by the end of May. Full-scale commercial deployments of Phase II NSS for VoiceStream's Ericsson switches should be underway by mid-June, for its Nortel switches by the end of June, and for its Nokia systems by mid-July. VoiceStream's nationwide roll-out of Phase II NSS is on schedule to be completed by the end of July 2002 for all but two of its markets, without regard to a valid PSAP request, and will provide Phase II location identification, for all handsets, accurate to within 1000 meters, 67 percent of the time, as VoiceStream stated in its *Amended Request for Limited Modification* of its E911 Waiver.⁴

With respect to the E-OTD portion of its Phase II implementation, that continues to progress toward actual deployment as well, although this progress continues to be slower than VoiceStream would like. Much of the equipment used and installed for the NSS solution will also be used for E-OTD. Of the additional equipment necessary for E-OTD, VoiceStream has received in its lab one of two pieces of Ericsson equipment, with

³ For the reasons stated at n.39, *infra*, VoiceStream has decided to deploy its Ericsson first office application (FOA) in Rhode Island, not Washington, DC as had been previously reported to the Commission.

⁴ VoiceStream Wireless Corporation Amended Request for Limited Modification of E911 Phase II Implementation Plan, CC Docket No. 94-102 (filed Feb. 28, 2002) (*“Amended Request for Limited Modification”*). As VoiceStream described therein, portions of the New York and Philadelphia MTAs require an NSS interworking solution that will be available by the end of 2002. *See also, infra*, p. 22.

the second piece due later this month. The commercial version of Nokia's remaining software is due in mid-April, and Nortel's remaining commercial equipment should arrive in May and June 2002. E-OTD FOAs will begin in early June for its Nokia switches, and by the end of June for its Nortel and Ericsson switches. VoiceStream currently expects to have completed its E-OTD FOAs and begun its commercial deployments for other PSAPs with valid requests in July 2002 for Nokia, and in August 2002 for Ericsson and Nortel.

VoiceStream is deploying its network infrastructure for NSS and E-OTD and will be approving E-OTD-capable handsets for commercial distribution as quickly as the commercial technology is made available by VoiceStream's infrastructure and handset vendors. In the case of the network infrastructure, VoiceStream's situation is not significantly different from the rest of the U.S. GSM operators, all of whom are relying on the same infrastructure vendors to produce network equipment. Moreover, the entire GSM platform has made substantial advances in developing its Phase II E911 solution over the past eighteen months, and it is substantially closing the gap that developed because, as the Commission has recognized, equipment manufacturers focused initially on developing Phase II E911 for the other air interfaces that were more commonly used in the United States.

Further, VoiceStream's handset vendors Motorola and Nokia have delivered E-OTD capable handsets for testing to VoiceStream. These handsets must be tested on live E-OTD networks before they can be approved for commercial distribution, in order to ensure that they perform as intended. Assuming the required E-OTD network elements are delivered on a timely basis, VoiceStream anticipates approving for

commercial release its first E-OTD-capable handset by September 1, 2002, and to approve two additional handset models by October 2, 2002.

In addition, the results of VoiceStream's E-OTD trial in Washington, DC show that the GSM carriers are on the right track with their E-OTD solution. VoiceStream's trial results indicate that the performance over the greater Washington area will be within the Commission's applicable standard of 100 meters, 67 percent of the time. Moreover, the trial has provided VoiceStream and its vendors with valuable lessons on how overall E-OTD accuracy can continue to be improved. These test results are particularly important to VoiceStream because the location algorithms tested in the D.C. trial are the same as those that will be utilized by Nortel and Ericsson, and thus give VoiceStream confidence that, with appropriate field engineering adjustments as necessary, it can meet the Commission's accuracy requirements. In addition, VoiceStream's Bellevue, WA trial has produced results for NSS well within the Commission's 1000 meter accuracy requirement.

Moreover, worldwide commitment to the E-OTD solution continues to increase, which by itself creates a virtuous investment cycle that will help fuel continued improvements. Manufacturers such as Mitsubishi, NEC, Quanta, RIM, Samsung, Sendo, and Siemens, in addition to Motorola, Nokia and Sony/Ericsson Ericsson, are all integrating E-OTD into handset products that are expected to be available for operator testing within 2002. In addition, companies such as Intel, Infineon, Texas Instruments and TTPCom are integrating E-OTD technology into their GSM chips and technology products.

With respect to its Phase I E911 requests, out of 764 PSAPs within VoiceStream's coverage area requesting Phase I E911, VoiceStream has fully implemented 252 requests, and is in the process of actively deploying Phase I E911 in 445 PSAPs. Sixty-seven PSAP requests are on hold for a variety of reasons, including lack of necessary PSAP or LEC upgrades, or protections against disclosure of proprietary information.

II. BACKGROUND

In a series of orders since 1996, the Commission has sought to improve the quality and reliability of 911 emergency services for users of interconnected wireless telephones by regulating the availability of basic 911 services and the implementation of E911 services. The implementation of E911 services was split into two phases. Under Phase I, as of April 1, 1998, or within six months of a request by the designated Public Safety Answering Point (PSAP), whichever is later, wireless carriers must provide the telephone number of the originator of a 911 call and the location of the cell site or base station receiving the call to the PSAP through the use of Automatic Number Identification (ANI) and Pseudo-ANI.⁵ Under Phase II, carriers are required to provide the PSAP with the latitude and longitude of a handset making a 911 call.⁶

VoiceStream (via its acquisition of Aerial Communications, Inc.) began to focus on the development of E-OTD as an Automatic Location Identification (ALI) solution for GSM in early 1999, when it became apparent that no other solution would likely satisfy the Commission's requirements for ALI. VoiceStream (through the acquisition of Aerial

⁵ 47 C.F.R. § 20.18(d)(1). When the number is not available, the carrier need only deliver the 911 call and available calling party information to the PSAP. 47 C.F.R. § 20.18(d)(2).

⁶ 47 C.F.R. § 20.18(e).

as well as the acquisition of Omnipoint Corporation) had participated in GSM standards development for ALI since 1998. One of VoiceStream's infrastructure vendors, Nokia, also began focusing in earnest on E-OTD in 1999. VoiceStream and one of its location technology partners, Cambridge Positioning Systems (CPS), conducted field tests in early 2000 to demonstrate that E-OTD was a solution *potentially* capable of meeting the Commission's regulatory requirements, including the fifty-meter handset accuracy requirement that the Commission announced in October 1999.⁷ VoiceStream has been the leading carrier in the development of Phase II location technology for the GSM air interface.

The Commission has recognized that development of ALI solutions for the GSM air interface lagged development for CDMA platforms, because GSM has held only a small portion of the U.S. market. Just 18 months ago, the Commission found that although GSM "is the standard air interface in most countries worldwide, GSM is used by carriers serving only a small percentage of U.S. wireless subscribers" and "there is evidence to suggest that the development of ALI capabilities for use by GSM carriers has lagged behind that for carriers using other interfaces that are more widely used in the United States, such as AMPS, CDMA, and TDMA."⁸ At that time, VoiceStream was the only nationwide or near-nationwide carrier fully utilizing GSM, and VoiceStream served only 3.5 percent of national subscribership in 2000 (and substantially less than 1 percent of the global subscribership). It is therefore not surprising that manufacturers dedicated

⁷ *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Third Report and Order, 14 FCC Rcd. 17388, 17392 (¶ 9) (1999) ("*Third Report and Order*").

⁸ *Fourth Memorandum Report & Order*, 15 FCC Rcd at 17461-62 (¶ 56).

greater resources to other solutions.⁹ GSM today is still used by only a fraction of the U.S. market, although three nationwide carriers are committed to GSM going forward, and all three of those carriers will be implementing the same ALI solutions as they are made available by manufacturers.¹⁰

A. Waiver & Conditions

In September 2000, the Commission approved VoiceStream's plan to adopt a hybrid network/handset-based solution for meeting its Phase II obligations¹¹. This plan had two components. First: the implementation of a network-based NSS solution covering all network users, to be accurate within 1000 meters. Second: the introduction of E-OTD-capable handsets combined with an upgrade of network infrastructure technology, based upon requests from PSAPs, in order to use E-OTD to provide more precise estimates of the location of the 911 caller. VoiceStream was concerned that its E-OTD solution would not immediately meet the requirements for handset-based solutions. Based on these concerns, VoiceStream sought a waiver of Section 20.18(h). VoiceStream requested that the Commission impose the network-based standard, rather than the more stringent handset-based standard, on its E-OTD system for the first two years of handset activations (*i.e.*, requiring the E-OTD system to be accurate to 100

⁹ As of December 31, 2001, VoiceStream had approximately 7 million subscribers of a total of 131 million nationwide. This renders it the sixth in size, following Verizon Wireless (29.4 million), Cingular Wireless LLC (21.6 million), AT&T Wireless Services (20.8 million), Sprint PCS (15.8 million) and Nextel (8.7 million).

¹⁰ In addition to VoiceStream, both Cingular and AT&T Wireless have announced plans to use GSM going-forward.

¹¹ *Fourth Memorandum Opinion & Order*, 15 FCC Rcd at 17461-64 (¶¶ 55-68).

meters 67 percent of the time and 300 meters 95 percent of the time), and stated that it would deploy NSS throughout its coverage area without need for a PSAP request.

The Commission granted the waiver in September 2000. Scrutinizing technological development to date, the Commission recognized that, as the only major U.S. carrier then committed to a GSM platform, VoiceStream “faced special circumstances.”¹² The Commission found that the “NSS/E-OTD approach may be the only method available to GSM carriers for compliance with Phase II for some time.”¹³

The Commission imposed several conditions on the waiver. With respect to NSS, the Commission imposed an accuracy requirement of 1000 meters, or better, for 67 percent of calls, and required that NSS deployment be completed by December 31, 2001.¹⁴ With respect to E-OTD, the Commission required that VoiceStream achieve 95 percent penetration of ALI-capable handsets among its subscribers no later than December 31, 2005, the same date as required of carriers using other air interfaces.¹⁵ The Commission also required that all new E-OTD handsets activated on or after October 1, 2003, comply with an accuracy requirement of 50 meters for 67 percent of calls, and 150 meters for 95 percent of calls.¹⁶ The standard was relaxed for the first two years of deployment to an accuracy level of 100 meters, 67 percent of the time and 300 meters, 95 percent of the time.¹⁷

¹² *Id.* at 17461-2 (¶ 56).

¹³ *Id.*

¹⁴ *Id.* at 17463 (¶ 61).

¹⁵ *Id.* at 17464 (¶ 66).

¹⁶ *Id.* (¶ 64).

¹⁷ *Id.* at 17463 (¶ 63).

A set of waiver requirements was keyed to the Commission's expectation that carriers would begin Phase II service by October 1, 2001. The Commission's rules require VoiceStream, like other carriers, in the absence of a waiver to implement the necessary network or infrastructure upgrades and begin providing Phase II location information by October 1, 2001, or within six months of a PSAP request, whichever is later. They also require carriers to begin selling ALI-capable handsets by October 1, 2001, so that they would be available to consumers when the first PSAPs could receive and use Phase II information. Pursuant to its waiver, however, VoiceStream was required to ensure that 50 percent of its handsets newly activated as of October 1, 2001, and 100 percent by March 31, 2002, are ALI capable-requirements greater than those imposed by rule.¹⁸

B. Request for Limited Modification

Although VoiceStream worked diligently after its waiver was issued in September 2000, the challenges of developing, procuring, testing and implementing both NSS and E-OTD proved to be more difficult and time consuming than VoiceStream had initially anticipated. VoiceStream updated the Commission with respect to these difficulties in July 2001,¹⁹ and in its October 2001 Semi-Annual Report, which provided details on its

¹⁸ *Id.* at 17463 (¶ 62). The general rule for handset-based solutions requires the following: introduction of one entry-level handset with ALI capability by October 1, 2001; 25 percent of handset activations with ALI capability by December 31, 2001; 50 percent of activations by June 30, 2002; and 100 percent of activations by December 31, 2002. 47 C.F.R. § 20.18(g)(1).

¹⁹ *Ex Parte* Presentation of VoiceStream Wireless, CC Docket No. 94-102 (filed Jul. 6, 2001).

revised deployment plans.²⁰ Finally, on December 21, 2001, VoiceStream filed a request for modification of its waiver to reflect the fact that NSS infrastructure equipment was not anticipated to be ready for commercial deployment prior to the December 31, 2001 deadline, E-OTD infrastructure equipment would not be ready for commercial deployment until spring of 2002, and E-OTD handsets could not be tested and approved for commercial distribution until a live E-OTD network was operating using actual commercial equipment.²¹ Subsequently, on February 28, 2002, VoiceStream amended its request for modification of its waiver to reflect a further intervening delay with respect to critical infrastructure software and to address technical issues caused by a unique configuration of network equipment in portions of the Philadelphia and New York MTAs.²² VoiceStream's proposed modifications would make the following specific, focused and limited modifications to the deployment benchmarks set in September 2000:

- VoiceStream will deploy NSS throughout its network, without necessity for a PSAP request, by July 31, 2002 (except for those portions of the New York and Philadelphia MTAs that currently are being served by a combination of Nortel Base Station Controller (BSC) and Ericsson Mobile Switching Center (MSC) equipment); in those portions of the New York and Philadelphia, VoiceStream will deploy NSS by December 31, 2002, without necessity for a PSAP request;
- By December 31, 2002, VoiceStream will implement E-OTD for all valid PSAP requests pending as of June 30, 2002, and, after June 30, 2002, will satisfy valid PSAP requests for Phase II service within six months of receipt, in full compliance with Commission rules; and

²⁰ Third Semi-Annual Report of VoiceStream Wireless Corporation on Its E911 Implementation Plan, CC Docket No. 94-102 (filed Oct. 1, 2002) (“*Third Semi-Annual Report*”).

²¹ VoiceStream Wireless Corporation Request for Limited Modification of E911 Phase II Implementation Plan, CC Docket No. 94-102 (filed Dec. 21, 2001).

²² *Amended Request for Limited Modification*.

- By September 1, 2002, VoiceStream will approve at least one model of E-OTD handsets for commercial distribution. VoiceStream will ensure that 50 percent of new handsets activated after February 28, 2003, and 100 percent of new handsets activated after June 30, 2003, will be E-OTD capable.²³

VoiceStream did not request any other changes to the interim waiver benchmarks in its *Amended Request for Limited Modification*.

Although VoiceStream's *Amended Request for Limited Modification* of its September 2000 waiver remains pending, because VoiceStream's proposed deployment dates are the most instructive (and non-discriminatory) yardstick against which to compare VoiceStream's progress toward implementing Phase II E911 requirements, we will report compliance with respect to those proposed deployment benchmarks.²⁴

²³ *Id.* at 3.

²⁴ It would be wholly arbitrary and capricious for the Commission to refuse to grant VoiceStream's request for modification of its waiver. Many of the proposed modifications are identical to conditions of a waiver already granted to Cingular for the GSM portions of its networks. There is no basis for treating one GSM carrier differently than another GSM carrier when both are implementing the same technical solutions, and the delays stem from platform-wide technical issues. Moreover, the Commission cannot impose technologically or economically infeasible requirements without Congress enacting a specific, technology-forcing statute. *Compare Bunker Hill Co. v. EPA*, 572 F.2d 1286, 1293-1301 (1977) (reversing and remanding EPA Clean Air Act regulations because "the EPA cannot require . . . technology that is technologically and economically infeasible") with *Edison Electric Institute, et al. v. EPA*, 996 F.2d 326, 335-336 (D.C. 1993) (upholding EPA Resource Conservation and Recovery Act regulations "even though it may have been impossible" for companies to comply where Congress spoke directly to the precise question at issue in "a highly prescriptive, technology-forcing statute" intended to be "draconian"). In this case, Congress has enacted no such statute requiring wireless carriers to meet the E911 Phase II benchmarks set by the Commission regardless of technical or economic feasibility. Instead, the Commission has relied principally on its general regulatory authority under section 303(r) of the Communications Act in its adopting E911 rules. Needless to say, Congress's basic grant of regulatory power in 1934 did not mandate the adoption of the E911 benchmarks or even its final deadlines. In the *Fourth Memorandum Opinion & Order*, the Commission again cited its authority under section 303(r) and asserted that Congress had ratified the Commission's E911 decisions by enacting the 1999 Wireless Communications and Public Safety Act.

III. PHASE II E911 DEPLOYMENT

Over the last six months, VoiceStream has continued to move its advanced hybrid network/handset solution from engineering theory to operational reality. However, developing and testing this complex system, which requires coordination among multiple parties and technologies, has been and continues to be an iterative process. Because many components, both in the network and in handsets, must work together seamlessly, delays in the development and delivery of key network software or hardware have cascaded through the entire deployment plan. Despite these delays, the light at the end of the tunnel is near. VoiceStream has received in its laboratories at least beta, and in most cases commercial, versions of all the hardware and software necessary to implement NSS, and most of the hardware and software necessary to implement E-OTD.

VoiceStream will soon begin its FOA of NSS for its systems that use Ericsson and Nortel switches. VoiceStream anticipates that during this next quarter, it will have substantially deployed its NSS solution nationwide, and begun the FOA for at least its Nokia E-OTD systems. VoiceStream expects that during the third quarter of 2002, it will complete its nationwide NSS deployment (by July 31, 2002, except for portions of the New York City and Philadelphia markets, as previously described), complete the

Fourth Memorandum Opinion & Order, 15 FCC Rcd at 17445 (¶ 6). The Wireless Communications and Public Safety Act, however, merely directs the FCC to “encourage and support” E911 development. 47 U.S.C. § 615. Moreover, in that Act, Congress expressly disclaimed any intent to authorize the Commission to adopt a technology-forcing regulation, stating that “[n]othing in this subsection shall be construed to authorize or require the Commission to impose obligations or costs on any person.” *Id.* Thus, any assertion that the Commission can enforce its E911 Phase II benchmarks regardless of technological or economic infeasibility would not survive judicial review.

remaining E-OTD FOAs, begin nationwide deployment of E-OTD for PSAPs with valid requests and approve one handset for commercial distribution.

A. Description of VoiceStream's NSS/E-OTD Network Infrastructure

The NSS and E-OTD Phase II solutions use the same basic data delivery infrastructure. In order to implement both NSS and E-OTD, new software is required in two major elements of VoiceStream's existing network, the Mobile Switching Center (MSC), which provides the systems switching functions, and the Base Station Controller (BSC), which provides the control and supervisory functions for the base stations. In addition to software upgrades for existing MSCs and BSCs, both NSS and E-OTD require the addition of two entirely new network elements, the Serving Mobile Location Center (SMLC) and the Gateway Mobile Location Center (GMLC). The SMLC performs location calculations for both NSS and E-OTD. The SMLC captures data from the handset and the relevant network elements (MSC, BSC, and Location Measurement Unit) and computes positional information during E911 calls. The GMLC acts as the interface between VoiceStream's network and the PSAPs. It initially triggers the request for positional information from the SMLC and subsequently presents the calculated latitude/longitude location to the PSAP.

For E-OTD, the SMLC must be upgraded beyond the level necessary to provide NSS and a new piece of equipment, the Location Measurement Unit (LMU) must be ready for deployment. The LMU is a small measurement receiver located at each base station to measure the relative time differences among base stations.²⁵ Delays in

²⁵ When a signal from at least three base stations is received by an E-OTD capable handset and the LMU, the time differences between arrival of the signal from each

providing any of the basic elements necessary for NSS, or in providing an upgraded SMLC or the LMU, will delay deployment of E-OTD.

As a legacy of the merger of four different companies (*i.e.*, Aerial, Omnipoint, PowerTel, and VoiceStream), each with unique infrastructure configurations, VoiceStream's network infrastructure is comprised of equipment from three different manufacturers—Ericsson, Nortel, and Nokia. Each manufacturer must independently develop different MSC, BSC, SMLC and LMU hardware and software upgrades for use with its own existing equipment. The successful development of upgrades for one type of equipment for one manufacturer does not mean that those components can be ported to the corresponding equipment of another manufacturer.

B. Network Infrastructure Equipment Testing and Deployment

VoiceStream is following the same testing and deployment process for its ALI functionalities as for all other new features and functionalities introduced into its wireless networks. First, equipment is shipped to VoiceStream's laboratory, where it is subjected to preliminary tests. After preliminary testing is completed, the equipment is deployed in

base station at the handset and at the LMUs at each base station are calculated. The time difference between transmissions from the base stations to the handset and between the base stations themselves are then combined with the coordinates of the base stations to produce intersecting hyperbolic lines from which the location of the handset is estimated.

a FOA, which is a commercial field installation where the actual commercial-grade equipment can be evaluated and tested. Once FOA is completed for the relevant system (NSS or E-OTD), VoiceStream can begin full-scale deployment of the system throughout its network.

VoiceStream has issued over \$44 million in purchase orders for ALI capable network equipment to date, and has approved a budget of approximately \$80 million for FY2002 for Phase II E911 implementation.

1. Receipt of Commercial Equipment

Table 1 shows the progression, over the past six months, in the estimated availability dates of VoiceStream's infrastructure vendors for those critical network software and hardware components discussed above. Except as otherwise noted, these dates represent when the components are to be delivered to VoiceStream's laboratory for testing.

Table 1 – Laboratory Delivery Dates and Status

Manufacturer	Estimated Delivery Dates		
	May 2001 ²⁶	October 2001	April 2002
Ericsson			
R9.0 MSC/VLR	10/01/01	10/01/01	Delivered
R9.0 BSC	11/01/01	11/01/01	Delivered
SMLC/MPS 4.0 (NSS)	10/01/01	01/01/02	Received, under test
LMU Type A (E-OTD)	2/28/02	12/15/01	Received, under test
SMLC/MPS 5.0 (E-OTD)	2/28/02	07/31/02 ²⁷	4/22/02
Nortel			
MSC –GSM13	09/01	09/01/01	Delivered
BSC-V12.4+	06/01	12/10/01	Delivered
SMLC-NSS	½	02/21/02	Received, under test
SMLC-E-OTD	04/02	07/20/02	5/10/02 ²⁸
LMU-A (E-OTD)	05/02	06/01/02	6/12/02 ²⁹
Nokia			
S.10– BSC/SMLC combined	12/15/01	01/15/02	Received, under test ³⁰
MSC	Delivered (M10)	11/15/01 (M11)	Delivered
LMU B (E-OTD)	11/15/01	11/15/01	Received, under test

As indicated in Table 1, VoiceStream and its vendors have made significant progress in the development and testing of Phase II-capable network infrastructure components since VoiceStream filed its *Third Semi-Annual Report*, and is on schedule

²⁶ These dates were General Availability dates only.

²⁷ This was a General Availability date from Ericsson.

²⁸ As discussed below, VoiceStream will begin its deployment in the FOA market with a CPS SMLC. The listed date is the date by which VoiceStream anticipates receiving the commercial Nortel SMLC in its lab.

²⁹ As discussed below, VoiceStream will begin its deployment in the FOA market with CPS LMUs. The listed date is the date by which VoiceStream anticipates receiving Nortel’s commercial LMU at its lab.

³⁰ Nokia provided a beta version of the S.10 software for its BSC/SMLC on March 15, 2002, and is scheduled to deliver the commercial version to VoiceStream’s laboratory on or about April 15, 2002.

with the benchmarks proposed in its *Amended Request for Limited Modification*. VoiceStream has received a commercial version of all but four Phase II-capable components—Ericsson, SMLC/MPS 5.0 (E-OTD); Nortel, SMLC (E-OTD) and LMU; and Nokia, S.10– BSC/SMLC. The final piece of Ericsson equipment is expected in the lab within the next month. Although the final Nortel versions of the SMLC and LMU will not be delivered to VoiceStream's labs until May and June, respectively, to allow for early E-OTD algorithm confirmation, VoiceStream will initially install an SMLC and LMUs provided by CPS.³¹ The Nortel SMLC and LMU can then be substituted for the CPS equipment without significantly delaying the deployment schedule. This allows VoiceStream to move ahead with E-OTD for its Nortel systems more quickly than was anticipated in October 2001. Nokia's S.10 software (used in its combined BSC/SMLC unit) did not ship in accordance with either VoiceStream's or Nokia's October 2001 expectations.³² However, as an accommodation to VoiceStream in order to accelerate testing, Nokia provided a beta version of the S.10 software on March 15, 2002, and is scheduled to deliver the commercial version to VoiceStream's laboratory on or about April 15, 2002.

2. *Field Trials*

a. Washington, DC

VoiceStream, with the cooperation of E-OTD technology vendor CPS and Ericsson, which is purchasing E-OTD from CPS for inclusion in its SMLC and LMU products, has been conducting field trials in Washington, DC of the latest CPS

³¹ CPS is supplying the underlying technology to Nortel.

technology. Washington, DC, was selected because its varied terrain and urban character make it a more difficult RF test environment than Houston, Texas, the site of the previous trials.

In Washington, DC, VoiceStream installed CPS LMUs at 32 cell sites covering an area of approximately 75 square kilometers. This allowed for testing to be conducted throughout an area that included both downtown D.C. and Capitol Hill. The Capitol Hill areas tested are topographically similar to the suburban, predominantly residential, areas that comprise the bulk of the areas inside the Capital Beltway.

The results have been heartening. Most significantly, based on these test results, VoiceStream projects that the performance of the E-OTD technology within the Capital Beltway, in accordance with OET-71, will be 81 meters, 67 percent of the time, and 167 meters, 95 percent of the time. This would be substantially better than the current standard of 100 meters, 67 percent of the time and 300 meters, 95 percent of the time.

Moreover, VoiceStream and CPS are achieving these results even though performance within the central core of Washington, DC is operating at 160 meters, 67 percent of the time.³³ This lower performance in the downtown area appears to be due to poor site distribution which results in radio signals propagating along the downtown urban canyons. These propagation effects are expected to be resolved by the availability of assistance data to the handset, which is currently being implemented into the CPS E-OTD systems. This assistance data will direct the handset to measure specific base

³² Nokia informed VoiceStream in late January 2002 that S.10 would not ship in February 2002, as had been previously expected.

stations to improve the geometry, and therefore to increase the accuracy of the location estimate. Additionally it should be noted that these results are for instantaneous location requests, that is, the performance expected immediately when a 911 call is made. OET 71 allows the use of additional information collected within the first 30 seconds of the call in order to refine the location estimate. This additional capability is expected further to improve the performance, and will be available in the commercial E-OTD implementations.

The Washington DC trial continues to illustrate that operators currently have only preliminary experience with implementing E-OTD. Moreover, the trial points out the extent to which E-OTD deployments, especially in the early stages, will be experimental and may reveal idiosyncratic issues that take some time to address in order to refine accuracy.

b. Bellevue, WA

VoiceStream and Nokia are conducting trials in Bellevue, Washington, of both the Nokia NSS and E-OTD Phase II solutions. For E-OTD, Nokia uses its own algorithms and designs for the underlying location identification technology, in contrast to Nortel and Ericsson, which are licensing the underlying technology from CPS.

VoiceStream and Nokia carried out NSS tests in March 2002. Testing was performed by driving a large portion of the Bellevue area, including a variety of topographical areas, including urban areas of downtown Bellevue with significant office buildings and suburban areas. Nokia was able to take live measurements from

³³ The “central core” area of Washington, DC includes the national Mall, adjacent areas,

VoiceStream's GSM network and compute the location using NSS for over 100,000 measurement points. Although this was not intended to be a definitive test of the NSS calculation methodology, the software uses the same algorithms as those used in the Nokia SMLC.

The results show that the NSS Phase II solution achieved an accuracy of 512 meters, 67 percent of the time. This is a substantial improvement in accuracy over Phase I cell identification and more than meets the waiver requirement that NSS be accurate to within 1000 meters, 67 percent of the time.

VoiceStream and Nokia have also begun conducting E-OTD tests in the same area. For the E-OTD tests, 25 cell sites have been fitted with Nokia developmental LMUs, with a developmental network overlaid over the existing VoiceStream 1900 MHz network. For these tests, the handset used is an actual E-OTD capable handset. Because of problems associated with converting the Nokia developmental overlay system to operate at 1900 MHz, and because of LMU and handset algorithm software problems, the trial has not yet produced meaningful results. Performance, however, continues to improve, and Nokia believes that it will be able to meet the Commission's accuracy requirements. VoiceStream and Nokia expect that meaningful results will begin to be produced in the near future.

and the downtown portion of Washington, DC.

c. Other Field Trials

In addition to trials being conducted in the United States, E-OTD trials are also currently taking place in Finland, France, the United Kingdom, Hong Kong and Singapore. These trials, in addition to the VoiceStream/CPS trial concluded in Houston last year, are providing evidence that E-OTD can achieve the Commission's 50 meter accuracy standard.³⁴

3. *First Office Applications and Full-Scale Deployment*

Table 2 summarizes the approximate dates on which VoiceStream expects to begin FOA installation and full-scale deployment of NSS and E-OTD, assuming there are

³⁴ Specifically, in the United Kingdom, an E-OTD system in Cambridge operates at an accuracy level of 48 meters, 67 percent of the time and 96 meters, 95 percent of the time. Further, the Houston trial, conducted by CPS and VoiceStream, reached accuracy levels of 40 meters, 67 percent of the time and 99 meters, 95 percent of the time within about 30 percent of that trial area.

no further changes in equipment availability or unanticipated developments during testing.

Table 2 – First Office Applications and Nationwide Deployment

	Nortel	Nokia	Ericsson
NSS			
FOA Start Date ³⁵	4/12/02	05/30/02	4/18/02
Nationwide Deployment Complete	06/21/02	07/12/02	06/10/02
E-OTD			
FOA Start Date ³⁶	06/30/02 ³⁷	06/05/02	06/30/02
Begin Deployment of Other Valid PSAPs ³⁸	08/14/02	07/20/02	08/14/02

a. NSS Deployment

VoiceStream is on track to meet the NSS deployment benchmarks proposed in its *Amended Request for Limited Modification*. VoiceStream will shortly begin its FOAs of

³⁵ VoiceStream installs equipment in the FOA markets prior to the start of the FOA, as equipment completes laboratory testing, and has begun installation of some Nokia NSS components.

³⁶ These projected FOA start dates depend upon timely equipment delivery and completion of laboratory testing. These dates could also be affected if deficiencies are discovered during VoiceStream’s ongoing Washington, DC (Ericsson/CPS) and Bellevue, WA (Nokia) trials.

³⁷ This FOA will begin with a CPS SMLC and LMUs on April 15, 2002, to allow for early E-OTD algorithm confirmation. VoiceStream will substitute the Nortel SMLC and LMUs as those are delivered. For consistency, the FOA start date listed here is the date after which VoiceStream expects the Nortel SMLC to be installed and operating.

³⁸ See n.36, *supra*.

NSS for its Nortel and Ericsson systems in Denton County, Texas, and Rhode Island, respectively.³⁹ With the exception of portions of the New York, Philadelphia, and Washington DC MTAs, VoiceStream expects to finish installation of NSS in all Nortel and Ericsson systems nationwide in June 2002. In portions of the New York and Philadelphia MTAs, a unique solution must be developed because of a combination of Nortel BSC and Ericsson MSC equipment. VoiceStream anticipates that these unique NSS systems will be deployed in the New York and Philadelphia MTAs by the end of December 2002. A portion of the Washington DC MTA (western Virginia) is also served by a combination of Nortel BSC and Ericsson MSC equipment. VoiceStream currently anticipates replacing that equipment with NSS-capable equipment from a single equipment vendor by the end of July. NSS FOA deployment for Nokia systems should begin in June 2002, with deployment completed in all Nokia systems in July 2002.

b. E-OTD Deployment

All three vendors expect to begin FOA tests of E-OTD in June or early July 2002. Nortel will begin to deploy in its FOA market in late April or early May 2002 using CPS-provided SMLC and LMUs. Nortel SMLC and LMUs will be substituted later, with the Nortel SMLC in place and operating in June or early July 2002. These projected FOA start dates depend upon timely equipment delivery and completion of laboratory testing,

³⁹ Because of concerns regarding the readiness of the Washington, DC PSAP, VoiceStream has decided to conduct its FOA for its Ericsson systems in Rhode Island. Washington DC will still have its NSS installed in June 2002, and VoiceStream will be ready to install E-OTD within six months of Washington, DC resolving its readiness issues.

and could also be affected by any deficiencies discovered during VoiceStream's ongoing Washington, DC (Ericsson/CPS) and Bellevue, WA (Nokia) trials.⁴⁰

Should the E-OTD FOA tests progress successfully, VoiceStream will proceed with E-OTD rollout on a PSAP-by-PSAP basis, working with APCO's Project LOCATE Guidelines. In accordance with the milestones proposed in the *Amended Request for Limited Modification* and the Commission's rules, all PSAP markets with valid requests as of June 30, 2002 should have E-OTD available by December 31, 2002,⁴¹ and all other PSAPs should have E-OTD available within 6 months of receipt of a valid request for Phase II service.

As VoiceStream has always cautioned, once nationwide deployment of E-OTD begins, there may still be location specific roadblocks to full E-OTD deployment. E-OTD deployment currently requires placing a small second antenna on towers to capture incoming positioning signals for the LMU. In some instances, adding these small (7 inch) antennas requires either landlord or zoning approval. In at least one instance (Salt Lake City), a locality has denied VoiceStream the zoning authorization necessary to implement E-OTD. VoiceStream is working with that locality to try to educate them and address their concerns, but until this situation is addressed, E-OTD cannot be implemented in that locality.

⁴⁰ See n. 36, *supra*.

⁴¹ See Part III.D below for a discussion of PSAP requests and readiness.

C. Handset Development and Deployment

Handset vendors Motorola and Nokia have already delivered E-OTD capable handsets for testing with VoiceStream.⁴² Both manufacturers have committed to commence volume shipments of E-OTD capable handsets once approved for commercial distribution. In order to approve an E-OTD capable handset for commercial distribution, it must be tested both in the lab and on the live commercial network of at least one vendor. VoiceStream had initially anticipated that Nokia's E-OTD FOA would begin in March 2002, and would provide the live network for handset testing. Late delivery of Nokia's S.10 software has delayed the date on which VoiceStream can begin handset interoperability testing on a live network. VoiceStream now anticipates that it will be able to approve for commercial release the first E-OTD-capable handset by September 1, 2002, contingent upon receipt of network equipment and completion of the FOAs on the schedule indicated above. Two additional handset models are expected to be approved by October 2, 2002. Pushing handsets through distribution channels and into the hands of consumers may take up to eight weeks after approval for commercial release. VoiceStream intends to push that process along as fast as possible, and, to the extent possible, to direct initial E-OTD capable handsets to markets with E-OTD capable networks. Based on its experience, VoiceStream has confidence that it will achieve 50 percent new activations of handsets with E-OTD capability by February 28, 2003, and 100 percent by June 30, 2003.

⁴² Motorola and Nokia have committed that after April 1, 2002 *only* E-OTD capable handsets will be submitted for VoiceStream's approval.

Table 3 summarizes VoiceStream’s anticipated schedule for testing, approval, and activation of E-OTD capable handsets.

Table 3 – Handsets

E-OTD Capable Handsets	Estimated Start Dates
Testing ⁴³	06/05/02
Commercial Approval, first handset model	09/01/02
Commercial Approval, second and third models	10/02/02
50% New Activations	02/28/03
100% New Activations	06/30/03

In addition, worldwide commitment to the E-OTD solution continues to increase among CPE vendors and their suppliers, which by itself creates a virtuous investment cycle that will help fuel continued improvements. Manufacturers such as Mitsubishi, NEC, Quanta, RIM, Samsung, Sendo, and Siemens, in addition to Motorola, Nokia and Sony/Ericsson, all are integrating E-OTD into handset products that are expected to be available for operator testing within 2002. A number of manufacturers are implementing E-OTD in tri-band globally capable handsets for worldwide sale. In addition, companies such as Intel, Infineon, Texas Instruments and TTPCom are integrating E-OTD technology into their chips and technology products.

⁴³ Handset testing is contingent upon start of an E-OTD FOA, as are all other dates (because testing is prerequisite to subsequent activities).

D. PSAP Phase II Requests and Readiness

There are a total of 2168 PSAPs in VoiceStream's current service area. Excluding requests from PSAPs outside its service area,⁴⁴ 249 PSAPs have requested Phase II service, representing about 11.5 percent of the PSAPs within VoiceStream's coverage area. In accordance with Section 20.18(j) of the Commission's rules, as amended by the *Richardson Order*,⁴⁵ VoiceStream has requested PSAP documentation that demonstrates its Phase II readiness from all but four PSAPs.⁴⁶ To date, only one PSAP from which VoiceStream has requested *Richardson* documentation has provided complete documentation that it is capable of receiving and utilizing the data elements associated with the service. VoiceStream has suggested to the Association of Public Safety Communications Officials (APCO) and the National Emergency Number Association (NENA) that they work together to create guidance on documentation that PSAPs can provide to meet the *Richardson* verification requirements. It would be helpful, for example, if PSAP equipment vendors could develop a standard vendor letter verifying Phase II customer premises equipment readiness, which those vendors could then provide to the PSAPs. Similarly, it would be helpful if local exchange carriers (LECs) and other major PSAP vendors could develop such letters so that the verification

⁴⁴ VoiceStream has received 6 requests for Phase II service from PSAPs outside its coverage area.

⁴⁵ *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Petition of City of Richardson, Texas*, Order, FCC 01-293, 16 FCC Rcd 18982 (2001) ("*Richardson Order*").

⁴⁶ VoiceStream is treating four PSAPs as if they have met *Richardson* requirements, although it reserves the right to investigate whether these PSAPs in fact have met *Richardson*.

process can proceed quickly, accurately and smoothly. The following table summarizes PSAP requests for Phase II E911 service received by VoiceStream.

Table 4 – Phase II PSAP Requests

Total PSAPs in Coverage Area	2168
Requesting PSAPs in Coverage Area	249
Percentage of Requesting PSAPs in Coverage Area	11.5%
Requesting PSAPs Out of Coverage Area	6
In-Area PSAPs Verified as Ready for Phase II or Treated as If Verified	5
In-Area PSAPs on Hold at PSAP Request	2
In-Area Unverified PSAPs	242

VoiceStream is participating in wireless forums organized by APCO and NENA and is communicating directly with PSAPs in order to keep them apprised of VoiceStream’s plans and to suggest improvements to the Phase II request process. In the fourth quarter of 2001 and again in the first quarter of 2002, VoiceStream sent letters to all PSAPs that have requested Phase II service to keep them informed of its progress in implementing Phase II.

VoiceStream has also taken steps in-house to facilitate E911 deployment at the PSAP level. It is currently traveling to its major markets, concentrating on those with valid Phase II requests, to brief its personnel on the details of its Phase II deployment plan and its policies regarding E911 implementation. Upon receiving a valid E911

request from a PSAP, VoiceStream's policy is to provide the PSAP with site data so that routing determinations and ALI database upgrades can be done at the earliest opportunity and implementation delays avoided.

VoiceStream has also purchased equipment to enable the J-STD-036 E-2 interface for PSAPs to get Phase II location data after call set up and to update the handset location during the E911 call, if needed and if the PSAP is equipped to do so.

IV. PHASE I E911 DEPLOYMENT

VoiceStream has received Phase I requests from 764 PSAPs within its coverage area, as of March 12, 2002, representing 35 percent of PSAPs in its coverage area.⁴⁷

VoiceStream has implemented Phase I capability for 252 PSAPs. Four hundred forty-five Phase I requests are currently in the process of being deployed. Sixty-seven Phase I requests are on hold for various reasons (*i.e.*, awaiting PSAP or LEC upgrades, lack of either a non-disclosure agreement or state legal authority protecting proprietary information against public disclosure). Table 5 provides a summary of Phase I PSAP requests and implementation.

⁴⁷ VoiceStream has received 69 Phase I requests from PSAPs outside its coverage area.

Table 5 – Phase I PSAP Requests and Implementation

Total PSAPs in Coverage Area	2168
Requesting PSAPs in Coverage Area	764
Percentage of Requesting PSAPs in Coverage Area	35%
Requesting PSAPs Out of Coverage Area	69
In-Area PSAPs Implemented	252
In-Area PSAPs Being Deployed	445
In-Area PSAPs on Hold	67

VoiceStream has purchased and installed (currently in testing) equipment to allow Phase I delivery via NCAS to accommodate PSAPs who can only accept this solution.

V. CONCLUSION

VoiceStream continues to make strong progress in implementing Phase II E911. Over the next four months, VoiceStream will start and complete its nationwide deployment of the Phase II NSS location identification, which will provide a means of locating any handset to within 1000 meters, 67 percent of the time. During the same period, VoiceStream expects to begin its First Office Applications for its E-OTD solution for each of its major network vendors. One handset should be approved for commercial distribution by September 1, 2002. This progress continues to be on track with the revised benchmarks set forth in VoiceStream's *Amended Request for Limited*

Modification. Moreover, VoiceStream has conducted tests that continue to suggest that both NSS and E-OTD will be able to meet Commission accuracy requirements.

VoiceStream is continuing to work with PSAPs with respect to both Phase I and, as it starts to roll out, Phase II E911 service.

Respectfully submitted,

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