

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

In the Matter of )  
 ) CC Docket No. 94-102  
Revision of the Commission's rules )  
to ensure compatibility with ) RM-8143  
enhanced 911 emergency calling systems )

NOTICE OF PROPOSED RULE MAKING

Adopted: September 19, 1994 Released: October 19, 1994

By the Commission:

Comment Date: January 9, 1995  
Reply Comment Date: February 8, 1995

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## I. INTRODUCTION

1. In this proceeding, the Commission proposes to amend its regulations to address issues raised by the provision of 911 and enhanced 911 services through certain telecommunications technologies. The primary objective of this proceeding is to ensure broad availability of 911 and enhanced 911 services to users of the public switched telephone network (PSTN) whose health and safety may depend on 911 emergency services systems. Toward this end, we intend to ensure that the effective operation of 911 services is not compromised by new developments in telecommunications. First, we address a petition filed by the Adcomm Engineering Company ("Adcomm") to amend Part 68 of the rules by proposing technical performance requirements that ensure the compatibility of private branch exchanges (PBXs) with enhanced 911 emergency services.<sup>1</sup> In this Notice of Proposed

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<sup>1</sup> Comments were filed by Associated Public-Safety Communications Officers, Inc. (APCO), Bell Atlantic, BellSouth, GTE, South Carolina Budget and Control Board, and the Telecommunications Industry Association (TIA), and reply comments were filed by Adcomm and the North American Telecommunications Association (NATA).

Rulemaking, we seek comment on proposals for ensuring the compatibility of private branch exchanges (PBXs) and other dispersed private telephone systems with enhanced 911 emergency services.

2. Second, we propose to adopt rules that would require wireless services, in particular commercial mobile radio services (CMRS)<sup>2</sup> that provide real time voice services, to include features that will make enhanced 911 services available to mobile radio callers. These features include Station Number Identification (SNI), Automatic Location Information (ALI), Selective Routing (SR), and other features for 911 calls provided over wireless mobile units. This action responds to a Petition for Reconsideration filed by the Texas Advisory Commission on State Emergency Communications (TX-ACSEC) under the Office of the Attorney General for the state of Texas.<sup>3</sup> It also responds to the issues raised in the Emergency Access Position Paper filed recently by the Associated Public Safety Communications Officials-International, Inc. (APCO), the National Emergency Number Association (NENA), the National Association of State Nine One One Administrators (NASNA), and the Personal Communications Industry Association (PCIA).<sup>4</sup>

## II. BACKGROUND

3. Since AT&T's announcement in 1965 that the digits 9-1-1 would be made available nationally as an emergency telephone number, the use of 911 for emergency purposes has become widespread. The Commission's Network Reliability Council, in performing a special study of the reliability of 911 services, found that "the American public depends on 911 services in its

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<sup>2</sup> CMRS is defined as "any mobile service...that is provided for profit and makes interconnected service available (A) to the public or (B) to such classes of eligible users as to be effectively available to a substantial portion of the public...." The term "interconnected service" means "service that is interconnected with the public switched network...." Omnibus Budget Reconciliation Act of 1993, Pub.L.No. 103-66, Title VI, §§6002(b)(3)(B), 107 Stat 312, 392(1992).

<sup>3</sup> The Petition for Reconsideration was filed in response to Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket No. 90-314, September 23, 1993, 8 FCC Rcd 7700 (1993) (Second Report and Order). Because this inquiry is broader than the proposals made in the TX-ACSEC petition, we are initiating this separate proceeding.

<sup>4</sup> This paper was filed on July 5, 1994, as an ex parte comment to GEN Docket No. 90-314. It is attached at Appendix D.

emergencies."<sup>5</sup> The Council found that 89 percent of the wireline access lines in the United States are served by some form of 911 service and that the service is increasingly engineered to provide a high level of reliability.<sup>6</sup> Currently, about 260,000 calls nationwide are placed to 911 every day.

4. 911 emergency services enable telephone users to receive, and state and local governments to provide, fast response to emergency situations. The ability to dial 911 offers several advantages to users. First, it is a single, nationally used three-digit number that is easy to remember and dial in emergency situations. This provides callers, including children, with easy access to emergency services in areas where the telephone number for the various emergency service providers is not readily known. Second, because 911 calls are sent to Public Safety Answering Points (PSAPs) over dedicated telephone lines, these calls are recognized and answered as emergency calls by professionals trained to assist callers in need of emergency assistance. Third, the use of 911 shortens the response time to requests for assistance because PSAP professionals have ready access to police, fire, and health emergency response service providers.

5. There are different levels of 911 services available, depending on the location. Basic 911 service is a forwarding arrangement in which calls dialed to the 911 telephone number are translated at a telephone company switch and are transmitted to a public safety agency for response. Most emergency systems, however, have enhanced this service.

6. Enhanced 911 systems help emergency services personnel achieve the shortest possible emergency response time by using Automatic Number Identification (ANI)<sup>7</sup> to route an emergency call

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<sup>5</sup> Network Reliability: A Report to the Nation, National Engineering Consortium, June, 1993 at Section F, page 1.

<sup>6</sup> Wireline carriers and 911 service providers may employ diverse routing of interoffice facilities, multiple 911 tandem switch architectures, alternate public safety answering positions (PSAPs), special marking of 911 equipment, back-up power sources for PSAP facilities and diverse links for automatic line identification database access to ensure 911 service is reliable.

<sup>7</sup> The use of the term "automatic number identification" or "ANI" in this NPRM is not intended as a reference to billing number presentation provided as part of Feature Group B or D local exchange services. Although the number presented to a PSAP on a wireline call is often derived from Feature Group B or D services, the number presented to a PSAP on a wireless call may be generated by several other means. Thus, the term ANI merely

to the PSAP nearest the caller's location. At a minimum, enhanced 911 service provides the PSAP with the ANI of the calling party, permitting the PSAP to call back in the event the call is disconnected. A fully enhanced 911 system not only displays the ANI, but also permits an attendant at the PSAP to identify the calling party's address through the use of an external Automatic Location Identification (ALI) database. The ALI feature also permits selective routing (SR) of the call to the appropriate PSAP for the identified location and displays the public safety agencies (fire, police and emergency medical services) covering that location on the PSAP terminal.<sup>8</sup> A fully enhanced 911 system may also provide the PSAP with other information, including the name of the subscriber, city, zip code, telephone number, date, time of day, and the class of telephone service (business, residential, etc.).<sup>9</sup> Approximately 85% of 911 services include some form of enhanced 911 service.

7. Congress created the Federal Communications Commission "for the purpose [among others] of promoting safety of life and property through the use of wire and radio communication ...."<sup>10</sup> This Commission has jurisdiction to license the electromagnetic spectrum, and also to regulate "instrumentalities, facilities [and] apparatus" through which wire and radio services are provided.<sup>11</sup> It is difficult to identify a nationwide wire or radio communication service more immediately associated with promoting safety of life and property than 911. We believe that broad availability of 911 and enhanced 911 services will best promote "safety of life and property through the use of wire and radio communication."

8. Private Branch Exchange and Dispersed Private Telephone Systems. Private Branch Exchange (PBX) and other dispersed

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identifies a number associated with the caller and used to reference the caller's location. The term does not reflect a specific service or technology.

<sup>8</sup> Selective routing is not needed in all areas. This feature is useful when telephone exchange boundaries extend into two or more PSAP jurisdictions.

<sup>9</sup> A list of the 911 call features currently available to many emergency call taking organizations, listed in order of importance as defined by NENA/APCO leadership, is shown in Appendix B.

<sup>10</sup> 47 U.S.C. §151.

<sup>11</sup> 47 U.S.C. §151, §153(a), (b), Titles II and III.

private telephone systems may present location identification problems for emergency services personnel. PBX systems route calls between telephone stations in an organization and connect those stations to the public switched telephone network through trunk lines. A single PBX may serve a number of different buildings. When a caller dials 9-1-1 from a station served by a PBX, a PSAP attendant may be able to retrieve the street address of a main building (the billing address associated with the ANI). Determining the precise location of the caller within a large building or at a station within a PBX that serves more than one building, however, may be complicated and time-consuming in a situation where time is critical.<sup>12</sup> While it is technically feasible to include location identification information in transmitting calls from stations served by PBX or other dispersed private telephone systems, there currently is no uniform means for ensuring that this information reaches emergency services personnel. Moreover, telephone users may or may not be aware that their telephone service is provided through PBX systems, and, in any event, are unlikely to be aware of 911 capabilities or limitations of the PBX systems. Yet, the ability of 911 service providers to deliver life saving services to them may depend on PBX compatibility with enhanced 911 systems.

9. Enhanced 911 and Wireless Systems. While some wireless systems are capable of providing basic 911 service, few, if any, are currently capable of providing an enhanced 911 service. This raises public policy concerns because the number of calls to 911 from wireless users, such as cellular telephone customers, is increasing rapidly. More than 13,000 new cellular telephones are installed daily in the United States.<sup>13</sup> In major metropolitan areas, it is estimated that as many as 10% of the 911 calls originate from mobile radio service subscribers.<sup>14</sup> For example, in January 1993, one California Highway Patrol communication facility fielded 80,000 calls for emergency assistance, 25,076 of which were from cellular telephones.<sup>15</sup> In 1987, the

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<sup>12</sup> See Adcomm Petition at 3, citing a newspaper report of a fatality attributable partly to the misdirection of medical aid to a caller using a private phone system.

<sup>13</sup> This figure is based on 1993 data, as published in The Wireless Factbook, Cellular Telecommunications Industry Association, Spring 1994, p. 6.

<sup>14</sup> Communications Daily, "NARUC Notebook" (July 27, 1994) quoting Leah Senitte of the National Emergency Number Association.

<sup>15</sup> This number for cellular telephone calls does not include calls from fixed cellular "Freeway Call Boxes." See, W. Clay Paxton, "Future Vision II: The 9-1-1 Imperative", NENA

Massachusetts state police received only about 300 cellular calls per month. By December 1992, that number had grown to more than 15,700.<sup>16</sup> We expect growth in the use of mobile radio services to continue. It has been estimated that by 1998 there will be 32 million cellular customers and 2.6 million Personal Communications Networks customers.<sup>17</sup>

10. The continuing growth of mobile radio service customers will increase the number of 911 calls that are placed from mobile telephones. As currently configured, however, wireless 911 services are inferior to the wireline 911 services that telephone users have come to expect. Specifically, 911 calls originated by mobile radio users generally do not provide PSAP attendants with the caller's precise location. Because the callers may not know their location,<sup>18</sup> the ability of emergency service personnel to respond is hindered.<sup>19</sup>

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News, Vol. 12, No. 2, May 1994, at pp. 20-28. See also, George Raine, "Cellular Phone Owners Dialing 911 Frivolously", The San Francisco Examiner, February 25, 1993.

<sup>16</sup> See W. Clay Paxton, op. cit. See also, Tony Rogers, "Cellular Samaritans Becoming the Eyes of the Highway Patrol", Associated Press, January 5, 1993.

<sup>17</sup> The Wireless Factbook, Cellular Telecommunications Industry Association, Spring 1994 p. 36.

<sup>18</sup> In Los Angeles County, 600,000 cellular/mobile 911 calls were placed in 1992. More than 25 % of the callers could not identify their location. This information was related by William E. Stanton, Executive Director of NENA, during a presentation at the FCC on March 23, 1994.

<sup>19</sup> The following example illustrates the difficulties posed by the use of mobile radio services to reach 911 emergency services. At 2:50 AM on September 22, 1993, the Amtrak Sunset Limited derailed from the Bayou Canot Bridge in a remote area of the Mobile Delta. The mayday call from the train was received by the CSX Railroad office in Mobile which placed a call to 911, but incorrectly identified the location of the derailment as Bayou Sara, several miles south of the actual location. Consequently, dispatched rescue units were unable to find the derailed train. Subsequent to this action, a second call to 911 came in from an Amtrak employee on the derailed train using a cellular phone. The Amtrak employee was able to tell the 911 operator only that the derailment was somewhere on the Mobile River. While Mobile County has a modern enhanced 911 system, it was of no value with these calls. The first call displayed the address of the CSX station in downtown Mobile, and the second call from the derailed train displayed "mobile phone." See NENA News, "Mayday in the

### III. COMPATIBILITY OF PBX EQUIPMENT WITH 911 SYSTEMS

11. Several states and localities have passed regulations or ordinances for the purpose of requiring PBX equipment to be compatible with 911 systems.<sup>20</sup> The specific requirements, however, vary significantly from one state to another. While several types of equipment and services may be available to ensure accurate routing of 911 calls from PBX or other dispersed private telephone systems, a lack of uniformity in this equipment may impair public emergency services by delivering inaccurate, incomplete, or misleading call origination information to the public switched telephone network. Moreover, mutually incompatible systems for resolving this problem are likely to cause user confusion or higher costs in equipment or services.

12. We propose to amend Part 68 our rules to ensure the compatibility of PBX equipment with enhanced 911 services. The record in this proceeding, discussed below, indicates that market forces to date have not been effective in implementing a solution to this problem. States and localities are considering separate and possibly conflicting regulations on PBX owners and equipment. Failure to address the problem quickly could result in increased costs as equipment that is not compatible with enhanced 911 systems becomes more widely distributed. Accordingly, we find that it is in the public interest to propose rules to require that PBX and other dispersed private telephone systems (hereinafter referred to collectively as "PBX equipment") operate effectively with enhanced 911 systems.

#### A. Adcomm and Industry Proposals

13. Adcomm Petition. The Adcomm petition seeks to prevent situations in which the provision of emergency services to a caller is delayed because the caller's location cannot be precisely determined when the caller dials 9-1-1 from a telephone served by PBX equipment.<sup>21</sup> Adcomm proposes specific rules to ensure that telephone stations served by PBX equipment are compatible with public emergency access networks. Adcomm points out that the resolution of this problem will require accurate

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Mobile Delta," Dennis Stapleton, Vol. 12, No. 2, May 1994, at pp. 16-18.

<sup>20</sup> See, e.g., Mississippi Code 1972 Annotated, tit. 29, Chapter 5, §§ 19-5-303.

<sup>21</sup> The problem may also exist for key telephone systems connected to Centrex. See TIA Technical Systems Bulletin (TSB-103), "PBX and KTS Support of Enhanced 911 Calling Service," (October, 1993) at 3.

management of telephone number databases and may have implications for the North American Numbering Plan by creating additional demand for numbers.<sup>22</sup> Adcomm states, however, that its proposed amendments address only that aspect of Part 68 concerned with preserving the integrity of emergency services provided on the public switched telephone networks. Specifically, Adcomm's proposed rules are "...simply intended to align interface approaches without proposing to control user implementations or local exchange carrier (LEC) services."<sup>23</sup> Adcomm's proposal would: (1) require PBX equipment to provide specific location information of the calling station to enhanced 911 systems; (2) require premises owners to provide local telephone companies with information on their PBX systems; (3) require certain training, verification, supervision and testing procedures for PBX operation; (4) specify signal power limitations; and (5) set technical standards for compatibility with enhanced 911 systems, including trunk interface and signaling requirements.

14. Industry Efforts. The Telecommunications Industry Association (TIA), through a subcommittee of its Multi-line Telecommunications Committee, has been working to develop technical standards for PBXs to resolve the Enhanced 911 problem.<sup>24</sup> In October, 1993, TIA issued a Technical Systems Bulletin (TSB-103) entitled "PBX and KTS Support of Enhanced 911 Calling Service", which addresses dialing, call routing, and caller location database issues associated with PBX and KTS support of enhanced 911 service providers. TIA anticipates final voting by the membership on these proposals in late 1994.

15. Comments. Commenters responding to Adcomm's petition generally acknowledge the need to ensure compatibility between PBXs and Enhanced 911 services, but take different positions on how compatibility may best be achieved. Bell Atlantic, BellSouth, GTE, and TIA urge the Commission to delay action

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<sup>22</sup> The Commission is currently examining various issues regarding administration of the North American Numbering Plan. See Administration of the North American Numbering Plan, Notice of Proposed Rulemaking, CC Docket No. 92-237, 9 FCC Rcd 2068 (1994).

<sup>23</sup> Adcomm Reply at 2.

<sup>24</sup> TIA is a membership organization of domestic and international providers of telecommunications products and services. Through various committees, TIA develops engineering standards and publications that facilitate interchangeability and improvement of products. Standards developed by TIA committees and adopted by TIA ballots are voluntary industry standards that represent an industry consensus.

pending industry consensus on standards. The North American Telecommunications Association (NATA) and the South Carolina Budget and Control Board (SCBCB) contend that the Commission should lead any such industry effort. SCBCB states it cannot endorse the Adcomm proposal due to potential technical and financial hardships.<sup>25</sup> NATA objects to Adcomm's proposed verification requirements and opposes new training requirements on customer premises equipment (CPE) installation personnel.<sup>26</sup> NATA argues that LECs do not offer the kind of interconnection of switched services that would permit PBXs to transmit station identification in a format that could be accepted or processed by the telephone network.

16. APCO, which supports the petition, expresses concern about PBXs that block 911 calls in favor of an internal safety service. APCO is also concerned about the confusion caused when an extra digit must be dialed to get an outside line before dialing 911 from a PBX station in an emergency. BellSouth, GTE, and NATA express concern about the cost of dedicated 911 trunks and the impact of the proposal on the North American Numbering Plan (NANP).<sup>27</sup> Adcomm notes that the enhanced 911 trunking mentioned in its petition was not intended to require PBXs to have dedicated trunks to PSAPs. Adcomm states that, under its proposed rules, end users and LECs may choose different ways of handling trunking.<sup>28</sup> GTE suggests there are particular difficulties identifying the location of calls placed from college campuses, hospitals, military installations and wireless PBXs.<sup>29</sup>

17. Commenters identified several specific elements that should be included in any resolution of the PBX/enhanced 911 compatibility issue. GTE states that compatibility will require the creation of a standard LEC/private switching system interface with identifying information for private switching system calling stations, private switching system compliance with NENA standards for the transmission of ALI data to the telephone company or caller location database, and the creation of either alternative number identification or Direct Inward Dial (DID) numbers for private switching system stations.<sup>30</sup> Bell Atlantic concurs with

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<sup>25</sup> SCBCB at 2.

<sup>26</sup> NATA 7-9.

<sup>27</sup> Bell South at 2; GTE at 5; NATA 2-23.

<sup>28</sup> Adcomm reply comments at 3.

<sup>29</sup> GTE at 5-6.

<sup>30</sup> GTE at 2-4.

GTE that any technical standards should specifically include the signaling and protocol specifications that have been published by NENA, to ensure that calls sent from PBXs to 911 systems carry proper identifying information.<sup>31</sup> NATA states that any rules the Commission adopts should ensure that telephone companies develop and market the least costly form of Enhanced 911 interconnection, and that such costs be fairly distributed.<sup>32</sup> GTE asserts that a solution may also require added functionality in end office switches and additional telephone number assignments.<sup>33</sup>

18. TIA contends that Part 68 should specify as few technical details as possible to avoid stifling technological advancement of enhanced 911 services and equipment. In order to assure that enhanced 911 services will work properly, TIA states that the regulations should: (1) clearly define the responsibilities of all entities involved; (2) reference the appropriate standards to be used, preferably national; (3) set reasonable deadlines for compliance; and (4) involve regulatory agencies in educating the public regarding the deployment and use of enhanced 911 calling service.

#### **B. Discussion**

19. We believe that federal rules for achieving uniformity are appropriate in these circumstances to avoid confusion among telephone users connected to PBXs and to ensure that PBX equipment operates on the public switched telephone network (PSTN) at an optimal level for emergency purposes. The Adcomm petition, the comments received, and published reports of difficulties in delivering emergency services to the proper location indicate that the incompatibility of PBXs with enhanced 911 systems is hampering public safety access through the public switched telephone network.

20. We propose to amend Part 68 of the rules to require compatibility of PBX equipment with enhanced 911 systems. We agree with Adcomm and several commenters that any Part 68 requirements must take into account industry standards, protocols and technical references. Moreover, the comments persuade us that any proposal for amending our rules must consider not only the delivery of ANI, but also issues such as ALI database administration and the delivery of other information, e.g., calling party number, to the PSAP that may facilitate a more timely emergency response. We, therefore, initiate a Notice of

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<sup>31</sup> Bell Atlantic at 1-2. A copy of the NENA protocol is attached as a appendix to Bell Atlantic's comments.

<sup>32</sup> NATA at 4-5, 6-7.

<sup>33</sup> GTE at 2-3, 4-6.

Proposed Rulemaking to require compatibility of PBX equipment with enhanced 911 systems. The proposed rules are patterned closely after those proposed by Adcomm, with modifications to reflect some of the commenters' concerns. We seek comment on these proposed rules.

21. In considering the proposed rules, our paramount concern is to ensure that PBX equipment does not hinder delivery of emergency services by impeding the transmission of adequate location information over the PSTN. We believe that any rules adopted must provide sufficient flexibility to foster the development of alternative methods and technological innovation in resolving compatibility problems between PBX and other dispersed private telephone systems and enhanced 911 systems. Moreover, we believe that the proposed rules should carefully balance the need to achieve compatibility and the need to ensure that equipment owners and manufacturers are not unduly burdened in implementing such upgrades. We seek comment on whether the proposed rules permit sufficient flexibility in conforming PBX systems to the needs of their owners while ensuring that the location of callers to 9-1-1 is properly identified to PSAP operators. We seek comment on whether and how equipment manufacturers, multi-line telephone system (MLTS) service providers, local exchange carriers, public safety agencies, and others such as local building inspectors should be identified as responsible parties, as suggested in TSB-103. Commenters supporting this suggestion should discuss specific amendments to Part 68 that would achieve this objective. Further, we ask that commenters provide detailed analysis of the technical and cost considerations of implementing the proposed rules for equipment owners, equipment manufacturers, network service providers, and other affected parties. In addition, we seek comment on whether there are particular difficulties in applying the proposal to college campuses, hospitals, military installations or wireless PBXs, and on whether the proposed rules must be applied where the equipment serves a physically small location, such as a single story building, or a small number of closely situated telephone stations. Commenters should propose specific alternative language where they do not believe the proposed language is appropriate.

22. 911 Availability. Both the Adcomm proposal and TSB-103 would require that PBX equipment properly route emergency calls dialed using the digits 911 or 9-911 (where 9 must be dialed to reach outside lines). TSB-103 notes that special dialing or routing features in PBX equipment, such as dial 9 blocking to prevent toll fraud and Automatic Route Selection for least cost routing, should not be implemented in ways that prevent 911 dialing. We tentatively conclude that a caller at a PBX station having the capability to reach the public switched network should have the ability to reach emergency services by dialing 911 without having to dial any additional digits. TSB-103 suggests that some form of user education or notification may be

appropriate to ensure proper dialing by the casual user of terminal equipment within a PBX or dispersed private telephone system. We further propose to require that PBX equipment domestically manufactured or imported prior to the proposed implementation date of the rules be labelled with a warning describing its limitations for those attempting to use it to call enhanced 911. We seek comment on these proposed rules.

23. Attendant Notification. TSB-103 recommends that new PBX equipment be capable of alerting an attendant or other on-premises personnel and providing calling station information to such personnel when a 911 call is dialed. On-premises personnel may assist emergency services personnel in locating or assisting the caller, particularly on large premises like schools, hotels, or military installations. TSB-103 points out that some state laws prohibit attendant "bridge-on" to a 911 call (e.g., a three way emergency call that includes the 911 caller, an attendant, and the PSAP operator) because it may create confusion. We propose to require PBX equipment to be capable of notifying an attendant, if one is present, and seek comment on our proposal. See Appendix C, proposed §68.320(e). We ask that commenters discuss any potential conflict with existing state or local regulations.

24. ALI database maintenance. Several commenters, as well as TSB-103, note that timely and accurate database maintenance is an essential element of enhanced 911 service. TSB-103 contends that any regulations should clearly define the responsibilities of all parties involved in implementing an enhanced 911 system. As noted above, accurate caller location information is vital to ensuring the timely delivery of emergency services through the public switched telephone network. TSB-103 demonstrates that a variety of customer premises equipment configurations or network services may perform this function. Both Adcomm and TSB-103 envision database maintenance as a separate issue from that of PBX equipment compatibility with enhanced 911.

25. We propose to require coordination procedures to ensure accurate and timely transmission of database information by PBX owners to local exchange carriers. We expect that the proposed rules will permit accurate and timely database maintenance, irrespective of the services or technologies employed to update and transmit information to enhanced 911 systems. We seek comment on whether the verification and training procedures in the proposed rules are sufficient to ensure the delivery of accurate caller location information from PBX equipment to emergency services personnel. See Appendix C, proposed §§68.228 and 68.320. Commenters should state with specificity whether additional equipment or service requirements should be imposed to achieve compatibility.

26. Station Number Identification (SNI). Several states

that have established 911 as the primary emergency telephone number require certain minimum information to be delivered to PSAPs. Typically, such states require the caller's station number, caller location identification, and a call-back number.<sup>34</sup> We tentatively conclude that our rules should establish that, at a minimum, a caller's telephone number, caller location identification, and a call-back number must be transmitted from the PBX or other dispersed private telephone system for use at the PSAP. We seek comment on these requirements and ask whether additional information requirements should be adopted. TSB-103 and GTE advocate the creation of alternative number identification (an "artificial" SNI) for each calling station on PBX equipment to facilitate delivery of caller location identification and to permit call-back by emergency services personnel. We seek comment on this approach, particularly with respect to commenters' concerns about its impact on the North American Numbering Plan (NANP). We ask that commenters describe in detail how the proposed rules would affect the NANP, and that proponents of any alternatives to these proposals include an assessment of the potential impact of such alternatives on the NANP, as well as specific proposed language for inclusion in the rules.

27. Information Protocol Standard. Bell Atlantic and GTE suggest that NENA standards for information protocol (the format in which information is transmitted for display on a PSAP attendant's screen) should be explicitly referenced in any rules governing enhanced 911 services that we adopt. We seek comment on this proposal, and a detailed analysis of the relevant cost and technical considerations. Specifically, we seek comment on whether this is the most appropriate format for transmitting information about 911 calls, and whether, or how, this format should be incorporated in our rules. Whether or not the NENA standard is appropriate for purposes of PBX compatibility with enhanced 911 systems, we believe that a standard protocol for transmission of information associated with 911 calls is essential. Costs for PBX equipment are unnecessarily increased by a multiplicity of formats, and we tentatively conclude that the potential for user confusion absent a uniform format warrants the adoption of a nationwide standard in our rules.

28. Network Interface Standards. TSB-103 notes that some PBX equipment may directly access the Automatic Location Identification Database Management System (ALI DMS) to input and

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<sup>34</sup> Depending on the technology developed for compatibility with 911, a PBX station call-back number may, in some circumstances, be different from the calling number.

update changes in station location records.<sup>35</sup> TSB-103 states that these data link interfaces should be standardized, and that such standards should address security and data integrity verification issues. We seek comment on this recommendation. Commenters should specifically address the technical feasibility, cost, and current availability of systems for ensuring security and data integrity verification. Commenters also should propose specific language for inclusion in the rules.

29. Local Exchange Company Services. We seek comment on the kind of LEC services that are essential to the compatibility of enhanced 911 systems with PBX equipment. Adcomm, TSB-103 and NATA acknowledge that telephone company services play an essential role in the identification of caller location to a PSAP. Local telephone companies provide facilities interface codes and tariffed network services that enable equipment registered at the Commission to be supported in the network. Their involvement is essential to enable PBXs to transmit proper identification and location information to a 911 tandem or PSAP. Specifically, we seek detailed information on the availability, cost, and any other factors affecting the implementation of LEC services to support the requirements set forth in our proposed rules or to support any alternative solution to the instant compatibility problem.

#### C. Implementation Schedule

30. We tentatively conclude that we should require rapid implementation of features capable of implementation with minimal difficulties for PBX equipment. Both the record in the Adcomm proceeding and TSB-103 indicate that coordination and standardization, rather than technical difficulties, are the chief obstacles to achieving compatibility between 911 systems and PBX equipment. In any event, minor technical obstacles should not unreasonably delay equipment modifications affecting public safety access. We believe that a proposal to require compliance as a condition of registration of new equipment would impose a minimal burden on manufacturers and suppliers, and would not impose significant burdens on users or customers served by 911 emergency systems. We ask for comment on this analysis.

31. We propose that the manufacture and importation of PBX equipment that does not comply with these provisions must cease as of one year from the effective date of the order adopting rules in this proceeding. In addition, the proposed rule would impose these requirements on equipment that is newly installed more than 18 months after the effective date of the order adopting rules in this proceeding, thus prohibiting the installation of non-complying equipment beyond that date. We do

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<sup>35</sup> TSB-103 at 13.

not propose to require manufacturers and suppliers to reregister grandfathered equipment or to reconfigure equipment that has been installed as of the effective date of the order. We tentatively conclude that the restrictions on importation, manufacture and installation of non-complying equipment are sufficient to promote rapid deployment of equipment that is compatible with enhanced 911 systems, and we seek comment on this analysis. In the interim period, we propose that any PBX equipment subject to these requirements that is manufactured or imported on or after 30 days from the effective date of order adopting rules in this proceeding that does not comply with the PBX rule provisions be labelled with emergency dialing instructions on the device and on the outside of the packaging in which it is marketed. We seek comment on these proposed dates and requirements. We invite alternative recommendations with an analysis of the costs and benefits of those alternatives.

#### **IV. Compatibility of Wireless Services with Enhanced 911**

32. The Texas Advisory Commission on State Emergency Communications (TX-ACSEC) filed a petition for reconsideration in the PCS proceeding asking that we require PCS licensees to provide accurate location information about 911 callers from the outset.<sup>36</sup> It also requested that we mandate a single enhanced 911 standard for all wireless technologies so that local governments are not required to expend scarce resources configuring their systems to handle a multitude of signalling protocols and interfaces. TX-ACSEC argued that we must act on these fronts.

33. Several parties, such as the Association of Public-Safety Communications Officials International, Inc. (APCO) and the National Emergency Number Association, filed comments in support of TX-ACSEC's position. KSI, Inc. ("KSI"), agreed that we should require PCS licensees to provide enhanced 911 services, but argued against a Commission-mandated enhanced 911 standard. KSI stated that a single enhanced 911 standard could stifle the development of possible alternative solutions by lessening the availability of capital to companies, like KSI, with nascent enhanced 911 technologies. APCO-International and others also believe that we should establish performance requirements while allowing industry to develop the necessary standards. American Personal Communications, American Telephone and Telegraph, MCI

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<sup>36</sup> TX-ACSEC indicated that the 911 program authorities in eleven states concur with its petition. These states included California, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New Mexico, Oregon, South Dakota, Vermont and Washington.

Telecommunications Corporation and Telocator (PCIA)<sup>37</sup> all acknowledged the need for enhanced 911 capabilities in mobile telephone networks, but argued that enhanced 911 standards should be developed separately from the PCS proceeding so as not to delay the implementation of PCS.

34. We have become increasingly concerned about the inability of mobile radio systems to interface with the enhanced 911 systems that have been deployed in wireline networks.<sup>38</sup> In the Second Report and Order, we stated that industry and standards-setting bodies should direct particular attention to offering an emergency 911 capability for services that would work with enhanced 911 systems and, to the extent feasible, permit locating a caller when the caller does not know his location.<sup>39</sup> We expressed particular concern that unless such capability is designed into personal communications system (PCS) equipment, dialing 911 from a PCS telephone would not be equivalent to dialing 911 from a wireline telephone. We added that the health and safety of citizens, as well as the fullest commercial success of PCS, would be affected by whether PCS is capable of providing enhanced 911 services. Accordingly, we stated that we intended to initiate a future proceeding to address enhanced 911 and related issues with regard to PCS, cellular, and any other relevant mobile service.<sup>40</sup> In the Memorandum Opinion and Order, GEN Docket No. 90-314 (adopted June 9, 1994) at para. 202, we dismissed TX-ACSEC's petition for reconsideration, stating that the issues raised therein would be addressed in a separate proceeding.

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<sup>37</sup> After it filed comments in this proceeding, Telocator changed its name to the Personal Communications Industry Association.

<sup>38</sup> Based on our experience with cellular and other mobile radio services, it appears doubtful that enhanced 911 interface capability will be implemented voluntarily.

<sup>39</sup> Second Report and Order, note 4, supra, paragraphs 139-140.

<sup>40</sup> Id. We have already proposed to require position determination capability in mobile satellite systems above 1 GHz, although current applicants do not intend to use their systems for extensive distress and safety communications. See, Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, Notice of Proposed Rule Making, CC Docket No. 92-166, 9 FCC Rcd 1094 (1992). As discussed in para. 38, we seek comment on whether mobile satellite services, among others, should be subject to requirements for enhanced 911 compatibility.

35. On June 30, 1994, APCO, NENA, NASNA, and PCIA issued an "Emergency Access Position Paper" ("Joint Paper"), which they filed as an ex parte comment in the PCS proceeding. See Appendix D. The Joint Paper presents the consensus recommendations of these organizations to assist standards bodies in developing appropriate standards for emergency access from wireless service systems to "9-1-1 type systems."<sup>41</sup>

36. The record before us indicates support for incorporating enhanced 911 technology in mobile telephone networks. The record also suggests that parties are skeptical of our ability to mandate an enhanced 911 standard in the PCS rulemaking proceeding without significantly delaying the implementation of PCS. Accordingly, we are initiating this separate rulemaking proceeding to address the enhanced 911 capabilities of PCS, cellular, and other relevant radio services. We are basing most of our proposals on the Joint Paper.

## B. Discussion

37. We believe that Commission action is necessary to ensure that, over time, mobile radio service users on the public switched telephone network have the same level of access to 911 emergency services as wireline callers. Wireless customers clearly expect access to 911 services, and may be unaware that their mobile radio services do not provide the kind of location information that emergency services personnel receive from stations on the wireline network. Thus, as the use of wireless services expands, those who access the public switched telephone network through mobile radio units may suffer a degradation in access to 911 emergency services absent a requirement that mobile radio systems must be compatible with enhanced 911 services. Accordingly, we propose to require that mobile radio transmitters supplied to wireless customers provide the same level of access to 911 emergency services as is available to wireline customers.

38. As an initial matter, we need to define the categories of mobile radio services that might be subject to compatibility requirements with enhanced 911 services. Our initial view is that mobile radio services offering access to real-time voice services provided on the public switched network may be an appropriate definition. 911 service today primarily depends on

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<sup>41</sup> NENA has since withdrawn its support of the Joint Paper, citing failure to suggest a specific time frame within which mobile radio services would have to provide more precise locations for 911 callers. See July 26, 1994 letter of Executive Director of NENA, to Chief Engineer, FCC.

voice, or voice equivalent (text telephone or TTY)<sup>42</sup> communication. We believe that users of voice mobile radio services today reasonably expect to have access to emergency services through 911. These customers would seem to be the population of mobile radio users PSAP facilities are primarily organized to serve. For example, cellular radio systems already represent a significant, and increasing, community of 911 service users.<sup>43</sup> We seek comment on this analysis. Should any compatibility requirements that might be imposed on mobile radio services be limited to those features most closely resembling traditional 911 services? Would commercial mobile radio services (CMRS)<sup>44</sup> providing real-time voice be an appropriate category, or should other, more limited services, such as one-way paging or the Non-Voice, Non-Geostationary Mobile Satellite Service, be required to meet compatibility requirements for some or all 911 features? What are the social, economic and other costs of including or excluding various categories of mobile radio services from any 911 compatibility requirements that might be developed? What are the costs and benefits of requiring any or all of the various 911 features? What time frames would be appropriate for requiring such features? Commenters should discuss how these considerations might vary with respect to specific types of services, e.g. cellular, PCS, or mobile satellite services. While we do not initially propose to apply rules for 911 compatibility to private mobile radio services, which may not be available to the public or interconnected with the public switched network, we ask for comment on this decision. We request comments on whether and how the proposed performance requirements, particularly phase-in periods, should be applied to existing systems (e.g., cellular) vis-a-vis new systems such as PCS. We also ask for comment on our proposal to limit this requirement to services capable of providing real-time voice.

39. With respect to appropriate features, we note that currently, mobile radio services, such as cellular, are able to provide access to 911 service, but they are unable to provide the information necessary for enhanced 911, such as the location of the caller (ALI), the number of the caller, call back capability, or an indication of the type of service required. By contrast, approximately 76% of wireline customers who have 911 services

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<sup>42</sup> The term "text telephone" or "TTY" replaces the term "TDD" or "telecommunications device for the deaf."

<sup>43</sup> In urban areas, 911 calls from mobile radio units currently account for 10% of all 911 calls. Communications Daily, "NARUC Notebook" (July 27, 1994) quoting Leah Senitte of the National Emergency Number Association.

<sup>44</sup> See note 2, supra, for definition of "commercial mobile radio service."

have access to these features. Availability of enhanced 911 service for wireless customers may require modifications to mobile radio handsets, mobile radio service provider networks, the public switched telephone network, or public safety access systems. In order to render functionally equivalent service, it appears that the mobile station must be able to communicate the information, e.g., ANI and ALI, to the base station, and the base station must be able to interpret all information transmitted from the mobile unit, provide the proper priority handling of 911 calls, and forward sufficient information to the public safety answering point to provide call back capability, location information (enabling selective routing), and determination of the type of emergency service needed.

40. We propose to adopt rules to improve the access of users of mobile radio services to 911, particularly enhanced 911 services. While we do not anticipate adopting extensive technical standards for enhanced 911 operation -- industry standards-setting committees are better equipped to address precise technical requirements for enhanced 911 compatibility<sup>45</sup> - - we propose that general performance criteria be adopted. We will discuss the essential capabilities proposed in the Joint Paper for access to 911 and enhanced 911 through wireless services.

41. 911 availability. The Joint Paper recommends, and we propose, that a user have the ability to reach emergency services from any service initialized<sup>46</sup> mobile radio handset<sup>47</sup> in a home service area or a subscribed-to roamed service area by dialing only 911. This means that any mobile radio transmitter that is service initialized on a radio network must be allowed to make a 911 call without a requirement for user validation. We ask commenters to describe the extent to which mobile radio services and equipment provide these capabilities today, and whether or to

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<sup>45</sup> We expect the industry committees to develop these standards working in conjunction with PCIA, APCO, NENA, and NASNA, among others. There are several standards bodies that are capable of assuming this work, such as Committee T1, sponsored by the Alliance of Telecommunications Industry Solutions (ATIS), and its various subgroups T1P1, T1S1, etc.; the Telecommunications Industry Association under TR 46 and TR 45.2; and research organizations, such as Bell Communications Research (Bellcore).

<sup>46</sup> Service initialized means that the user has purchased services from a wireless service provider.

<sup>47</sup> The Joint Paper uses the term "handset or wireless terminal." We ask whether the term "mobile radio unit" would represent an appropriate broadening of the scope of the availability requirement.

what extent implementation of these features would require hardware changes to the mobile equipment or the associated base stations. What considerations are raised for new or developing services? Commenters should specifically address the application of this feature to mobile radio handsets used on a "roaming basis" or outside a mobile radio service provider's roaming area. Commenters should provide specific data on the economic and technical feasibility of such a requirement. We propose that this dialing feature be made available one year after the effective date of the order adopting rules in this proceeding, and we seek comment on the ability of licensees and equipment manufacturers to implement the feature in this time frame.

42. Grade of service. The term "grade of service" refers to the percentage of calls between the mobile transmitter and the PSAP that are blocked either within the radio or the wireline network. The interconnection of a mobile radio transmitter call with a PSAP attendant may involve several interconnecting networks, including mobile radio links and the wireline PSTN. The Joint Paper expresses concern that competitive forces, expected to drive service quality levels in a wireless environment, may result in higher blocking rates than wireline networks experience.

43. The Joint Paper recommends, and we agree, that standards bodies should investigate technical solutions or other strategies to ensure minimal blocking of 911 calls from mobile radio transmitters. Any overall grade of service objective will require a cooperative effort between the initiating, interconnecting, and terminating systems. Our initial view is that federal standards are not warranted at this time. We seek comment on this assessment. Commenters advocating federal standards should describe how grades of service would be defined, and discuss any jurisdictional implications of imposing such standards.

44. 911 call priority. We seek comment on our proposal to require that, one year after the effective date of the order adopting rules in this proceeding, originating 911 calls must be assigned priority over non-emergency service calls. This priority would be assigned at the handset and would extend to placing the 911 call at the beginning of any queue for calls waiting to be placed in the mobile radio network. Because of the unknown nature and importance of calls in progress, this priority would not require the interruption of calls in progress. We seek comment on whether this capability would require any major equipment modifications. Do existing systems have this capability? If not, what obstacles exist for developing this feature? We seek comment on the technical feasibility and cost for licensees and equipment manufacturers of establishing priority for 911 calls in new and existing mobile radio networks.

45. User location information. The Joint Paper finds that the wireless system should have the ability to identify the location of a wireless terminal used to make a 911 call. We agree. Automatic location identification (ALI) is more easily accomplished within a wired telephone network because the location of each telephone is known. ALI is not as easy in a mobile radio network because the caller can be located anywhere in the network's service area. In a wireless network, a caller's approximate location can be determined by identifying the specific transmitter that is communicating with the caller. Such approximations, however, may only narrow the location of the caller to an area of a few square miles and may be of minimal use to emergency service personnel, particularly in urban settings. Moreover, to obtain precise geographic location information, a PSAP would need to know not only the latitude and longitude of the mobile unit, but also its elevation in the event the caller is located in a high-rise building.<sup>48</sup>

46. We seek comment on the specific technical and cost considerations affecting the implementation of an ALI requirement for enhanced 911 service to wireless customers that would include detailed location information.<sup>49</sup> While there are several possible methods available to provide location data with varying levels of precision, all of these raise issues regarding performance, cost or technical feasibility. These methods include: Global Positioning Satellites (GPS), including differential GPS;<sup>50</sup> time delay measurements; received signal strength; ranging and triangulation; received signal angle of arrival, e.g., reception employing "smart" antenna technology or KSI's Direction Finding Localization System; CDMA time

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<sup>48</sup> The equipment used at the PSAPs would have to be modified to permit the use of geographic data instead of a street address. Precise location information, especially for a mobile radio transmitter, would have to be based on latitude, longitude and elevation. The transmitter would be unable to determine automatically a nearby street address, and, in fact, no street address may exist at the mobile unit's location, particularly in rural areas.

<sup>49</sup> In order to locate a caller within a 100 foot radius, 12 to 15 digits of latitude and longitude information must be relayed. Relaying this amount of information to the PSAP may require modifications in ALI services or in PSAP equipment. However, the representations by wireless interests that this capability currently is technically and financially infeasible are not documented in this record.

<sup>50</sup> We understand that the Federal Aviation Administration is participating in the development of an aircraft navigation system in which GPS corrections would be broadcast by satellites.

synchronization; commercial FM multilateration; LORAN reception; automatic vehicle monitoring (AVM), time-of-arrival measures; and, cell site/radio port sectorization. All of these methods offer varying degrees of accuracy, affordability, and implementation problems. As an example, GPS does not work well if a caller is inside a building or amid obstructions that attenuate or block the satellite radio signals. Terrestrial radio triangulation methods are also hampered by interference and by signal reflection (multipath), though they are not as affected as satellite communications by attenuation inside buildings. Commenters should also address whether adding ALI components would increase the size of mobile radio transmitters or threaten the market-driven evolution toward smaller devices.

47. We recently received a copy of a "Survey of Location technologies to Support Mobile 9-1-1," conducted by C.J. Driscoll & Associates for APCO and the State of California, department of General Services Telecommunications Division. A copy of the report is being placed in the record of this proceeding. This report surveys eighteen different location systems that either exist or are under development and may be suitable for automatic location identification for enhanced 911 service. We invite comment on the APCO report, specifically with regard to the feasibility and accuracy of the various systems for ALI for enhanced 911 and the cost estimates. We also solicit information as to any systems or technologies that are not discussed in the report.

48. We are aware that the industry is working with the public safety community to address many of the same issues that we are addressing in this proceeding, particularly with regard to ALI. A Joint Experts Meeting was held in early August under the auspices of the Telecommunications Industry Association TR45 Committee. We are inserting a copy of the report of this meeting in the record for comment. A second Joint Experts Meeting was held in mid October under the auspices of the Personal Communications Industry Association, focusing on PCS in particular.

49. Due to the concerns about technical and financial feasibility expressed by manufacturers and communications service providers, we tentatively conclude that compliance with any ALI requirement should be implemented in three steps. Under this approach, as a first step, wireless service providers would be required to design their systems so that the location of the base station or cell site receiving a 911 call from a mobile unit is relayed to the PSAP. If the base station or cell site employs a sectorized antenna, the information relayed to the PSAP would have to indicate the sector that received the call. We seek comment on our proposal that wireless base stations be capable, within one year after the effective date of the order adopting rules in this proceeding, to route 911 calls with sufficient location

information to permit connection of the mobile station to the PSAP closest to the mobile caller.<sup>51</sup> It appears that this limited ALI information, at a minimum, should indicate the location of the base station receiving the 911 call and, if sectorized antennas are employed, the direction (sector) of the mobile unit from the base station or cell site. We seek comment on this analysis, and on the means of transmitting this information to the PSAP, *i.e.*, network elements, information protocol standards, location information updates, and speed of transmission. Compatibility seems to require that these features be passed through the PSTN to the PSAP in a manner and format capable of being used by those facilities. We seek comment on whether the proposed rule allows licensees and equipment manufacturers sufficient time to develop these features, and on the technical and cost considerations involved in implementation.

50. In the second stage, the associated base station or cell site should be capable of relaying more precise information. Specifically, we propose to require that, three years after the effective date of the order adopting rules in this proceeding, the ALI information provided to the PSAP must include an estimate of the approximate location and the distance of the mobile unit from the receiving base station or cell site, calculated on the basis of the received signal strength or by some other method. If a signal is received by more than one cell site, we assume the site at which the signal is strongest becomes the controlling site for the call. We seek comment on whether this assumption is correct. We ask that commenters address whether more precise location identification requires identification of the cell site only or identification of a specific base station. We seek specific and detailed analysis of the technical and cost considerations involved in such implementation, and of the time provided to licensees and equipment manufacturers to develop these features.

51. In the third phase, we propose to require that, five years after the effective date of the order adopting rules in this proceeding, the mobile station be located in a 3-dimensional environment within a radius of no more than 125 meters. This information should enable the PSAP to assist emergency services personnel by providing a relatively precise location for a 911 caller using a wireless service. Even greater accuracy could be necessary in urban environments to determine the precise location of a caller within a multi-story structure. On the other hand, location information consisting only of latitude and longitude may be sufficient for radio transmitters operating outside of an urban environment. We request comments

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<sup>51</sup> We do not propose to change the implementation date that is adopted in CC Docket No. 92-166 for mobile satellite services position determination information. See note 41, supra.

on the feasibility of this approach both technically and economically, and on whether the rules propose an appropriate time frame for implementation of these features. Commenters should provide detailed and specific analysis of and support for their conclusions. We ask whether more precise location requirements should be specified in the rules. Commenters should provide analysis demonstrating the feasibility of any proposed requirements. Commenters should also provide specific time periods for various industry segments and feasibility analysis if they recommend more rapid phase-in than the three stage approach proposed in this Notice.

52. Re-ring/call back. We request comment on the technical and economic feasibility of wireless services to provide the capability to return calls placed from mobile radio transmitters to a 911 emergency number immediately. We propose to require that, within three years of the effective date of the order adopting rules in this proceeding, wireless systems must provide PSAP attendants with the capability to call back the 911 caller if the call is disconnected.<sup>52</sup> We seek detailed analysis of existing and potential capabilities of wireless services to provide information that permits immediate call back to the mobile user. For example, commenters should indicate whether at present when emergency calls are dialed to 911, the PSAP sees the call as originating from a mobile radio subscriber. It appears that many types of mobile radio units, such as cellular, transmit ANI for subscriber billing purposes, and that this information does not pass to the PSAP.<sup>53</sup> We seek comment on whether the directory number of the mobile unit, the subscriber's billing number, or some other number must be transmitted to the PSAP to provide call back capability, or whether call back to the mobile unit may be accomplished by other means. Ideally, this feature would represent a seamless process whereby any return call from the PSAP is connected directly to the mobile unit that originated the call. We seek comment on the technical feasibility and cost to licensees and equipment manufacturers of implementing immediate call back, and request comment on whether the proposed rule provides sufficient time to develop such a feature.

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<sup>52</sup> This assumes that the mobile radio can receive the return call, e.g., the mobile user has not turned off the mobile unit.

<sup>53</sup> One reason for this blockage for cellular systems has to do with the "roaming" feature of cellular: when outside the home area, a cellular subscriber's seven digit ANI, billing number in this case, is of no use unless it is accompanied by a roaming code, typically requiring 10 digits instead of seven. PSTN switching facilities that process mobile radio calls and PSAP premises equipment would have to be modified in order to receive and use 10 digit numbers.