

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554

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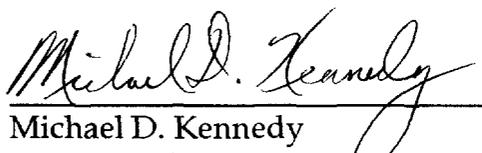
FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

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

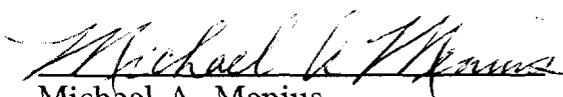
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Motorola, Inc. ("Motorola") is pleased to submit its comments in the proceeding captioned above.

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## EXECUTIVE SUMMARY

Motorola strongly supports the Commission's proposal to ensure enhanced 911 access in the wireless personal communications environment. There are both technological challenges and opportunities associated with the process of making enhanced 911 services accessible to CMRS users. It would be a mistake to attempt to clone the "wired" version of E-911 service into the mobile environment. This would deprive public safety providers and the public of technological innovations which will be available uniquely through evolving wireless communications.

The Commission's proposal appropriately applies to real time voice services within the Commercial Mobile Radio Services category. Other groups such as paging, mobile satellite service, and private mobile services should be excluded: they are technologically distinguishable from those services where enhanced 911 communications are typically made. There are, however, some gray areas within the definition of "CMRS" which create unintended and undesirable consequences in this proceeding: specifically, small SMR systems should also be excluded from the proposal, as is discussed in more detail below.

Motorola proposes an action plan which builds on the work already in progress within industry working groups and standards bodies. This is the most expeditious route to making E-911 access a reality. This approach is an alternative to pre-judging the outcome by specifying in advance what should be the location capabilities and other features of wireless E-911. The latter approach also runs the risk of forcing poor technology choices, making it necessary to remove and replace infrastructure, and causing delays in the availability of E-911 access nationwide. Poor implementation also runs the risk of a public expectation that wireless E-911 will provide information which it cannot in fact provide - or worse yet, inaccurate information.

The wireless industry should develop (and is fully equipped to do so) a "location subsystem interface" standard. This standard will allow an overlay location subsystem to interface into the developing wireless intelligent

network. Operators would then have the alternative of providing 911 location capability either by integration into their current wireless infrastructure or by an overlay subsystem provided by a third party equipment provider.

Motorola's discussion of technical issues includes various time periods. These are good faith estimates only and should not be construed as deadlines which should be mandated.

Motorola supports federal preemption which would permit PSAPs to receive 911 information in a common format from wireless service providers nationwide. This preemption must be combined with the development of industry standards for a common 911 network.

Equipment labeling requirements should not be mixed into the implementation of E-911 access. This process is not an add-on to a handset or a base station. Instead, systemwide modifications will be involved, also including PSAPs and even the wired PSTN. Compliance with E-911 access policies is not a part of the equipment approval process.

## INTRODUCTION

Motorola strongly supports the Commission's proposal to ensure enhanced 911 access in the wireless personal communications environment. Indeed, Motorola has long been a pioneer dedicated to the growth of public safety communications.

When a member of the public makes a 911 call, he or she taps into a remarkable network of public safety communications. Motorola has for years been the leader in providing the radio communications path from a public safety dispatcher to the field officer providing emergency assistance: two-way radios, communications control centers, mobile data terminals, trunking, automatic vehicle location, secure voice encryption, etc. With Enhanced 911 systems, we are also able to include the important link from the individual

calling for help - all the way through the emergency response and incident conclusion.

End-to-end communications has been the key to meeting the needs of public safety providers and the served public. Motorola's leadership role as a public safety equipment supplier has been due to the integration of all aspects of the communications process. The same challenge will present itself in implementing E-911 access in the wireless environment. Motorola's extensive cellular, SMR and PCS technology (in both infrastructure and subscriber equipment), coupled with our public safety communications experience provides in-depth knowledge which is pertinent to this proceeding.

Equipment development is only one aspect of providing public safety communications capabilities. For years, Motorola has also participated in industry activities which give definition to these vital public safety services: standards activities within TIA, APCO and PCIA; nationwide numbering functions within the National Emergency Number Association, etc.

The advent of PCS and of wireless 911 provide additional opportunities for Motorola to be an industry pioneer in public safety communications. We actively participate in cooperative efforts with the FCC, APCO, PCIA, CTIA, TIA, NENA and other organizations. We actively support the industry standards process toward providing wireless users access to public safety assistance.

While is always easy to issue a symbolic "yes" to public safety issues, it is not always easy to deliver a reliable cost effective solution. The latter challenge will require the best talent and energies from the wireless, wireline and public safety communities.

**I. IT IS NEITHER APPROPRIATE NOR EVEN FEASIBLE TO "CLONE" THE PRESENT WIRELINE E-911 ACCESS MODEL INTO THE MOBILE ENVIRONMENT.**

Rather than seeking to develop the ". . . equivalent to dialing 911 from a wireline telephone . . ." (as expressed in the NPRM, at paragraph 34), it will be necessary to examine and utilize the features and capabilities of cellular, PCS and other CMRS systems. These features are often unique and distinguishable from wireline capabilities. Current E-911 access methods which were implemented around wireline-based technologies may not always be mirrored precisely in wireless E-911 access. Moreover, mobile E-911 access involves formidable technical challenges, as discussed below.

PCS and other commercial mobile radio services are still in a dynamic mode, not fully defined. This is particularly the case involving how these systems will access enhanced 911 services. Much standards work and testing will be required before it will be clear how these systems will be implemented across networks and systems which utilize perhaps several different technologies.

It is too early to pre-judge these issues by selecting particular technologies or specifying detailed performance requirements. The one thing which is clear, however, is that whatever variation(s) of E-911 access become available in the mobile environment, they will not be copies of the wireline versions of E-911 service.

It is therefore essential to develop a procedure which allows the industry, in the most expeditious possible manner, to address these wireless-technology-based issues and develop solutions which are not yet in place.

**II. REAL-TIME VOICE SERVICE OVER CMRS IS THE APPROPRIATE CATEGORY FOR E-911 ACCESS.**

Motorola supports generally the Commission's proposal to impose compatibility requirements for mobile E-911 access on those features most

closely resembling traditional 911 services. In general, the category of real-time voice service over the commercial voice radio services appears appropriate. As discussed below, however, there are some members of this category for whom the compatibility requirements are not appropriate.

**II(A). PAGING SHOULD BE EXCLUDED.**

Motorola supports the exclusion of one-way paging from the compatibility requirements. Paging users clearly have no expectation of making a 911 call. The one-way pager is a receive only device which is incapable of initiating a telephone call.

Newer and future forms of paging, frequently referred to as "advanced messaging" should similarly be excluded. One form of advanced messaging based on two-way paging provides only data communications services which is clearly unrelated to access to real time voice. A second form of advanced messaging utilizing two-way paging provides voice messaging. However, this voice messaging is outbound only (to the pager only) and is again unrelated to access to real time voice. Furthermore, the pager is incapable of originating a telephone call into the public switched telephone network.

Some of the distinguishing characteristics of two-way voice paging should be enumerated. There is no subscriber keypad on the pager for dialing telephone numbers (including 911). The pager contains no microphone, so voice communications from the paging subscriber is not an option. Moreover, the air interface has not been designed to allow transmission of voice messages from the pager. The infrastructure typically only receives incoming calls, and those are not from the paging subscriber but rather from wire and wireless parties wishing to send a voice message to a paging subscriber. Therefore, a two way voice pager is not a suitable class of mobile radio for origination of a telephone call or duplex voice communications.

In summary, the category of "real-time voice communications" should not be erroneously construed to include forms of advanced messaging. Clarification of the scope of the definition would help eliminate any potential confusion. We recommend the following clarification:

“The categories of mobile radio services that might be subject to compatibility requirements with enhanced 911 services are those offering the capability of the user to originate a telephone call into the public switched telephone network with access to duplex, real-time voice services.”

Similarly, personal digital assistants (PDA's) should be excluded from E-911 compatibility requirements. While these devices incorporate two-way messaging, they have no data or voice real time voice capability (as is the case with advanced messaging), which is essential to the E-911 vision. Instead, all communications are digitized, stored, and forwarded to the infrastructure.

**II(B). PRIVATE MOBILE RADIO SYSTEMS SHOULD BE EXCLUDED.**

Motorola supports the Commission's conclusion to exclude private mobile systems from the compatibility requirements. Private Mobile Radio (PMR) systems' primary and often sole function is dispatch communications, that is, one-to-one or one-to-many communications between an identified group of individuals. PMR systems provide management of mobile resources under the control of a central dispatcher for public safety, transportation, business and industrial operations. One of the primary functions of two-way radio dispatch is emergency response. This is true not only for public safety but likewise transportation, utility, business and industrial operations. Procedures are established and personnel pre-assigned to respond to emergency situations. In fact, modern computer managed two-way radio systems are able to dynamically regroup pre-assigned personnel to establish a communications network for these emergency responders. The first and most immediate response capability is the fleet dispatcher who is best able to make an immediate determination as to what resources are required to respond to an emergency and whether they are available either within or outside the operation. The dispatcher is likewise responsible for requesting and directing outside assistance to the emergency location.

In contrast, telephone interconnect, while available in many two-way radio systems is an ancillary function with access limited to key supervisory personnel who require occasional communications with individuals outside their fleet. Telephone calls are not given priority access and in fact are either limited or eliminated during period of heavy dispatch traffic.

Two-way radio users first call for assistance would be their dispatcher, not 911. It is interesting to note that all emergency responders to 911 calls are themselves equipped with two-way radio to help ensure immediate response to the emergency. If the first responder determines that additional resources are required, the request is again directed to the dispatcher through the PMR system.

Ensuring that PMR systems are compatible with enhanced 911 emergency calling system would require significant redesign of both the radio system and the telephone interconnect switch, thereby adding considerable cost and complexity to the system. It would add no additional response capability and in fact would probably compromise and delay the first priority emergency response through the dispatcher. The Commission should continue to support its initial proposal, that is, that 911 compatibility rules should not be applied to any PMRS.

**II(C). LOCAL AREA SMRS SHOULD BE EXCLUDED.**

Motorola supports generally the CMRS category as appropriate for inclusion in the compatibility requirements to make E-911 calls. There is, however, one category within CMRS which is not appropriate for inclusion: local area trunked SMRs. These systems' primary function has and continues to be one-to-one and one-to-many dispatch communications. Telephone interconnect was made available over the past years on many trunked SMRs but only as an ancillary function. Its use within fleet operations is usually limited to key supervisory personnel who have a need to contact individuals within the public switched telephone network and outside their fleet operation.

Telephone interconnect messages are generally longer in duration than dispatch and can present a significant load to the trunked SMR system. Trunked SMRs often provide priority access for dispatch calls and correspondingly either limit or in fact eliminate telephone interconnect access during busy hours. However, SMR switches only provide the basic telephone interconnect functions and do not have the capabilities to support the functions and features of landline central office switches or even those provided by cellular systems.

While Motorola SMR trunked systems utilize a dedicated signaling/control channel, others do not and instead dedicate all channels to support voice traffic during busy periods. The latter systems cannot provide a priority access for emergency calls.

One of the primary functions of two-way radio dispatch is emergency response. Procedures are established and personnel pre-assigned to respond to emergency situations. The first and most immediate emergency response capability is the fleet dispatcher supported by mobile resources within the fleet. If additional emergency responders are required, the fleet dispatcher is best able to make that determination and to place the required calls including 911 to obtain that assistance.

Ensuring that local area interconnected trunked systems are compatible with enhanced 911 emergency calling systems would require significant redesign of both the trunking systems and the telephone interconnect equipment, thereby adding considerable cost and complexity to the system (even without addressing mobile unit location). It could also compromise the first priority emergency dispatch response. Most SMR operators would undoubtedly opt to eliminate telephone interconnect if they were required to comply, especially since this requirement simply adds cost without enhancing the overall emergency response capability.

The Commission during past Commercial Mobile Radio Service (CMRS) proceedings stated that it would look to further forbearance for small local area CMRS operators so as not to penalize them with all the requirements of CMRS as they might apply to cellular, PCS and wide-area

SMRs. This proceedings provides the Commission with such an opportunity without negatively impacting on public emergency response. In fact, maintaining a viable local area SMR dispatch capability will actually enhance emergency response and disaster recovery for the American public.

**II(D). MOBILE SATELLITE SERVICE SHOULD BE EXCLUDED.**

Motorola strongly urges that non-geostationary Mobile Satellite Service (MSS) should not be required to meet compatibility requirements for enhanced 911 features. In the NPRM, at paragraph 38, the Commission proposes to exclude only Non-Voice, Non-Geostationary MSS. This language is typically used to refer uniquely to "Little LEO" (Low Earth Orbit data-only MSS) systems licensed in bands below 1 GHz rather than the full voice and data services licensed to "Big LEO" MSS above 1 GHz. Although in many cases these systems will be capable of providing E-911 services, there are, however, very compelling reasons for not including these latter services within the scope of this proceeding.

MSS systems are already well on the way toward designing and implementing an infrastructure which includes emergency communications capabilities. For example, an IRIDIUM subscriber within the United States will be able to make a "911" call, although the entire range of enhanced 911 features may not be available.<sup>1</sup> These emergency messaging capabilities are understandably designed to function within a global environment, which differs in many key aspects from the domestic environment served by PSAPs within the United States.

In the case of Motorola's IRIDIUM System, for example, MSS service will be based on Location Area Codes (LACs). A LAC is an area of the Earth's surface typically belonging to a single geopolitical entity. A LAC may be as

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<sup>1</sup> It should be noted that a non-domestic IRIDIUM subscriber roaming within the United States may not have the capability to make a 911 call while in the U. S. Some countries do not use "911" as the code for emergency calls. For subscribers in such countries, IRIDIUM handsets are programmed for making the appropriately coded call.

large as 150 miles square in the United States. This location capability is considerably less precise than that which is contemplated in the NPRM, but in the global context it provides a remarkably localized amount of coverage in the formidable task of offering service potentially to every country and region in the world.

Not only are users located on the basis of their LAC, but MSS systems such as IRIDIUM also route calls on a LAC basis, so the ability of PSAPs to receive calls within their jurisdiction is not currently a deliverable feature over MSS. The LACs are not broken down to select the myriad jurisdictions within a LAC. Similarly, the ability to transfer the caller to the "appropriate PSAP" has a different meaning within the MSS context, where the 911 call would be routed to the PSAP which is designated to serve the LAC identified for the caller. This designated PSAP would not necessarily be the closest PSAP to the caller at the time when the emergency call is placed.

Changes to the call processing and routing capabilities of the IRIDIUM system would involve significant system redesign which, at this juncture, would be extremely difficult to implement from both a technical and business standpoint. In this connection, it must be borne in mind that the IRIDIUM System is already well beyond the design stage. Construction of the system has already begun pursuant to waiver authority and will continue on a fast pace upon the issuance of construction permits later this month<sup>2</sup> so that Motorola can meet its schedule of beginning launch activities next year and initiating service in 1998. Thus, any system design changes that would be necessitated by a requirement to provide certain 911 features would not only have serious financial and contractual ramifications for Motorola and presumably other MSS licensees, but would also delay the availability of MSS in the U. S. as well as countries around the world, countries which would in many cases receive no benefit from the system redesigns, since many of these countries have no equivalent E-911 infrastructure in place. Indeed, many

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<sup>2</sup> See Report and Order, CC Docket No. 92-166, 59 Fed. Reg. 53,294 (Oct. 21, 1994) at paras. 39 and 80 ("Given the national and other public interest benefits of ensuring the United States' global leadership in providing these important new satellite services, we also plan to process these applications on an expedited basis, with action anticipated by January 31, 1995").

lesser developed countries have little or no communications infrastructures of any kind and, thus, are expected to rely heavily on MSS systems. Thus, it would be a sad irony if the ability of many people around the world to make even a simple emergency call were delayed in the interest of implementing enhanced E-911 capabilities in the United States. Even insofar as the U.S. is concerned, delaying the introduction of MSS for this purpose would not serve the public interest because these satellite systems are expected to provide the only available means of communication in many emergency situations taking place in remote areas.

There are other features which are typically part of a fully enhanced 911 access model but which are not currently part of the MSS scheme for global emergency communications service. For example, the ability to hold the line for trace is not supported in the current IRIDIUM network design. Nor is the ability to call the party back after disconnection currently included. The calling party number is supplied to the gateway operator only. Switch modifications may be required to pass calling party ID to the PSAP. On MSS systems, subscribers also have the option to choose certain service features which may in fact make it impossible to call back after disconnection. Examples are call forwarding, blocking of all incoming calls, closed user group, etc.

It is important to bear in mind that Big LEO MSS service will offer a different mix of features and services from terrestrial wireless mobile communications developing domestically within the United States. This is true for emergency communications as well as other service offerings. Emergency communications over MSS must be flexible enough to respond to the emergency communications needs over oceans as well as a host of individual countries and political entities.

There is no international standard for E-911, so the satellite gateway portion of MSS systems will interface with a variety of infrastructures designed to provide emergency communications around the world. In fact, the code "911" is itself not a global standard. It is precisely because of this lack of global standardization that it is premature (and perhaps inappropriate) to impose the domestic E-911 scheme on global MSS.

The appropriate course to follow in this proceeding is to impose compatibility requirements on terrestrial forms of real-time CMRS and to specifically exclude Big LEO MSS systems. At some point in the future, when terrestrial CMRS systems have fully defined their E-911 access features, it may be appropriate to examine the interface between these systems and global MSS systems. At that time, the industry and the Commission should work together to select those features which may be appropriate to incorporate into future generations of MSS systems.

**III. MOTOROLA PROPOSES AN ACTION PLAN AS AN ALTERNATIVE TO THE PHASED IMPLEMENTATION PROPOSAL IN THE NPRM.**

Although the phased implementation proposal appears to effectuate a step-by-step implementation of E-911 in the mobile environment, Motorola cautions that it may in fact have the opposite effect. The Phase 2 requirements of providing direction and distance information within 3 years may confuse the issue and may divert attention and resources from development of the requirements called for in Phase 3, to be in place within 5 years. Moreover, Phase 3 may be in place sooner if Phase 2 is not mandated.

The following discussion focuses specifically on the three phases of the proposed implementation.

**III(A). PHASE I**

As a first step, the NPRM proposes 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." (paragraph 49, NPRM) It is to be noted that the geographically closest PSAP may not always be the most appropriate PSAP. Selective routers perform the function of making this important choice.

While Motorola supports the FCC initiative to establish E-911 service in the most expeditious manner, time to achieve agreement on network protocols, as well as industry design cycles, will make industry implementation within one year difficult to achieve. In addition, the provision of location information will limit other capabilities. In current networks, selective routers are used to send the Automatic Number Identification (ANI) from the switch to the PSAP. ANIs are currently limited to seven digits. Pseudo ANIs (pANIs) can be developed which provide basic location information (cell, sector) in the seven available digits. However, the seven digit limitation will preclude the sending of both location, in the form of a pANI, and a call back number, in the form of the mobile ANI.

To establish first phase 911 service with basic location information, PSAP and Wireless Switch suppliers would need to develop new software versions to support the use of pANI with E-911, a process which can take 12 to 15 months. Then suppliers, operators, and PSAPs would perform compatibility testing, requiring approximately 3 months of effort. Nationwide roll out would require Switch Supplier support to define system unique data for every wireless market, a cycle which would require 12 months to be complete, for a total elapsed time of 27 to 30 months.

### **III(B).        PHASE II**

As a second stage of implementation, the NPRM proposes to require that ". . . approximate location and the distance of the mobile unit from the receiving base station or cell site . . ." be provided. (paragraph 50, NPRM)

While the Phase II proposal may appear to be an interim step leading in a logical fashion toward the desired features described in Phase III, it in fact is not a useful mid-point for implementation. Earlier in this proceeding, when industry discussions were taking place, the interim step was informally examined and appeared to be a helpful bridge toward full implementation. On closer examination, however, this does not appear to be the case. Instead, the interim step may prove to be a costly diversion from the third and final step toward 911 access.

Under the second stage proposal, the mobile unit's approximate location and distance from the receiving base station or cell site must be provided to the PSAP. This required information may be calculated on the basis of the received signal strength or by some other method.

There may, however, be a technology disconnect between the second and third stages in the proposal. When 911 access is fully implemented (in the third stage of the proposal), the location and distance from the base station or cell site may be totally irrelevant, depending on what location technologies are employed. For example, the received signal strength may not be used as the means to ascertain the mobile unit's location. Developing the proposed second stage of location technology may be a costly side track, and service providers may find themselves forced to undergo expensive infrastructure modifications to implement the ultimate service features used under the third stage proposal. They should not be required to take such actions solely to comply with an interim stage which may not contribute to the long term solution to mobile 911 access.

Motorola suggests that the Commission should eliminate the second stage proposal, going directly from the first stage (as discussed above) to the implementation of the 911 compatibility requirements, as addressed in the third stage of the proposal. Taking this approach will allow all parties to focus directly on the correct technical solutions and the complex challenges which must be overcome.

### **III(C).        PHASE III**

In the third stage, the FCC proposes to require that "the mobile station be located in a 3-dimensional environment within a radius of no more than 125 meters." (paragraph 51, NPRM)

Motorola respectfully suggests that the provision of accurate location determination for wireless subscribers will require invention which has not yet been accomplished. Location of handheld stations in the indoor and outdoor urban environment has not been reliably demonstrated. The NPRM makes reference to a "Survey of Location Technologies to Support Mobile 9-1-

1," conducted by C. J Driscoll & Associates." (paragraph 47, NPRM) The Driscoll paper on location technologies is in fact exactly what its title indicates, a survey. It makes no claims that any of these surveyed technologies have carried out feasibility studies to demonstrate whether they would be suitable overlays on wireless systems. It would be factually incorrect to assume, based on the Driscoll survey, that there is currently available a variety of tested location technologies which would function in a mobile environment.

AT&T has recently provided a more real-world assessment of the current limitations in location technologies. See AT&T, "Radio Direction Finding of Mobile/Portable Wireless Devices," March 21, 1994, submission to PCIA's Emergency Access Task Force, Document Number TE/94-4-15/519. The AT&T contribution examines the "state of the art in direction finding available to the commercial world."

Two fundamental system designs were considered. In each case, AT&T concludes either that serious technical limitations exist or much additional developmental effort will be required. First, in the case of Global Positioning Systems (GPS), there are areas where operation is marginal for this E-911 application (despite the overall robustness of GPS technology in general). Significant to this proceeding is the following: within cities, inside buildings, and on hilly terrain, GPS is not useful for wireless terminals. Second, using the inherent location capabilities of handheld personal communications device-based systems, mobile units can sometimes be located to within a 1,000 foot radius, but radio propagation effects and multipath interference will sometimes cause significant errors involving several miles. Within buildings, use of PCS for location will be feasible only when PCS base stations are deployed ubiquitously every 50 to 200 feet.

The AT&T submission concludes: "More work is needed to determine if the commercial direction finding equipment works as easily as claimed. Some real world tests are necessary in areas where radio propagation and multipath effects are known to cause problems as well as in suburbs where it should be easier to find a wireless terminal. . . PCS systems can and will support 911 services to the best of their ability. The precise location

information currently available in wireline 911 service is not yet technically feasible." paragraph 9, AT&T contribution (emphasis supplied)

In addition, the diversity of air interface technologies (AMPS, NAMPS, TDMA, CDMA, DCS, MIRS, WACS, etc. likely to be deployed at either 800 MHz or 1900 MHz) makes the provision of reliable E911 service to all mobile users a complex problem. The AT&T contribution points out that the digital modulation schemes, as well as the low power outputs proposed for PCS, do not lend themselves to easy tracking by direction finding equipment installed on vehicles or carried by personnel. No independent body has tested the reliability and accuracy of the proposed commercial wireless locating technologies as they would be used in this application.

Finally, there are many other technological challenges, which are addressed in more detail below (see discussion of call priority, re-ring and call back, Federal preemption, and availability).

#### IV. AN ACTION PLAN: "LOCATION SUBSYSTEM INTERFACE"

Any advanced location capability, either integrated or overlay, will require development of industry standards as well as product/system development. At this point, it is premature to specify either detailed performance requirements or time frames for compliance.

Motorola emphasizes, however, the need for expeditious action to implement E-911 access, and proposes an action plan which will enable the industry to move forward without waiting for all technical issues to be resolved.

To speed the effort, it is recommended that the wireless industry review the possibility of development of a "location subsystem interface" standard. This interface would allow an overlay location subsystem to interface into the developing wireless intelligent network. Wireless system operators would then have the alternative of providing 911 location capability either by integration into their current wireless infrastructure or by an overlay subsystem provided by a third party equipment provider.

This action plan proposal builds upon the efforts already underway within the industry. For example, APCO, NASNA and PCIA are already coordinating their efforts to assist standards bodies in developing appropriate standards for mobile 911 access. The TR45 Joint Experts Meeting (JEM) on Public 800 Mobile and Personal Communications Support of 911 Emergency Service, has been completed and the resulting JEM Report was published on October 11, 1994. This report includes specific recommendations for follow-up standards development, identifies air interface issues to be raised, and recommends a numbering plan. On November 18, 1994, a second JEM report was published, the "Wireless Support of 9-1-1 and Enhanced 9-1-1 Services Report," sponsored jointly by APCO, NASNA, NENA, PCIA, TIA and T1P1..

These reports have been forwarded to the FCC as well as to the participating industry groups and wireless system operators. Together, they represent the implementation efforts which have already taken place. These documents also constitute the road map for upcoming standards work, assigning particular tasks to appropriate technical working groups.

Motorola strongly supports that the Commission's phased implementation plan should be keyed to these critical processes now being addressed within the industry bodies. These activities will identify the key features (such as location capabilities and others) which must be selected and implemented. These activities will also identify realistic timetables for standards work, field testing, accuracy verification, equipment development, and implementation. These activities will also resolve many of the difficult technical challenges which were raised in the NPRM. Motorola suggests that, until these industry bodies have accomplished their work, it will not be in the public interest to set arbitrary dates for wireless location implementation.

#### IV(A). RELIABILITY CONSIDERATIONS

In the NPRM, the Phase III location requirements are expressed in terms of geographic coordinates. Any performance requirements which are ultimately adopted should also include the factor of reliability. Motorola suggests that any reliability standard above 60 per cent would create

unrealistic expectations in a wireless environment. This is true, not only for the many technological limitations described in the AT&T contribution, but also because of the unique aspects of the mobile environment: calls are frequently made in a rapidly changing situation where the user is no longer situated where the emergency originally occurred. For example, an explosion at a refinery would generate calls all over a metropolitan area. Another example would be many vehicular users driving past an accident. In either case, the high volume of calls could create delays in response by the appropriate PSAP, and there could be confusion as to the actual nature and location of the accident itself (as distinguished from the location of the caller).

As an alternative to the proposed location requirements, Motorola suggests the minimal requirement that calls be able to be located within 125 meters in three dimensions, and with no better than 60% reliability.

#### **IV(B). "TIME STAMP" CONSIDERATIONS**

The dimension of time is also an important aspect of 911 calls from mobile users. Motorola notes that the industry has recommended including a time stamp feature as an integral part of the location information transferred from the mobile user to the PSAPs. The time information comes not from the mobile unit but from the cellular or adjunct system. While the Commission may not need to mandate this as part of the current proceeding, industry participants may wish to include the time dimension as part of the process.

#### **V. TECHNOLOGY ISSUES**

The NPRM requests comment on a number of technology-related issues concerning E-911 access. These issues relate in general to system design, calling features, etc. Motorola offers the following discussion of these issues.

**V(A). FEDERAL PREEMPTION**

The NPRM indicates that its proposal to impose uniform requirements for compatibility of enhanced 911 systems with wireline equipment and wireless services to be consistent with the Commission's responsibility, set forth in the Communications Act, to promote safety of life and property. The Notice further affirms the Commission's authority to preempt inconsistent state regulation which affects interstate service.

Motorola supports the proposal that uniform 911 standards be established across the nation for 911 networks. In particular, we support uniform network standards for pANI, wireless switch to ANI database links, and common channel signaling or other signaling network alternatives. PSAPs should be able to receive 911 information in a common format from wireless service providers nationwide. We support the execution of FCC authority to preempt state regulation in this matter, and the development of industry standards for a common 911 network.

**V(B). RE-RING / CALL BACK**

The NPRM proposes to require that, within 3 years of the effective date of the order adopting rules within this proceeding, wireless systems must provide PSAP attendants with the capability to call back the 911 caller if the call is disconnected. Comment is requested on the technical and economic feasibility of the proposal. paragraph 52, NPRM.

Motorola supports the development of solutions to provide call back capability. The difficulty is in accomplishing this without compromising the preceding requirement for routing to the most appropriate PSAP based on serving cell and sector information. Today's Centralized Automatic Messaging Accounting (CAMA) signaling interface to the PSAP via an E911 Tandem Selective Router cannot readily support both the routing capability and the delivery of the mobile ID. Several methods have been proposed to work around this constraint but many separate problems need to be addressed. Based on the need to define, standardize, design and implement

the required new interface (or interfaces), we believe the initial capability would be difficult to provide within the 3 years specified.

The AMPS cellular air interface protocol recognizes the innate independence of the mobile and the tenuous control available to the cellular switch in maintaining a connection with a mobile that has stopped transmitting. This removes the possibility of retaining 911 called party control as it exists in the wireline network. It does not, however, prevent the cellular switch from attempting to re-initiate a call to the calling mobile in response to a re-ring signal from the PSAP if standard called party control and re-ring features were developed for the cellular switch. These are quite complex features to develop, however, and they would only work as long as the PSAP maintained its hold on the connection. Once the PSAP dropped the disconnected, the PSAP would still be without knowledge of the mobile ID for later call back capability.

The calling mobile ID could be provided over several different proposed interfaces. Given an interface to the PSAP that allows delivery of the calling mobile number (10 digits is required for multiple local area codes or roaming mobiles), the following is a discussion of some of the operational difficulties which must be handled to provide call back capability using the mobile ID in a variety of cases:

1. Call back capability for service-initialized local mobiles with standard directory numbers can be provided in a straight forward manner by dialing the mobile number over the standard telephone network. Special capabilities would have to be provided to call mobiles whose service profile normally prevents them from receiving incoming calls. Mobiles with non-standard numbers might require treatment like non-home mobiles.
2. Non-home service-initialized mobiles can be dialed over the national telephone network only if they are valid roaming mobiles with standard national directory numbers and subscribe to a "follow-me" roaming service used by the local cellular service provider. For other cases, the mobile ID can be provided directly by DTMF to the specific cellular service provider associated with the caller. To recognize the PSAPs need to call the mobile

without requiring the normal validation and to bypass incompatible service profiles, a dedicated connection (or a new password security feature) would be required between the PSAP and the mobile switching center.

3. Non-service initialized mobiles (which may appear to be either roaming mobiles or invalid home mobiles) may not have a dialable number; i. e., 111-111-1111 for example. The PSAP may be required to specify which ESN was intended to receive the call-back page so that the correct mobile might be selected from the multiple responses.

**V(C). 911 AVAILABILITY**

The NPRM proposes to require that, within one year of the effective date of the order adopting rules in this proceeding, a dialing feature be available whereby wireless users would have the ability to reach emergency services from any "service initialized" mobile radio handset in a home service area or a subscribed-to roamer service by dialing only 911. Under this proposal, no user validation would be required for such calls.

Motorola supports the proposal for 911 availability. The process of service initialization is the only method available to install the desired unique call back number. The NPRM makes the appropriate distinction between calls from users who are legitimately a part of the system (and have an expectation of receiving mobile service, including 911 availability), and attempted calls from individuals who may be in possession of a subscriber handset but are not matriculated into a particular service provider's infrastructure.

Motorola also understands fully the policy rationale for the NPRM's proposal not to require user validation for roamer units making 911 calls. In some cases, the automatic user validation process could consume precious time needed more critically to obtain emergency assistance. In cases where the validation process is not successfully completed (for whatever reason), the roamer could be denied service until the request for validation is repeated and successfully completed. In lieu of automatic validation, when it is not

available, manual validation or registration is frequently employed. Even when the validation is successful the first time, delays may be involved before the 911 call is passed through to the PSAP.

The dilemma is that, from a system design standpoint, a non-service initialized mobile unit is indistinguishable from a service initialized mobile unit until the validation process distinguishes between them. In each case, the cellular system uses the same user validation process. The system can be designed to provide one of two options: either to employ user validation in both cases or in neither. It is not possible, however, to do one and not the other.

If all roamer 911 calls are to be permitted without user validation, then the cellular system's user validation process must be suspended across the board. Hence it will not be possible to deny 911 access to non-service initialized mobiles.

Motorola can provide the operator the option, on calls to specified emergency numbers, of: a) serving all mobiles capable of operating within the air interface protocol or; b) serving only those mobiles that can be service validated.

The 911 availability issue involves a balancing of several desirable policy objectives. The Commission should obtain the input of all parties in assessing the relative merits of these somewhat competing objectives.

V(D).            911 CALL PRIORITY

The NPRM proposes to require that, within one year after the effective date of the order adopting rules within this proceeding, originating 911 calls must be assigned priority over non-emergency service calls. Interruption of calls in progress would not be required.

Motorola supports the proposal to provide priority to calls destined to predetermined emergency numbers ("911" being the most notable such