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

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket No. 94-102
to Ensure Compatibility with E9-1-1	)	RM-8143
Emergency Calling Systems	)	

REPLY OF NENA, APCO AND NASNA

The National Emergency Number Association ("NENA"), the Association of Public-Safety Communications Officials International, Inc. ("APCO") and the National Association of State Nine-One-One Administrators ("NASNA") -- hereafter "Joint Commenters" -- reply to the comments of others responding to the FCC's Public Notice, DA 98-1936, released September 22, 1998. The Notice presented the proposal of the Ad Hoc Alliance for Public Access to 911 ("Alliance"), dated September 17, 1998, that new analog cellular handsets be equipped "to select automatically the strongest available compatible channel of communication" for completing 9-1-1 emergency calls "if the signal from the user's provider is 'inadequate' at the time a 911 call is placed."

Prior to filing the proposal, Alliance had shared it with the Joint Commenters, who earlier had jointly expressed serious reservations about choosing channels for emergency communications based on "strongest signal."[1] In letters of September 21 and 22, 1998, the three public safety

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[1] "Public Safety Response to the Alliance Trott Report," *ex parte* communication of February 23, 1998.

organizations acknowledged as useful Alliance's recognition that 9-1-1 calls could be completed on channels that were adequate without being comparatively "strongest." They deferred comment on the specific technical means by which adequate emergency communications should be evaluated, but all recommended review by appropriate standards bodies.

Most of the comments responding to the new Alliance proposal are negative for one or more of the following reasons: (1) It continues to rely on selection of a strongest signal if the initial choice of channel is inadequate; (2) signal strength or signal level is not reliable as a single predictor of adequate communications; (3) a better method, "automatic A/B roaming," already has been supported by the Telecommunications Industry Association ("TIA") and is available for prompt implementation; (4) whereas the Alliance proposal involves technology which (a) is proprietary (patented) and (b) would require additional standards review even if available; and (5) in any event, it is not clear that present methods of completing cellular calls to 9-1-1 are inadequate.

After reviewing the entire docket record on this issue, dating back three years, we believe that Alliance and its commissioned engineering firm, Trott Communications, have failed to make the case for a strongest signal approach, even with an "adequate signal" threshold. That approach, in either version, relies on measuring the signal level of forward control channels as the best predictor for assigning a successful voice path. To the contrary, our experience with public safety radio suggests that the weakest communications links are the reverse paths -- from mobile and portable units in the field to fixed base stations. On that basis, we have supported the TIA automatic A/B roaming ("A/B") solution because it considers all the elements of call set-up, not just the signal level of the forward control

channel.[2]

While Alliance did not view the A/B solution as a substitute for its own strongest-signal proposal, it agreed with the other parties to the 1997 E911 Status Report that installing A/B programming in new cellular handsets would be an improvement. NENA believes it is time to make that recommendation a requirement, and to go one major step farther. Automatic A/B roaming should be applied to the analog component of all new handsets with digital and 800 MHz cellular analog capability, not just pure analog handsets.

Brief Technical Overview

As Trott Communications correctly points out in its paper of August 19, 1998 ("Trott Paper") accompanying the latest Alliance proposal, any cellular call involves four communications paths, a forward and a reverse control channel and a forward and reverse voice channel. The four are described as follows in ANSI/TIA/EIA 553-A**:**

Forward Control Channel. A control channel used from a base station to a mobile station.

Reverse Control Channel. The control channel used from a mobile station to a base station.

Forward Voice Channel. A voice channel used from a base station to a mobile station.

Reverse Voice Channel. The voice channel used from a mobile station to a base station.

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[2] Note 1, *supra*. *See also*, 1997 E911 Annual Joint Status Report, January 30, 1998, Appendix A, where the term "A over B or B over A logic" was used.

Forward control channels are constantly broadcast. Over-simplified, a cellular call is completed when the mobile station signals the base station that it wishes to attempt a call. If the reverse control channel signal is received, the system will establish the forward voice channel. The actual conversation then proceeds on the reverse voice channel.

As with its prior "strongest signal" proposal, the new Alliance plan uses the signal strength of the forward control channel as the primary indicator of an adequate voice channel.[3] This is not supported by common engineering knowledge and practice. Wireless engineers understand that an adequate voice channel is the result of a complex interplay of transmission equipment, processing equipment, and handset equipment. The Alliance proposal focuses only on the handset, and (a) scans and measures the 21 forward control frequencies on the A side and stores the strongest channel; (b) scans and selects the strongest frequency on the 21 B-side forward control channels, (c) compares the strongest A and B forward control channels, (d) selects the stronger of the two, and (e) attempts to establish a voice channel.[4] This proposal is described in more detail in United States Patent No. 5,465,388 issued to Robert G. Zicker ("Zicker patent") and, according to Trott, adds at least two seconds to the call set-up time.

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[3] In the initial call attempt on the preferred carrier, Trott recommends that all four communications paths, including the forward control channel, be at a level of -80dBm or higher. If this threshold of adequacy is not met, a search for strongest compatible signal on either preferred or non-preferred carrier ensues. Trott Paper, 4.

[4] The use of "A" or "A side" and "B" or "B side" should not be confused with the cellular frequency blocks A and B, which initially were assigned to non-wireline carriers and wireline-affiliated carriers, respectively. Here, we use "A" as a shorthand for the "preferred carrier" with which the subscriber is enrolled and "B" to designate a compatible non-preferred carrier to which the subscriber would have access.

As noted in our earlier paper on the subject (note 1, *supra*), this process creates a variety of negative effects on public safety ranging from capacity and blocking concerns to disincentives for early installation of Phase II E9-1-1 location systems. That is why the leadership of every national public safety organization opposed the Alliance proposal.

We think it better to exploit the present capability of most analog telephones to (i) scan the preferred (A-side) carrier's 21 control channels, (ii) attempt to set up a voice channel on the strongest channel and, if not possible, (iii) attempt to set up a voice channel on the second-strongest A channel; and (iv) in the event the call cannot be completed, switch to the alternate carrier where the above process is repeated.[5] This is a more effective means to establish an adequate channel, and does not eliminate the carrier which may have a weaker forward control channel but a perfectly useable voice channel.

In other words, upon initiation of a 9-1-1 call, if the mobile station is unable to confirm the initial voice channel (described in Section 2.6.4.2 of the Cellular System Mobile Station-Land Station Compatibility Specification, OET Bulletin No. 53, April 1981), the mobile station should enable or disable the serving-system status as required,[6] then enter the Scan Dedicated Control Channels task (see Sections 2.6.1.1 and 2.6.1.1.1, OET Bulletin No. 53). We propose triggering the override of the selected system based on whether the call actually goes through, and not on the comparative

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[5] Known as "automatic A/B roaming," this sequence is discussed in Attachment 1 of the CTIA's October 7th Comments and is supported by the standard ANSI/TIA/EIA 553.

[6] The problem is that many cellular phones have this feature disabled. The simple solution is to override that disabling in the case of 9-1-1 calls.

signal level of the forward control channel which -- by itself, as stated above -- does not indicate the mobile station and serving system's ability to complete a call.

An additional concern is time to implement. The Alliance proposal presents two issues not present with the A/B solution, both of which will delay its implementation. First, the basic algorithm of the analog handset must be altered and that requires changes in the analog standard. Second, handset manufacturers may be required to use the Zicker patent if the FCC orders the implementation of the Alliance proposal.[7] This could involve lengthy technical and commercial negotiations. By contrast, TIA reports that "Automatic A/B Roaming can be implemented within existing standards and is compatible with present network registration and control procedures and functions." (CTIA Comments, October 7, 1998, Attachment 1)

The Joint Commenters' Expanded Proposal

We hereby propose to the Commission a plan which can be implemented rapidly and which would benefit almost six times the number of wireless subscribers covered by the Alliance proposal and the A/B recommendation in the 1997 E911 Status Report. The A/B recommendation was made under the auspices of the informal Wireless E9-1-1 Implementation Ad Hoc ("WEIAD"), a body convened initially to keep the Commission apprised of the pace of implementation of Section 20.18 of the Rules. As proposed, the installation of automatic A/B programming in new handsets, and the education of consumers on the manual programming of

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[7] TIA complies with ANSI policy, which allows use of patented technical means in a standard if the Formulating Group determines there is a technical reason to do so; but licensed access to the patent must be available on reasonable and non-discriminatory terms.

older units, would have applied only to "purely analog phones." (1997 E911 Status Report, Appendix A)[8]

We propose that the Commission order the implementation of the WEIAD proposal, but apply it to all new handsets[9] that combine digital and 800 MHz analog capability, not just pure analog handsets. As the wireless industry moves to digital, the sales of analog-restricted handsets are declining. Looking at projected analog handset sales over the next three years, we believe the immediate implementation of the expanded NENA proposal could affect a large part of analog handset sales in 1999 and all those in 2000 and 2001. Due to the delays cited above, the Alliance proposal would have a diminishing impact, perhaps none on sales in 1999 or 2000, and few thereafter.

Herschel Shosteck's "Strategic Wireless Communications Seminar" of June 28-July 3, 1998 included a "Summary Forecast of Terminal Sales by 800 MHz Carriers, By Technology, U.S., 1998-2001," that projected analog sales of 8.1 million (1999), 5.9 million (2000) and 4.1 million (2001), or a total of 18.1 million for the three-year period. We believe the Alliance proposal would miss most of the 1999 sales -- even if the Commission ordered the process to begin now.

By comparison, digital handset sales by 800 MHz cellular carriers are growing. The same report predicted they would be:

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8 Similarly, Alliance repeatedly has described its proposals as limited to purely analog cellular telephones.

9 At the same time, users of older phones should be instructed in the manual programming of their units to achieve access to alternate carriers for 9-1-1 calls. NENA would prefer that this occur through the voluntary actions of wireless manufacturers and service providers.

Year	TDMA Sales (800 MHz)	CDMA Sales (800 MHz)	TDMA+CDMA
1999	4,900,000	2,000,000	6,900,000
2000	5,700,000	3,900,000	9,600,000
2001	5,600,000	4,800,000	10,400,000
Total	16,200,000	10,700,000	26,900,000

All of these phones are dual-mode, reverting to analog where there is no digital signal -- but they do not include the growing PCS subscriber base. We know of no estimate of the number of dual-band (800 MHz/1900 MHz) cellular/PCS phones which are expected to be marketed over the same time frame. According to Paul Kagan Associates, Inc., a total of 19.4 million PCS subscribers are expected to be added over 1999-2001.[10] Some significant portion of these will be dual-band handsets. Assuming only 50% of the PCS phones have dual-band capability, that adds another 9.7 million phones to the above, for a total of about 36.6 million handsets. This total rises to 54.7 million when the purely analog handsets are added.

Assuming the validity of the Shosteck analysis, our proposal will positively affect nearly 55 million wireless subscribers in the next three years, whereas the Alliance plan likely would affect closer to 10 million. And, for reasons already stated, the effect of the Alliance plan could be negative.

The Joint Commenters have found no technical reason why the analog component of digital cellular phones cannot also be programmed for the A/B solution. In the previously cited Attachment 1 from CTIA's Comments, the Chair of TIA's Engineering Committee TR 45 states:

> Relative to digital technology, the attachments indicate that the standards support similar capabilities for an

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10 *Wireless Telecom Investor*, February 18, 1998, at 5.

integrated network approach in meeting the requirements for improved 9-1-1 call completion rates.

Accordingly, we propose that all phones (analog and digital) operating in the 800 MHz spectrum be programmed as described above for the greatest possible completion of 9-1-1 calls in the minimum amount of time. This includes dual-band (800/1900 MHz) phones when they operate in the 800 MHz. frequencies.

Other Pending Issues Demand FCC Attention

We join other commenters who have urged the Commission to resolve this one-sided strongest-signal debate so that many critical pending issues can be addressed. These include identifying and locating callers from stations connected to wireline PBXs and other multi-line telephone systems;[11] responding to petitions for further reconsideration of wireless carrier liability questions; and determining whether the FCC should inject itself into negotiations between wireless carriers and 9-1-1 Authorities over the choice of E9-1-1 technical solutions.

CONCLUSION

There is substantial support on this record for adoption of TIA's A/B solution. Only Alliance and ICSA argue for a strongest-signal approach. The first can be implemented promptly, the second only with predictable delay. The first has few if any identified disadvantages. The second risks a multitude of unintended consequences which may actually hinder 9-1-1 call completion and detract from other FCC policies, such as improved wireless

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[11] This issue, raised five years ago by AdComm Engineering and designated RM-8143, predates the wireless component of Docket 94-102. It is the subject of a proposed industry-public safety consensus that has remained unaddressed for over 18 months.

caller location in Phase II and beyond. Better solutions than either of these may yet appear, but the Joint Commenters do not believe we can afford to wait for them. It is time to apply the clearly preferred A/B solution to all new wireless telephone handsets that operate in the analog mode at 800 MHz, when 9-1-1 is dialed. As for older phones, consumers need to be instructed in the manual programming of their handsets to achieve similar access to compatible non-preferred carriers.

Respectfully submitted,

NENA, APCO and NASNA

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