

DOCKET FILE COPY ORIGINAL

Ad Hoc Alliance for Public Access to 911

Alliance for Technology Access•Arizona Consumers League•National Consumers League•World Institute on Disability•National Emergency Number Association-California Chapter•Crime Victims United•Justice for Murder Victims•California Cellular Phone Owners Association•Florida Consumer Fraud Watch•Center for Public Interest Law•Consumer Action•Consumer Coalition of California•Consumers First•California Alliance for Consumer Protection•Californians Against Regulatory Excess•The Office of Communication of the United Church of Christ•Utility Consumer Action Network•Children's Advocacy Institute

EX PARTE OR LATE FILED

May 20, 1998

RECEIVED

MAY 20 1998

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

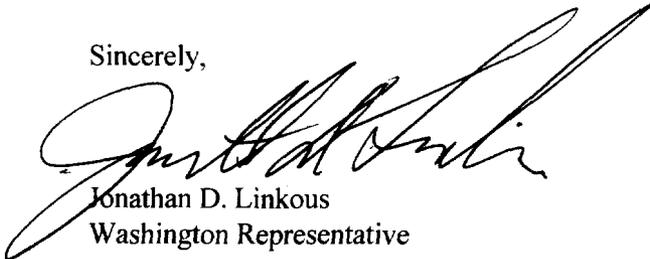
Magalie R. Salas
Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554-0001

re: *Ex Parte* Meetings
CC Docket 94-102, Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems

Dear Ms. Salas:

On May 19, 1998 Mr Carl Hilliard and myself, representing the Ad Hoc Alliance met with Mr. John Cimko, Nancy Booker, Ron Netro, and Won Kim of the FCC's Wireless Bureau. Later that day, we also met with Mr. Ari Fitzgerald of Chairman Kennard's office. The topic of the discussion is covered in the enclosed material that was used as a handout for the meetings.

Sincerely,



Jonathan D. Linkous
Washington Representative

enclosure

No. of Copies rec'd
List A B C D E

021

**ALLIANCE EX PARTE PRESENTATION
IN RESPONSE TO CTIA SO CALLED “CONCERNS”
ABOUT THE “STRONGEST SIGNAL” PROPOSAL
CC Docket 94-102**

On October 27, 1995 the Ad Hoc Alliance for Public Access to 911 (“Alliance”) asked the Commission to adopt a rule which would require that users of cellular phones have automatic access to the strongest available compatible signal when ever 911 is dialed. This proposal was based on extensive field tests and independent engineering analysis.

On July 26, 1996, the Commission asked for further comment and stated. **If a commenter believes that Alliance's proposal is technically infeasible, it should provide its reasons in detail, with supporting engineering analyses.** No comments or engineering analyses were filed.

In the Fall of 1997 the Alliance was asked to meet with the “WEIAD,” which is an organization made up of representatives of the wireless industry and the public safety community, to see if some agreement could be reached concerning the Strongest Signal proposal. The Alliance made a presentation to the WEIAD on November 6-7, 1997. At that time it was agreed that the “concerns” of the wireless industry would be addressed in a technical session on January 6, 1998. December 15, 1997 was set as the date for exchange of written materials detailing the technical positions of the parties. The Alliance submitted its engineering reports and supporting information to the other members of the group. **No written materials were submitted in support of any “concerns” by any party. At the time of the meeting of the technical committee, the Chair asked for additional contributions and there were none!**

A well-respected engineering firm, the Trott Group, has addressed all of CTIA’s technical “concerns” about the Strongest Signal. The Trott Group found that none of these “concerns” had any basis. A copy of the Trott reports of August 27, 996 and January 27, 1998 are attached.

CTIA HAS STALLED AND DELAYED ACTION ON THE STRONGEST SIGNAL PROPOSAL FOR OVER TWO YEARS. DURING THIS TIME OVER 25 MILLION CELLULAR PHONES HAVE BEEN MANUFACTURED WITHOUT THIS LIFESAVING FEATURE WHICH WOULD HAVE SAVED THE LECHUGAS AND MORE TO COME. FURTHER DELAY IS UNCONSCIONABLE.

(1) ***“Blockage” argument***

- The typical cell site has 30 channels, which can be used for voice communication.
 - As the Alliance tests show and Trott pointed out, in areas of high traffic density there are a large number of cell sites. In these areas the site receiving the strongest signal changes within a matter of a few feet as one travels down the freeway.
 - Thus, as a practical matter, there are at least 60 channels of communication, less the busy channels, available for 911 calls in areas where there might be a large number of calls to report an emergency.
- The typical Public Safety Answering Point (“PSAP”) has 10 to 15 operator positions in urban areas and serves a county or municipality.
 - The cellular companies and the PSAP choke off incoming 911 calls by limiting the number of lines from the 911 tandem switch to the PSAP.
 - The average call to 911 lasts less than a minute.

THE PSAP CHOKES POINT WILL LIMIT 911 CALLS LONG BEFORE THERE IS ANY POSSIBLE “BLOCKAGE” AT THE CELL SITE. IN DENSE URBAN AREAS, WHERE A LARGE NUMBER OF 911 CALLS CAN BE EXPECTED, THERE WILL BE NO BLOCKAGE BECAUSE THE STRONGEST SIGNAL CHANGES EVERY FEW FEET. IN NON-URBAN AREAS, WHERE FEW 911 CALLS CAN BE EXPECTED, THE STRONGEST SIGNAL IS CRITICAL. (E.G. MARCIA SPIELHOLZ AND THE LECHUGA FAMILY). IN THESE AREAS OF LOW TRAFFIC THERE IS NOT EVEN A REMOTE POSSIBILITY OF BLOCKAGE.

(2) *“Call back” argument*

- In cellular telephones, the Mobile Identification Number (“MIN”) is the same as the telephone number assigned to the cellular phone. This information is sent from the cellular phone and is not generated by the serving switch. No lookup is required to provide a call back number. No other data is required to be sent to the PSAP from the caller’s user information.
- The Alliance proposed a call back solution that has now been acknowledged as technically sound.
 - The PSAPs have deferred the decision to deploy this technology because:
 - PSAP study shows that less than ½ of 1% of all 911 calls require call back.
 - CTIA promised to use its best efforts to deploy a nation wide wireless customer information system for use by the PSAPs.

THE CALL BACK NUMBER FOR CELLULAR CUSTOMERS CAN BE GIVEN TO THE PSAPs TODAY. THE ALLIANCE HAS PROVIDED A SOLUTION FOR ALL OTHER SITUATIONS HOWEVER, THE PUBLIC SAFETY COMMUNITY HAS NOT DECIDED TO DEPLOY THIS SOLUTION BECAUSE (1) OF THE VERY SMALL NUMBER OF INCIDENTS WHERE CALL BACK IS NEEDED AND (2) CTIA PROPOSAL TO CREATE A INFORMATION BANK.

(3) *“Discourages advanced deployment of location technology” argument*

- The Commission has required that all CMRS providers deploy location technology by 2001.
 - The Commission’s decision was based on industry representations concerning availability and installation time.
- CTIA says that Strongest Signal would:
 - Discourage cellular companies from early deployment of this technology because there would be no advantage to the customer if the 911 call would not be directed to the cellular company with the location technology.
 - The reality is the cellular companies are anxious to deploy location technology because it will enable them to serve other markets (e.g. location, concierge, etc., services) which are potentially very lucrative. That is the strongest incentive to implement Phase II technology.
 - Solution the Alliance agreed to at the WEIAD, is to put in a switch (number pad code) giving the consumer the option to turn off the Strongest Signal feature if availability of location technology is a reason for purchase.

CTIA APPARENTLY ADMITS THAT LOCATION TECHNOLOGY CAN BE DEPLOYED EARLIER THAN THE COMMISSION WAS LEAD TO BELIEVE AND ADMITS THAT PROFIT, NOT PUBLIC SAFETY, IS THE DECISION POINT FOR THIS INDUSTRY. IN FACT, THE WIRELESS INDUSTRY HAS DISCOVERED THAT LOCATION TECHNOLOGY OFFERS TO OPEN UP SIGNIFICANT ADDITIONAL PROFIT CENTERS THAT ARE UNRELATED TO PUBLIC SAFETY AND THAT IS THE MOTIVATION FOR EARLY DEPLOYMENT. STRONGEST SIGNAL DOES NOT AFFECT THE REAL MOTIVES TO DEPLOY LOCATION SERVICES.

(4) **“Increased call set-up time” argument**

- The Audiovox cellular phone models, which automatically select the strongest signal today, require *less than 2 seconds* to scan all channels.
 - Two seconds was confirmed by the Trott report as the amount of scan time required.
- The cellular records of the six calls placed over the Lechuga cellular phone show holding times of 30.7 seconds, 1:09.4 minutes; 44.5 seconds; 59 seconds; 1:07.4 minutes and finally 19.7 seconds. During these time intervals the caller heard nothing but “dead air” even though the phone would have indicated that it was “in service.”

TWO SECONDS IS NOT GOING TO CAUSE CALLERS TO HANG UP.

(5) *“Refer to TIA” argument*

- TIA is a standards setting body organized, financed and supported by the wireless industry.
 - Trott has said that the Strongest Signal proposal involves a minor software change in cellular phone handsets, which does not require a change in standards.
 - Trott has also said that there will be no unintended consequences because the cellular phones already scan both channel groups when the phone is turned on and when it loses signal.
 - No unintended consequences have been identified.
- Audiovox has already deployed several models of cellular phone that select the strongest signal when an emergency number is dialed. Some of these phones are being marketed by the American Automobile Association.
 - These Audiovox phones comply with long established cellular *operating standards* and they have already been type accepted by the FCC and carry the CTIA certification seal!
 - No operating problems have been identified.
- The Commission determines what services are required by the public interest.
 - The role of TIA has been to set standards that carry out the Commission’s direction.

TIA IS THE WIRELESS INDUSTRY’S STANDARD SETTING BODY. AS THE TROTT REPORT AND AUDIOVOX TELEPHONE’S SHOW, NO NEW STANDARDS ARE REQUIRED TO IMPLEMENT THE STRONGEST SIGNAL PROPOSAL! EVEN IF NEW STANDARDS WERE REQUIRED, SUCH STANDARDS ARE DEVELOPED AFTER THE COMMISSION HAS DECIDED THAT THE SERVICE IS REQUIRED. HERE CTIA IS MISUSING ITS STANDARDS SETTING COMMITTEE IN AN EFFORT TO DELAY AND BLOCK A FEATURE REQUIRED BY THE PUBLIC INTEREST ALREADY CERTIFIED BY CTIA, YET STILL OPPOSED BY CTIA.



Report

Prepared for

AD HOC ALLIANCE FOR PUBLIC ACCESS TO 911

Prepared by

Trott Communications Group, Inc.

January 27, 1998

Background:

The Ad Hoc Alliance for Public Access to 911 (*Alliance*) proposed that the FCC adopt a rule change requiring newly manufactured cell phones to automatically select the strongest compatible forward control channel whenever a 9-1-1 call was dialed. On July 26, 1996, the FCC released a Further Notice of Proposed Rulemaking in CC Docket No. 94-102. In that Notice, the FCC said " If a commenter believes that Alliance's proposal [to select the strongest signal] is technically infeasible, it should provide its reasons in detail, with supporting engineering analysis."

The *Alliance* retained Trott Communications Group, Inc. (*Trott*) to evaluate this proposal and prepare a report for submission to the FCC. The *Trott* report of August 27, 1996 concluded that the *Alliance's* proposal could be achieved with minimal impact on the equipment manufacturer and would minimize the probability of dropped or uncompleted 9-1-1 calls. It is *Trott's* understanding that no other reports were filed with the FCC within the comment period.

During approximately the same time period, the *Alliance* had engineers perform radio frequency signal measurement tests in different cities across the country. These tests documented the existence of areas within each of these cities where the best signal from one of the cellular carriers was not sufficient to maintain a reliable path of communications from a hand held cell phone. The studies also demonstrated that the signal provided by the competing cellular carrier in these same locations was usually a much stronger signal.

Trott's review and analysis of those studies and the collected data indicates that both of the competing carriers each had locations where they were the weak signal

provider vs. the competitor's signal. However, the *Alliance* studies did not locate any areas within the cities tested where either carrier had a complete lack of measurable signal, only areas where it would be difficult to maintain a reliable path of communications.

Trott was informed by the *Alliance* that after the filings (August, 1996), a number of ex parte presentations were made to the FCC which challenged the *Alliance* proposal but that a review of the ex parte filings, by the *Alliance*, failed to reveal any engineering analysis in support of these challenges.

Recent Activities:

The *Alliance* has indicated to *Trott* that it was asked to reopen its proposal in a joint meeting between certain wireless industry and public safety representatives during WEIAD II in Baltimore. At that meeting, questions were voiced concerning the call set up time; the effect on the cellular systems when the signal strength from both carriers was nearly equal and instances when the strongest forward control channel does not result in obtaining the best voice channel. *Trott* understands that it was agreed that the *Alliance* would consider these questions if they were placed in writing and supported by appropriate engineering analysis. The *Alliance* then made arrangements for *Trott* to evaluate any such materials and for *Trott* to attend the January, 1998, workshop prior to the WEIAD III meeting in Phoenix to discuss any objections further.

At the end of December, 1997, *Alliance* advised *Trott* that no written issues, questions nor any supporting engineering data were received by the *Alliance* for review. Therefore, the *Alliance* concluded that there were no valid technical reasons why the *Alliance's* proposal should not be adopted by the FCC and no reason for *Trott* to attend the workshops or the WEIAD III meeting.

Current Situation:

Alliance advised *Trott* that, at the workshop meeting prior to the WEIAD III meeting in Phoenix on January 5, 1998, certain members of the wireless industry proposed that all "purely analog" cell phones be programmed to use A over B or B over A system select logic as an alternative to the *Alliance's* proposal. The *Alliance* believes that this change is a small improvement for cellular customers but it is not an alternative to the *Alliance's* strongest signal proposal. Also at this meeting, the *Alliance* received a recommendation that the *Alliance* submit its proposal to a standards setting body for review. The *Alliance* was told that as part of a standards process, they (the *Alliance*) should expect to be required to develop a prototype unit



which must be tested in 100 different locations. The *Alliance* membership questions whether or not the *Alliance's* proposal involves standards setting in the first place. The proposed rule change requested by the *Alliance* directs the handset manufacturers to enable their product to select the strongest compatible forward control channel when a 9-1-1 call is dialed using whatever means is most appropriate.

As a result of the workshop meetings of January 5, 1998, the *Alliance* has asked *Trott* to produce this report to provide advice, comments and recommendations on the following list of "issues":

1. A/B or B/A system select criteria
2. Call set up time
3. Control channel signal strength as predictor of voice channel quality
4. Impact on cellular system
5. Customer choice
6. Unintended consequences
7. Standards setting

The following are our comments and suggestions concerning the above enumerated items:

1. A/B or B/A System Select Criteria

Programming cell phones for A/B or B/A instead of A Only or B Only is indeed a small step in the right direction, but it should be applied to all phones that the carrier sells, not just "purely analog" handsets. As the *Alliance* engineers pointed out, this mode of operation will allow calls to be completed when the preferred system is not providing any signal at a given location. The *Alliance's* signal strength tests demonstrated that the total absence of the preferred signal was not the issue in the metropolitan areas tested. The presence of a weak and inadequate "preferred" signal still prevents the handset from switching to the non-preferred system. This "solution" cannot provide the cell phone user with the call completion and retention success that the *Alliance's* "strongest compatible signal" proposal will provide.

2. Call Set Up Time

The "issue" that the *Alliance's* proposal will result in extending the call set up time to an excessive amount is without substance. A "Rescan" of both the preferred and non-preferred system at the origination of the 9-1-1 call will extend call set up time by no more than ½ second based upon today's



handset technology. We believe that this interval is not a significant reason to deter implementing the *Alliance's* proposal.

3. Control Channel Signal Strength as Predictor of Voice Channel Quality

The "issue" of the strongest forward control channel signal strength not resulting in the best voice channel was addressed by *Trott* in our initial report dated August 27, 1996 and re-addressed in our October 18, 1996 response to comments. We reiterate that the design of cellular systems mandates that control channel signal strength will be less than or equal to the associated voice channel signal strength from that cell site.

The possibility does exist, however, that the cell site with the strongest control channel signal will not have a voice channel available to handle the call and the call will be "Redirected" to a nearby cell site for completion. This process of "redirection" is normal for congested cell sites. The result of this process may cause a call to begin at the "Redirected" cell site if sufficient signal strength is available, but it will normally be handed back to the closer cell as channels become available. As stated, this is the normal process today without regard to the *Alliance* proposal. All callers who prefer the system with the strongest control channel signal will experience this treatment today. Implementing the *Alliance* proposal will affect only conforming handsets that prefer the weaker control channel but have switched to the non-preferred stronger control channel. Quantifying this event is almost impossible with the number of variables involved. We do not believe that there is substance to this "issue".

4. Impact on the Cellular System

What impact the *Alliance's* proposal will have on the cellular system loading depends on a number of variables:

- a) The signal strength provided to a given location by each of the systems
- b) The number of cell phones operating in close proximity within this given location
- c) The distribution of system preference among these operating cell phones



- d) The number of simultaneous 9-1-1 calls originated by this group of cell phones
- e) The number of handsets among this group of operating cell phones complying to the *Alliance's* proposal of seeking out the strongest compatible signal when 9-1-1 is dialed
- f) The mobility of this group of 9-1-1 callers (i.e. Stationary, Walking or Driving through the location).

We believe that in the core areas there will be no impact as calls will be evenly distributed between the systems. In the suburban and rural areas there will be more traffic directed to the stronger signal provider but as the *Alliance's* tests demonstrated, this still results in fairly even total call distribution between the carriers as each basically fills in the others weak signal spots. Again, we don't believe this "issue" has sufficient substance to deter implementing the *Alliance* proposal.

5. Customer Choice

As far as customer choice is concerned, we believe that an "air-bag" switch is appropriate. Allowing the customer to choose whether the handset will utilize the *Alliance* proposed 9-1-1 call process can be easily implemented by the manufacturer.

6. Unintended Consequences

Prudence is a desirable quality. However the search for unintended consequences suggests that the *Alliance* proposal involves new process for the cell phone. This is not the case. The cell phone today already scans the full list of forward control channels (both A and B system) during its power-on sequence and whenever signal is lost from the preferred system. The *Alliance* proposal simply triggers this process to occur when the user dials 9-1-1. As we stated in our initial report, the complexity of this change is minimal and the cost to the manufacturer to implement it should be equally minimal. We believe that all predictable consequences of the *Alliance* proposal have been voiced by the wireless industry and none have created a reason to deter its implementation.

7. Standards Setting

The *Alliance* has identified an objective which is in the public interest and the



Alliance has demonstrated that this objective can be realized without imposing undue burdens on the wireless industry. As stated, the handset already performs the scan of both systems. No new standard is needed for this action. We also think it inappropriate for a consumer group to gain access to manufacturer's software, develop modifications to that software, build a prototype and pursue the setting of standards. The manufacturers are best equipped to determine how they will implement the *Alliance* proposal into their handsets as each manufacturer's software is unique.

Conclusion:

There have been no technical issues raised surrounding the *Alliance's* "strongest signal" proposal that justify further delay. Further discussions and continuing the "what ifs" are unlikely to result in anything productive. The goal is to take advantage of the fact that where the "A" carrier has a coverage hole, the "B" carrier usually fills the hole, and likewise, where the "B" carrier has a coverage hole, the "A" carrier usually fills the hole. Taking advantage of this fact is no longer a technical issue, it is a policy issue for the FCC to decide.





**FEASIBILITY OF SELECTING THE STRONGEST
COMPATIBLE CELLULAR SIGNAL**

REPORT PREPARED FOR

AD HOC ALLIANCE FOR PUBLIC ACCESS TO 9-1-1

BY

TROTT COMMUNICATIONS GROUP, INC.

AUGUST 27, 1996

INTRODUCTION:

The Ad Hoc Alliance for Public Access to 9-1-1 (Alliance) has proposed that the Commission adopt a rule change that will require all wireless handsets to automatically select the strongest compatible signal when the user dials 9-1-1. Under the Alliance proposal, the process of selecting the strongest signal will automatically eliminate incompatible signals. This proposal is easily achievable and will impose a minimal burden on manufacturers compared to the benefits provided to the user.

The Commission has also asked for comment concerning ways for mobile users to complete a 9-1-1 call to any available wireless system without regard to system compatibility. In consideration of this issue, it is impractical to require wireless handset manufacturers to support a multitude of frequency bands, modulation types, signaling formats and protocols. It is equally impractical to require wireless service providers to construct systems to support a multitude of frequency bands, modulation types, signaling formats and protocols. It is even more impractical from the Commission's standpoint to re-assign spectrum in each frequency band from one wireless service provider to several competing wireless service providers to support such activities. Due to these impracticalities, this report will address 9-1-1 access only from a cellular perspective.

As a practical matter, most cellular carriers will ensure inter-system compatibility to offer roaming service in order to remain competitive in the marketplace. This will require such service providers to continue to dedicate some spectrum to analog service and handset manufacturers to produce dual-mode analog/digital equipment to accommodate the needs of the roaming subscriber. Thus, a 9-1-1 call can be switched to the strongest, compatible (analog or digital) signal.

GENERAL:

Cellular handsets are designed, manufactured and programmed in compliance with appropriate industry standards to ensure compatibility between the Mobile Station (MS) and Base Station (BS). These standards were prepared by Electronic Industries Association (EIA) and Telecommunications Industry Association (TIA) and published as EIA/TIA Standards. These Standards were reviewed and approved by the F.C.C. and incorporated into their Rules and Regulations by reference. The majority of the cellular handsets in service today are compatible with the original OST-53 analog standard (AMPS). Some are also compatible with one of the digital standards.

Unlike other wireless services, Cellular Radio Telephone Service was initially implemented using analog technology and some systems were subsequently upgraded to one of the standardized digital technologies. In order to retain compatibility with the existing subscriber base and to remain compatible with all other cellular providers in providing roamer service, cellular service providers are retaining analog service; i.e., some channels operate in the analog mode while others operate in a digital format (TDMA, CDMA). In addition, cellular subscriber units are being manufactured as dual-mode; i.e., analog and digital. As a result, most cellular handsets will continue to be compatible with current cellular systems in the analog (AMPS) mode of operation.

COMPATIBILITY ISSUES:

The nationwide deployment of digital cellular is not following a single standard as was the deployment of analog cellular. In some cities, one cellular provider is implementing TDMA in addition to analog while the other is implementing CDMA in addition to analog. In addition, deployment of digital is in isolated areas and not ubiquitous.

The Commission's REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING CC Docket No. 94-102 / RM-8143, specifically Paragraph 146 and related Footnote 288, ignores one of the central and material parts of the Alliance's request, that wireless handsets automatically select the strongest, **COMPATIBLE** signal when the user dials 9-1-1. Cellular handsets will not recognize or "lock-onto" a stronger signal with an incompatible format. For example, a CDMA handset looks for CDMA pilot channels which are totally different from analog control channels and a TDMA handset looks for TDMA digital control channels which are totally different from analog control channels. In addition, analog-only handsets will not recognize either TDMA or CDMA control or pilot channels. Furthermore, digital (dual-mode) phones will search for analog control channels if no compatible digital signaling is found; therefore, a dual-mode handset could, if so directed, search both format-compatible digital control or pilot channels in addition to analog control channels to determine the strongest compatible system. In light of the ubiquitous nature of the analog networks and better audio quality at this time in the deployment process, it may be preferable to place all 9-1-1 calls in the analog portion of



the wireless networks. This would also speed up the deployment of handset location due to technical limitations of digital location technology, especially CDMA. Digital technologies are intended to benefit the service providers by increasing capacity in a fixed bandwidth, and may in some future generation, provide close to equal voice quality.

REVIEW OF CURRENT PROCESS:

This review is based upon the original OST-53 compatibility specification since all analog operations are backwards compatible to support the original MS equipment. Upon application of power, the MS in a cellular system will perform the *INITIALIZATION* Task (2.6.1) and then enter the *IDLE* Task (2.6.2). The MS will remain in this *IDLE* mode of operation waiting for either a BS or user event. Periodically, the MS will re-scan the cellular environment to ensure itself of current data and accessibility to cellular service.

When the MS user places a call, the MS will exit the *IDLE* task and enter the *SYSTEM ACCESS* Task (2.6.3) with the Origination Flag set. The *SYSTEM ACCESS* Task begins with *SET ACCESS PARAMETERS* Task (2.6.3.1) which defines the basic time allowance for the MS to complete the access attempt. The *SYSTEM ACCESS* Task then continues with the *SCAN ACCESS CHANNELS* Task (2.6.3.2) which instructs the MS to examine the signal strength of ALL control channels beginning with *FIRSTCHA* and ending with *LASTCHA* looking for the strongest two channels in the group. The *INITIALIZATION* Task (2.6.1) set the *FIRSTCHA* and *LASTCHA* parameters to encompass the control channels associated with the preferred serving system, either the A-Side channel set or the B-Side channel set. Therefore, the MS will only look at the access channels for one of the available cellular service providers in the area.

Once the *SCAN ACCESS CHANNELS* Task completes, the MS is tuned to the strongest channel and the *RETRIEVE ACCESS ATTEMPTS PARAMETER* Task (2.6.3.3) is entered. This task informs the MS as to the allowable number of access attempts it will be permitted to try before access failure is declared. The MS then enters the *UPDATE OVERHEAD INFORMATION* Task (2.6.3.4) to insure compliance with the serving system registration and authentication requirements. The MS will then enter the *SEIZE REVERSE CONTROL CHANNEL* Task (2.6.3.5) where it will attempt to pass the Origination request to the serving system.

The processing of this origination call will remain with the selected serving system until call termination or until the serving system hands off the call to a neighboring system if both systems are part of a wide area seamless service agreement. Upon call termination, the MS will enter the *SERVING SYSTEM DETERMINATION* Task (2.6.3.12), which will re-scan the cellular environment before returning to the *IDLE* Task.



PROPOSED CHANGES TO THE PROCESS:

The Ad Hoc Alliance for Public Access to 9-1-1 has proposed a change to the above call process for 9-1-1 calls to be directed to a Public Safety Answering Point (PSAP) from a MS by all cellular service providers. This change is defined as a requirement for the MS to examine ALL control channels for both the A-Side and B-Side service providers to select the strongest compatible channel to process the call without regard to their preferred service provider. This change will ensure the MS user of access to the best communication path to process the emergency call. This process will also enable the locating process to more accurately report the true location of the MS when only the location of the BS cell site is being reported to the PSAP; i.e., the first five years following adoption of the new regulations. It will also reduce the probability of dropped or uncompleted calls and minimize the requirement for call-back by the PSAP.

IMPACT OF THE PROPOSAL ON THE CALL PROCESS:

Incorporating the proposed change into the MS is limited to a relatively minor software modification. The *SET ACCESS PARAMETERS* Task (2.6.3.1) is modified to examine the dialed number to determine if 9-1-1 is being called. If the user has dialed 9-1-1, this task, (2.6.3.1) is expanded to pre-load the *FIRSTCHA* parameter with the lowest A-Side control channel (313) and the *LASTCHA* parameter with the highest B-Side control channel (354) in addition to the task's normal process. As a result of this minor change, the following task, *SCAN ACCESS CHANNELS* Task (2.6.3.2) will examine **ALL** control channels for both the A-Side and B-Side when selecting the strongest compatible signal.

The remainder of the call process will proceed with **NO** changes required, and as a result, the user will always select the BEST compatible channel from BOTH cellular systems when calling 9-1-1. This change will NOT affect any other calls made by the user. The non-9-1-1 calls will be placed on the preferred system selected by the user.

CONCLUSION:

In summary, the proposal by the Alliance to "Seek the Strongest Compatible Signal" when placing a call to 9-1-1 is achievable with very little impact on the equipment manufacturer, while providing the benefit of the best possible reliability to the user and providing the closest cell site information to the PSAP. This proposed change will also benefit the PSAP by minimizing the probability of dropped or uncompleted calls requiring call-back by either the PSAP or the user.



This report is in response to the “concerns” raised by the Public Safety Communications organizations in their February 23, 1998 response to our report dated January 27, 1998. The concerns raised are the result of misconceptions and misunderstandings of the technical aspects of cellular phones, cellular systems, related cellular standards, and the Alliance’s proposal. In order to better understand the issues and positions, we have formatted this response in a issue-answer format.

1. **Issue:** In areas where both cellular carriers provide an adequate signal level, will the Alliance’s “Strongest Signal” approach reduce the ability and capacity of the cellular/911 systems to handle a high volume of simultaneous emergency calls, reduce the area capacity by 50%, overload the 911 trunk capacity of one carrier, and totally eliminate the other carrier?

Answer: This issue assumes a multiple call situation where many subscribers simultaneously report the same incident from essentially the same location, such as a busy freeway or other urban area. It further erroneously assumes that only one cell site from one of the two carriers provides the strongest signal to all of the callers. This premise leads to the assumption that this cell site will be overloaded and calls will be redirected to the next cell site of the same carrier, which may have a weaker signal than the competing cellular carrier and that one set of 911 trunks will be overloaded while the other carrier’s trunks remain unused.

The studies previously performed and provided by the Alliance found that in most high density areas the signal strength of the two carriers are nearly equal. The study, which measured signal strengths in “core” areas, showed that in such areas, the strongest signal changes back and forth from one carrier to the other as the subscriber travels over very short distances. Thus the strongest carrier is likely to change from car to car along a traffic lane.

Based upon the empirical data collected and presented by the Alliance, the strongest signal approach will have the effect of distributing the 911 calls more or less equally between the cellular carriers in the high density core areas. Therefore, the hypothesis and resulting conclusions are both incorrect.

Due to the “distributing effect” discussed above, 911 trunk duplication will **NOT** be lost, “choke point” will **NOT** change, weaker carriers will **NOT** be totally eliminated, the ability to transport 911 calls will **NOT** be reduced, and other calls within the region will **NOT** be blocked. In essence, there will be no changes to cellular systems operation in the core urban areas.

Appendix 3 of that same report is useful to help understand the problem. The portable cellular handset is a 600mW device and a mobile cellular telephone is a 3W device. The difference in the mobile versus portable "Up-Link" power (from the mobile to cell or from the portable to cell) is 8db. This represents a five-fold advantage for the mobile unit in talk-back range to the cell site versus the portable's talk-back range. Balance between "Down-Link" power and "Up-Link" power is established by cell site design. The cells designed for "Portable Grade" coverage lie in the core of the cellular markets where market pressures for greater capacity in a limited area have forced the carriers to add cells in close proximity to each other. The "coverage" of these core cells is limited through careful antenna selection and power management to allow for the frequency reuse needed to increase traffic capacity. This results in hand-offs between cells occurring at relatively high signal strength levels and the portable enjoys a balanced environment between the "Up-Link" and "Down-Link" powers. The mobile unit power is throttled back to resemble the signal strength being presented to the cell from the portables; otherwise, the high-power mobiles would be received quite some distance away and interfere with the frequency reuse plan. Therefore, the mobile unit acts like and looks like another portable to the core cell sites.

Out in the suburbs and rural areas; however, the situation is reversed. The cells are designed for coverage not capacity and the link budgets are tailored for Mobile Grade Coverage. This means that the "Down-Link" power is increased to extend the area that the cell site can cover when talking to a mobile unit. The portable unit can hear the cell site signal when it is close to the tower and can easily talk back to the cell. As the units move further away from the cell site, they are ordered by the cell to increase their power output to compensate for the signal loss over distance. Remember, the mobile unit can increase its power output to 3W or 8db more signal than is possible from a portable unit. Therefore, the mobile unit can talk back to the cell site from anywhere within the designed coverage (i.e. Mobile Grade Coverage). The portable unit; however, runs out of steam and soon faces a dilemma where it can hear the cell site signal when it is quite removed from the cell site in areas where it can successfully pass data messages to register or originate calls, but it cannot be heard by the cell site when it reaches a voice channel and must transpond the SAT handshake signal that allows conversations to take place. Therefore, portable handsets can hear the cell site signal where it cannot talk back to the cell under any circumstances, but it will remain locked onto this cell site signal until it loses word sync or rescans and locates a stronger preferred cell site. It must be recognized that the robust data signaling can successfully pass a data message at signal levels that cannot support voice traffic.

As long as the portable handset can maintain word sync with the overhead data stream from the cell site, it will not seek another cell site, unless the periodic Rescan finds a stronger signal from the preferred system. When a call is originated by the user of a portable handset, the handset will Rescan its dedicated environment and seek the strongest control channel. If this signal is being provided by a "Mobile Grade Coverage" cell site and the portable is not in the "Portable Grade Coverage" area of the cell site (i.e. not close to the tower), the



The purpose of the Alliance's proposal is to insure completion of 911 calls where, without the strongest signal approach, no call from the affected subscriber will be completed to the Public Safety Answering Point.

2. **Issue:** Will the strongest signal concept impair the marketability of 911 location service?

Answer: This "concern" is based upon the assumption that subscribers will be unwilling to pay a surcharge for location service deployed in advance of Year 2001 if they do not have the assurance that this feature will be available to them when they dial 911. This issue was addressed in the report. The Alliance specifically asked us if the strongest signal feature should be capable of being disabled. Our response was, and is, that the strongest signal feature should be enabled by default, but easily disabled by consumers who wish to make that election. We feel that it is advisable to allow subscribers to knowingly disable the strongest signal feature at their leisure, rather than be required to enable the feature while involved in a stressful situation.

We understand the Public Safety community's position that they would prefer to receive a 911 call with location; however, we are sure that people who have been injured would have preferred that the call be completed without location rather than not completed by a system with location technology. Implementation of location technology will have no effect upon dropped or uncompleted 911 calls that could be supported by the Alliance's strongest signal proposal. The Public Safety report stated, "We can't help them if we can't find them." The Alliance contends that, "You can't help them if you can't hear them"; however, if you can hear them, at least they have the opportunity to tell you their location and the nature of their problem.

3. **Issue:** Will the presence of a weak and inadequate preferred signal prevent the handset from switching to the non-preferred system?

The Public Safety response disagrees with our statement that a weak signal where voice communication is not possible from a portable cellular phone can prevent a handset from switching to the other system. Their response also states that as long as a handset can register, be confirmed, then voice calls can always be carried.

Answer: Our statement that weak signal levels can prevent handsets from switching carriers is not a contention, it is a fact. Their statement that as long as a handset can register, be confirmed, then voice calls can always be carried is simply not true. For example, the Alliance's report concerning the Lechuga accident contains a cell site printout showing that the Lechuga phone was registered but that calls could not be completed due to weak signal level.



portable can successfully pass an origination order to the MTSO through the cell site and will receive a voice channel assignment. The portable will fail to connect on the voice channel due to its weak "Up-Link" signal, but will have succeeded as far as the 553 standards are concerned and it **WILL NOT** switch sides seeking a better pathway. Only when the portable fails to receive a voice channel assignment from the serving system at call origination, or when word sync is lost from the preferred system will the portable switch to the other side. The presence of even a weak and unusable (to the portable) signal will keep the handset on the preferred system and it will not access the other side. Clearly, the A over B and B over A is not a better solution than the Alliance's "Strongest Signal" proposal.

In order for the A/B or B/A to meet an equivalent level of service as the Alliance's Strongest Signal proposal, a method of determining adequacy of voice channel service must be established and the handset commanded to rescan all forward control channels upon loss of voice channel capability. This process **WILL** require a revision of the 553 Standard, since the subscriber units do not currently possess this function.

4. **Issue:** Is our statement that "the cell phone today already scans the full list of forward control channels (both A and B systems) during its power-on sequence and whenever signal is lost from the preferred system" inconsistent with pages 2-11 of ANSI/EIA/TIA-553-1989 STANDARDS, SECTION 2.6.1.1.1 (553 Standard)?

Answer: The short answer is "NO." The last paragraph of Section 2.6.1.1.2 of the 553 Standard (pages 2-12) STATES, "If it cannot complete this task on either of the two strongest control channels, the mobile station may check the serving-system status: If the serving-system status is enabled, it may be disabled; if the serving-system status is disabled, it may be enabled. The mobile station must then enter the Scan Dedicated Control Channels Task (see 2.6.1.1.1)." This action will force the mobile station to examine all control channels when it encounters no service from its preferred system. This task is also initiated when a call origination is attempted and will result in the same scan. The 553 Standard shows that the mobile station already knows how to scan all of the control channels; therefore, no change to the standard is necessary to implement the Alliance's Strongest Signal proposal.

Conclusion: All of the negative comments concerning the Alliance's Strongest Signal proposal pose hypothetical situations where the proposal may have adverse effects upon cellular operations; however, these comments have never provided documented proof of the impact. Further, these comments have not provided documented proof that the Alliance's proposal can jeopardize safety as the Alliance has proven actual cases where death or serious bodily injury has resulted from not implementing the proposal.



October 18, 1996

Trott Communications Group, Inc. prepared this response to the comments filed in the matter of CC Docket 94-102 at the request of the Ad Hoc Alliance for Public Access to 911.

Several of the commenters contend that the "Alliance" proposal for selection of the strongest, compatible signal is flawed or unworkable and this proposal is attacked on several fronts. Their discussions concerning incompatibility between the several digital and analog technologies were addressed by the "Alliance" in its comments and will not be repeated herein. The second issue raised was the contention that the strongest control channel does not indicate the strongest voice channel. The radiated signal from the control channel that pilots the cell or sector is always designed to mimic very carefully the available radiated signal from the associated voice channels of that cell or sector. This design practice assures the handset that is tracking the control channel signal of knowing where the useful coverage area of that cell lies. Therefore, when a handset locks onto the strongest control channel signal for a given cell, the strength of the control channel signal is truly representative of the strength of the associated voice channels of that cell. Otherwise, there will be either cell or sector access in areas where there is no voice coverage or voice coverage where there is no control channel access. Neither approach makes any sense; therefore, the contention also makes no sense. The contention that the control channel and the voice channel are unrelated is simply not true.

In some isolated cases, the control channel power is reduced by 3dB compared to the voice channels to ensure good voice quality in all areas where cell or sector access is available. This differential is far outweighed by the 20dB average differential between systems in some markets.

The third issue raised by commenters is that of simply moving a few meters will invert the carrier providing the strongest signal. This is only true where the control channel signals, therefore voice channel signals are nearly equal level between the two carriers. As the "Alliance" field tests have demonstrated, the differential between systems in some markets averages 20dB and in many locations this differential was measured as high as 50dB. In these cases, movement of many hundred meters would be required to overcome this high differential. In markets where the differential is less (approximately 10dB as in Dallas), the selection becomes less important since the subscriber is at less risk of not completing or losing the call. However, many 911 calls are made by immobilized subscribers (such as from an accident location). If this location happens to be in a "dead spot or service gap" area, it is then imperative that the subscriber's equipment be capable of automatically placing the call on the other system which probably will not have the same "dead spots or service gaps" and most likely will be capable of providing superior service.

As rightly stated by PCIA in their comments on page 12, *"Wireless systems, by their nature, will never be able to provide 100 percent coverage."* This supports the "Alliance" position that, since carriers will never be able to provide 100 percent coverage, there will always be cases where selection of the strongest compatible signal is necessary and critical.

George W. Weimer, P.E.
Vice President