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Building The Wireless Future™

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May 20, 1998

Ms. Magalie R. Salas
Secretary
Federal Communications Commission
1919 M Street, NW Room 222
Washington DC 20554

EX PARTE OR LATE FILED

RECEIVED
MAY 20 1998
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Re: Ex Parte Presentation
CC Docket # 94-102 (E9-1-1)

Dear Ms. Salas:

On Wednesday, May 20, 1998, Brian Fontes, representing the Cellular Telecommunications Industry Association ("CTIA"), submitted the enclosed letter and its attachments to Daniel Phythyon, Chief, Wireless Telecommunications Bureau, regarding the above-referenced proceeding. Copies of that letter and its attachments were also submitted to the following:

Chairman William Kennard
Commissioner Michael Powell
Commissioner Gloria Tristani
James Casserly
Peter Tenhula
Ron Netro
Rosalind Allen
Commissioner Susan Ness
Commissioner Harold Furchtgott-Roth
Ari Fitzgerald
Paul Misener
Karen Gulick
John Cimko

Pursuant to Section 1.1206 of the Commission's Rules, an original and one copy of this letter and its attachments are being filed with your office. If you have any questions concerning this submission, please contact the undersigned.

Sincerely,

Cleveland Lawrence III

Cleveland Lawrence III

No. of Copies rec'd 0+1
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May 20, 1998

Building The Wireless Future

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Brian F. Fontes
Senior Vice President for Policy and Administration

Mr. Daniel Phythyon, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
1919 M Street, N.W.
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Re: CC Docket No. 94-102 (E-911)

Dear Dan,

I am submitting to the record the following information on the strongest signal issue. The attached document demonstrates that call origination should not use RF signal strength as the sole guide when a 911 call needs to be made. The net effect of relying on the strongest signal approach for 911 call completion would be an increase in public jeopardy due to the resulting unacceptably high level of call blocking. (This information was developed by CTIA in conjunction with independent technical experts.)

Also attached you will find an explanation of the strongest signal impact on call setup time. The strongest signal approach to processing 911 calls will add an additional 4-18 seconds to the call completion time on top of any delays caused by the mobile station performing rescan or any call setup. Delays in processing 911 calls could prove more disastrous in emergency situations as callers attempt to redial 911 over and over, thereby resulting in even further delays.

Dan, for your convenience I have attached two additional documents. One document is the public safety response to the Alliance Trott report and the second document is CTIA's ex parte previously filed with the Commission.

I am confident that the attached information will shed light on the problems associated with the strongest signal proposal. In good faith, the wireless industry cannot accept a proposal that has the potential of placing the public in harm's way.

Sincerely,

Brian

Brian F. Fontes

Attachments

A Study of 911 Call Origination Policies in Cellular and PCS Systems

INTRODUCTION

With the importance of 911 emergency calls today, the reliable support of 911 emergency calls in cellular and PCS systems is essential. Due to the critical nature of 911 calls, the success rate of call origination becomes an important issue. A proposal was made that 911 calls shall always be originated using the strongest RF signal regardless of the default band (A or B), system, or operator. The objective of this paper is to examine the effectiveness of this proposal, and to compare this proposal with alternatives.

SUMMARY and CONCLUSIONS

When a 911 call needs to be made, the call origination should not use RF signal strength as the sole guide. In fact, the analysis of this paper shows that this policy improves the call origination success rate only slightly under light call traffic condition. When the call traffic is beyond a moderate level, this policy is more likely to hurt the call origination success rate than improving it. When the call traffic is heavy or when many 911 calls need to be made due to the large scale of an emergency incident, this policy may even lead to catastrophe with an unacceptably high level of blocking rate. This catastrophe is mainly caused by the fact that most of the 911 calls originated around the same incident location will likely to lock into the same cell closest them. This tends to make the available channels in the cell the dominate factor relative to the coverage hole factor.

Beyond the call origination policies studied in this paper, the call origination success rate can improve significantly when handset is allowed to originate calls in the second cell when its origination in the first cell fails. Even in this situation, the first call origination is recommended to use the handset default system to guarantee even call distribution and to avoid potential call collision.

I. SYSTEM MODEL

In general, the success of a call origination is a function of the following parameters:

1. the signal strength;
2. the designed blocking rate of the system;
3. the available channels of the system during the time of the call;

Since the time of the call depends on the time of the incidence, and is not a controllable parameter, we shall focus on the first two parameters in this study.

Currently in the United States, there are two frequency bands (A and B) in the cellular frequencies, and more than three frequency bands (A, B and C) in the PCS frequencies. Since the PCS systems using band C and others are not yet widely deployed, we shall assume the general availability of only four frequency bands (or operators) for both cellular and PCS in this study. We shall also study the case in which there are only two bands available (cellular only or PCS only cases).

For any given frequency band, we further make the following assumptions based on typical cell site settings of the current cellular and PCS service providers:

1. the coverage of each cell is 90%;
2. the call blocking probability is 2% in the coverage area;
3. the emergency location can be anywhere in the cell with identical probability;
4. probabilities that a call belonging to one of the four frequency bands is identical;
5. normal calls and 911 calls arrive according to a Poisson process with a constant call arrival rate λ;
6. call lengths are statistically independent and follow exponential distribution.

Let us consider two polices for call origination when an emergency situation occurs. In the first case, a call is originated using the strongest detected signal regardless the default band, system (if the phone is at least dual mode) and operator. In the second case, a call is originated using the default band and operator.

Based on the current statistics, 911 calls are usually originated in clusters in both time and space. This is because that calls are usually made around the time and place of an incidence. For a particular incident, usually more than one 911 calls are made depending on the size of the incident and number of people involved. For this reason, we shall study the case in which all 911 calls will be made within one cell. Here we use the word cell as a generic term that means a cell site when the cell site is omni-directional and a sector when the cell site has more than one sector.

To study the call origination success rate, we shall adopt the Erlang-B queueing model. Assume that the call arrival rate is λ, the call duration is $1/\mu$, and the number of channels in the cell is m, the probability of a call being blocked is given by[1]:

$$p = \frac{(\lambda / \mu)^m / m!}{\sum_{k=0}^{m} (\lambda / \mu)^k / k!} \tag{1}$$

Denote p_1 as the probability that a call is in the coverage area. Clearly, the probability of a successful call origination in a given cell P is the product of the probability that the call is in the coverage area and the probability that the call is not being blocked due to lack of any channel, given by:

$$P = (1 - p) p_1 \tag{2}$$

II. CALL ORIGINATION ANALYSIS

Given the mathematical model as described in the last section, we shall examine the call origination success rate using some typical numbers so that certain typical trends can be identified.

First let us consider the cell site coverage issue. When there is only one cell, the coverage is assumed to be 90% as given in the last section. When there are two frequency bands covering the same area, the coverage clearly improves because the cell sites may not be in the exactly the same location. However in this case, we cannot assume that the two cell coverage areas are statistically

[1] Leonard Kleinrock, Queueing System, Vol. I., pp. 106, John Wiley & Sons, 1975.

independent. Cell location selection is clearly a complex problem and a detailed study of this problem is out of the scope of this paper. However, it is important for us to observe that:

1. cell sites are selected to cover residents, business and traffic roads;
2. different operators of different frequency bands usually target the same set of customers;
3. many coverage holes are due to particular terrain structure that may affect coverage of all operators.

To circumvent the above complex problem, we shall adopt the following simple mathematical model. As shown in the following figure, there are two cells located along the x axis with a distance x_1 between them. The coverage of the two cells are the two circles as shown with the same radius r=1. When x_1=0, the two cells are at the exactly the same location and the two coverage areas completely overlap. When one of the cell moves to the edge of another cell, x_1=1, the overlap areas decrease to the minimum. When the cell center moves outside the coverage area of the given cell, we assume that it belongs to another cell and it shall overlap with an adjacent cell of a different service provider. Therefore, the range of x_1 is between 0 and 1.

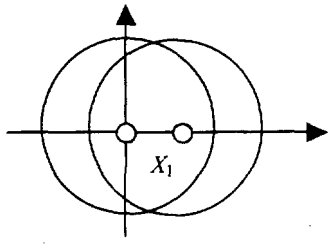

Figure 1. Two cell sites at different locations with common and separate coverage areas

With the help of the above figure, we shall try to identify the percentage of the overlap area of the two cells and to determine the percentage improvement of the coverage when a location is covered by two cells.

From the above figure, the overlap area can be computed from the following equation.

$$\begin{aligned} A &= \int_{x_1-1}^{1-x_1/2} dx \int_{\sqrt{1-(x-x_1)^2}}^{\sqrt{1-(x-x_1)^2}} dy + \int_{1-x_1/2}^{1} dx \int_{\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy \\ &= \frac{\pi}{2} + (1-1.5x_1)\sqrt{1-(1-1.5x_1)^2} + \arcsin(1-1.5x_1) \\ &\quad + \frac{\pi}{2} - (1-x_1/2)\sqrt{1-(1-x_1/2)^2} + \arcsin(1-x_1/2) \end{aligned} \tag{3}$$

By substituting x_1=1, and x_1=0 into the equation, we observe that the overlapping areas for the two cells are 40% and 100% respectively.

To determine the coverage improvement due to two overlapping cells covering the same location, we need to know the average of the overlapping with x_1 as a variable. We further assume that x_1 follows a linear distribution with the maximum at x_1=0 and zero at x_1=1. This assumption is included to account for the observation that different operators usually target the same set of customers. Therefore the cell locations may more likely to be close than to be apart. Under all

these conditions, the average of the overlapping area for the two cells is computed to be about 85% relative to the whole cell area.

Now let us calculate the probability that a call is in the coverage area with two operators. It is:

$$p_2 = 0.85p_1 + 0.15(1-(1-p_1^2)) = 0.9135$$

The above number is calculated assuming p_1=0.9. With similar argument, we can also calculate the probability that a call is in the coverage area with four operators:

$$p_4 = 0.85p_2 + 0.15(1-(1-p_2^2)) = 0.925$$

From the above analysis, the average of the coverage improvement is about 2.5% under the assumption that different operators target similar set of customers.

As for other parameters, we shall assume that the average number of channels in a cell is m=20. The average call duration is $(1/\mu)$=2.5 minutes as published by CTIA[2]. Under all the above assumptions, the blocking probability for a call that always select the strongest signal of two cellular or PCS operators regardless the handset default is

$$P_s = 1-(1-p)p_2 = 1-p_2\left(1-\frac{(\lambda/\mu)^m/m!}{\sum_{k=0}^{m}(\lambda/\mu)^k/m!}\right) \tag{4}$$

Note that in this case all calls will select the same cell for call origination because this cell is supposedly closest to the incident site and has the strongest detected signal. The blocking probability for a call that always select the strongest signal of four cellular and PCS operators regardless the handset default is

$$P_s = 1-(1-p)p_4 = 1-p_4\left(1-\frac{(\lambda/\mu)^m/m!}{\sum_{k=0}^{m}(\lambda/\mu)^k/m!}\right) \tag{5}$$

Note again that in this case all calls will select the same cell for call origination because this cell is supposedly closest to the incident site and has the strongest detected signal. When a call is made using the handset default setting, the blocking probability can be determined from:

$$P_d = 1-(1-p)p_1 = 1-p_1\left(1-\frac{(\lambda/\mu)^m/m!}{\sum_{k=0}^{m}(\lambda/\mu)^k/m!}\right) \tag{6}$$

In this case calls will be uniformly distributed in two or four cells belonging to two or four different operators. Since calls are not originated using different operators, the number of channels available for a call remains to be m=20 rather than 40 or 80. No further queueing

[2]Survey Result Table in Wireless Reference Desk at CTIA Website

efficiency can be obtained. However, the Erlangs value (λ/μ) does increase by two or four times. Or equivalently, $\lambda_d=2\lambda$ or $\lambda_d=4\lambda$ for a given μ.

Substituting all the numbers in the above three equations, the call blocking probabilities for the above four cases can be computed with respect to the supportable call arrival rate per minutes as shown in the following figure.

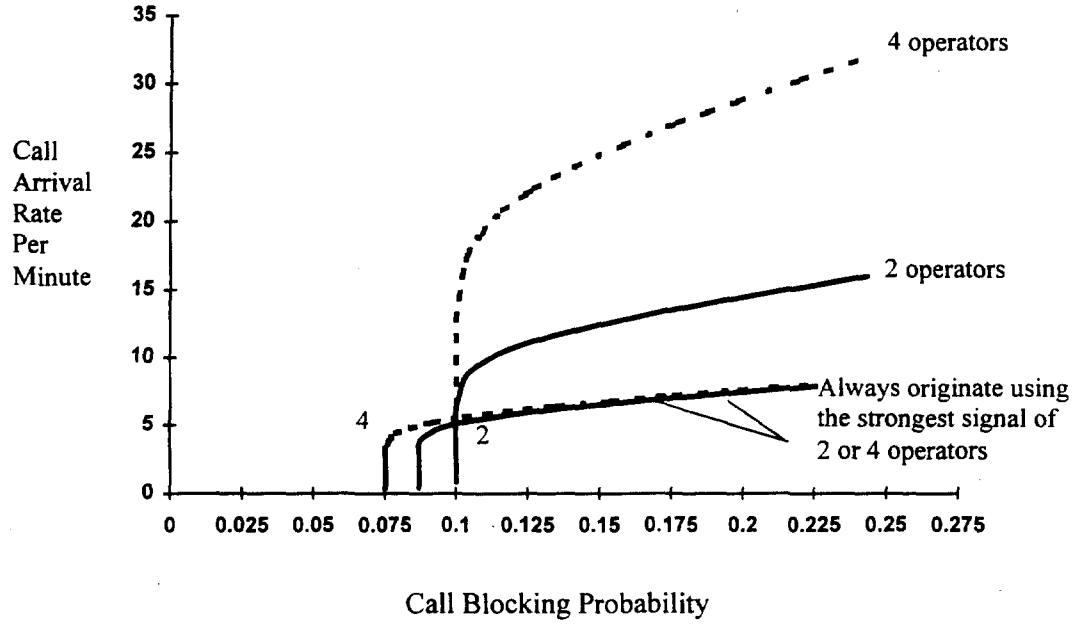

Figure 2. Supportable call arrival rate as a function of call blocking probability

From the above figure, the following observations can be made:

1. When the system is not busy, and calls arrive at the cell site at a rate less than 5 calls per minute, call origination using the strongest signal has 1.4% or 2.5% less chance to be blocked depending on whether 2 or 4 operators are available.
2. When the system is busy with more than 5 calls per minute, call origination using the handset default system performs much better because it has much less chance to be blocked by other calls.
3. The above figure is obtained assuming the system is empty with no calls. When there are existing customers, the supportable call arrival rate will decrease linearly according to the load.

III. FURTHER DISCUSSIONS

From the analysis of the previous sections, the success rate of the 911 call origination depends on both signal strength and call volumes. When call volumes is low, the origination scheme based on signal strength is superior. When call volumes is high, the performance curves cross cover and the origination scheme based on handset default setting is better. While these results are obtained based on certain specific parameter assumptions that are subject to change, this cross-over trend nevertheless appears to be general.

While so far we only studied cases in which calls are always originated in a particular cell, the results can also apply to the cases in which calls are allowed to be originated in another cell when origination in one cell fails. In this case, the results can be interpreted as the success rate of the first attempt of call origination.

"Strongest Signal Impact on Call Setup Time"

Call setup times for 9-1-1 calls will be significantly longer when the call is processed for registration and authentication by the accessed system. This is because half of the time, the mobile station will access a system that it has not been registered to previously (i.e., the "non-preferred system").[1]

The registration cycle for IS-41-based network signaling requires an authentication message exchange and a registration message exchange. The authentication message exchange proves the phone is who it says that it is and the registration message exchange retrieves the profile of the mobile station, including the mobile directory number. Once this information is obtained the call can be allowed to proceed with the callback number. Authentication Requests may take up to 6 seconds and Registration Notification may take up to 12 seconds for a total of 18 seconds (according to the IS-41 standards). These numbers are worst case numbers with nominal delays expected to be around 4 to 6 seconds for each registration attempt. Thus, if a phone is registered on the A carrier, scans A-B and then selects the B carrier when 9-1-1 is called, re-registration on the B carrier could take an additional 4 to 18 seconds. These delays are on top of any delays caused by the mobile station performing rescan or any call setup.

To implement this callback capability using the "strongest signal" concept, roamer agreements would have to be supported between all service providers. In addition, for this to work, IS-41 network signaling protocols would have to be modified to support such emergency service roaming agreements. This protocol development would take time and investment to standardize, develop, and deploy.

In should also be noted that registering on the subscriber's non-preferred system may result in a loss of the ability to support the subscriber's chosen location service. A service provider may elect to offer mobile assisted location services that may not be supported by other service providers. When the subscriber-scans to the non-preferred service provider, the ability to precisely locate the mobile station may be lost. For example if Carrier A elects to use GPS units built into the consumer's handset, location will not be possible for Carrier B's customers that end up on Carrier A's network because of the "strongest signal concept".

[1] Note that registration is required for mobiles to obtain their mobile directory number, since the mobile directory number and mobile identification number will no longer be tied together in order to support local number portability and NPA splits. The serving system uses the mobile directory number as the callback number when it passes the 9-1-1 call to the emergency services network.

Public Safety Response to the Alliance Trott Report

February 23, 1998

This statement from three national public safety communications organizations* is in response to the "Trott Report" of January 27, 1998, which was prepared for the Ad Hoc Alliance ("Alliance") for Public Access to 9-1-1. As the Commission is aware, there is an ongoing debate between the wireless industry and the Alliance as to the technical merits of "strongest signal" and whether or not a new standard is needed to implement it. As requested by the Commission, public safety and the wireless industry have met with the Alliance on several occasions and have formed the Wireless E9-1-1 Implementation Ad Hoc ('WEIAD") to address wireless 9-1-1 issues, including the Alliance's proposal.

We have several concerns, from a public safety perspective, regarding the "strongest signal" concept. The wireless industry and the 9-1-1 service providers are building 9-1-1 trunks from the mobile switching offices to the 9-1-1 tandems, engineered to support a P.01 grade of service, as is the norm for wireline. We provision trunk groups by region in order to enable default routing of calls in the event of an ANI failure, as well as to provide a choke-point to limit the debilitating effects (on the PSAP) of large spikes in call volume; again, as is the practice with wireline 9-1-1. Specific trunk groups are assigned and circuits are sized for each individual carrier between the cellular mobile switching offices and the 9-1-1 tandems.

Thus, the two wireless cellular carriers in each licensed service area provide not only separate voice channels, but also separate 9-1-1 trunks. But this useful duplication of capacity would be lost in the Alliance proposal. By design, "strongest signal" would totally eliminate the carrier that has the weaker RF signal in a given area from processing any calls and force all 9-1-1

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* National Emergency Number Association ("NENA"), Association of Public-Safety Communications Officials-International, Inc. ("APCO") and National Association of State Nine-One-One Administrators ("NASNA"). The statement is submitted to the Federal Communications Commission ("FCC"), pursuant to Section 1.1206 of the Rules, as an ex parte communication in the Further Notice of Proposed Rulemaking in CC Docket 94-102, 11 FCC Rcd 18676, where at ¶144 comment was sought on an Alliance proposal that 9-1-1 calls be forwarded to the cellular system with the strongest control channel signal.

traffic to the carrier with the stronger forward control channel (FOCC). Not only will this reduce the ability to transport 9-1-1 calls from the local area by approximately 50%, in addition, 9-1-1 calls from any other point within the region served by the same mobile switching office may also be blocked, regardless of the availability of a perfectly satisfactory voice channel and available 9-1-1 trunks from the other carrier. Furthermore, the strongest control channel will not always deliver the strongest voice channel. If a voice channel is not available at the cell site sector where the strongest control channel is transmitted, the cellular phone will be redirected to another sector and/or cell site which may produce a weaker voice channel than the one assigned by a weaker forward control channel from the other carrier.

Our second concern is that some of the carriers will meet Phase I and Phase II caller location mandates much sooner than others. As the Commission is aware, New Jersey has successfully demonstrated a live 9-1-1 Phase II trial. New Jersey hopes to deploy Phase II in 1998. Texas and other states are also embarking on early implementation of Phase II technology. However, the "strongest signal" concept is having a negative effect on the willingness of the carriers to move forward with location technology prior to October 1, 2001. Carriers who are stepping up first to provide Phase II location are hoping to use the system to increase their market share, which, in turn, will help offset some of the costs of location technology. The "strongest signal" concept will cripple the ability to market 9-1-1 location service. What cellular carrier would agree to collect a surcharge for, and build, 9-1-1 location technology if the "strongest signal" rule could cause their system to be bypassed when needed most? And even if we are able to convince the carriers to move forward with location technology, who will take accountability for moving the caller from his carrier of choice, with location technology, to the other carrier which does not have location technology and is, therefore, unable to provide the location data for which the subscriber may be paying a premium?

Our third concern is related to this same issue of caller location. From a public safety perspective, we feel it is better to receive a 9-1-1 call with Phase I and/or Phase II location technology than one with a slightly stronger signal but without Phase I and/or Phase II

technology. The Trott report seems to overlook the fact that signal strength need only be adequate, not the strongest. If you can talk in a normal voice to someone, does shouting make it better? We suspect not. The cell sites and phones need sufficient signal, and if the signal is stronger, then the cell site's power controls the phone to reduce its power. Words like "weak" or "strong" have little meaning because they are subjective. "Stronger" does have meaning because it implies that one signal is being compared to another signal. We disagree with the Trott report that the presence of a weak and inadequate preferred signal will prevent the handset from switching to the non-preferred system. Cell sites have the ability to measure signal level, and there are specific quality thresholds like a carrier-to-interference (C/I) ratio of 18dB, or signal level > - 110 dBm. If a phone is locked, it is registering. The cell site responds to every registration to confirm to the phone. If the phone can see the cell site with enough power, and if the cell site can see the phone at or above the thresholds, the phone can register and be confirmed, and calls can be carried. If the phone is below thresholds, registration and calls cannot be completed, and the phone will seek another forward control channel from the preferred carrier or the non-preferred carrier depending on the programming of the mobile unit.

The advantages of Phase I and Phase II must not be underestimated. As we have pointed out on several occasions, "we can't help them if we can't find them." The Alliance "strongest signal" proposal is but a single approach to reaching the goal of, "the call must go through." We fear "strongest signal" will actually have the opposite result. Given the indisputable fact that "strongest signal" will eliminate the weaker carrier, and with it, half of the call handling capacity in the area, it is far less effective than programming cellular phones for A/B and B/A.

"A/B" or "B/A" ("A over B" or "B over A") means that analog cellular phones can be built or programmed to switch to the alternate carrier when the preferred carrier provides no signal or an inadequate signal below the established threshold. This option is available today for the over 50 million existing phones and new phones without a single alteration to hardware, software or their associated standards. We have heard repeatedly from the Alliance about the two cases in California where it was reported that the caller could not reach 9-1-1 on a cellular

phone. We still have unanswered questions about those incidents. Was the phone programmed for A or B side only or A/B or B/A? Did the cellular carrier have available talk channels at that moment in time? Were 9-1-1 trunks available from the cellular mobile switching office to the 9-1-1 tandem at that moment in time? Does the Alliance truly understand that "strongest signal" will actually cause 9-1-1 calls to be blocked if the "stronger" carrier's voice channels are all in use or its switching office-to-tandem trunks are at capacity?

A better way to address the "coverage holes" identified by the Alliance may be to simply program the cellular phones for A/B or B/A. We have proposed this solution to the Alliance but they believe it is insufficient. They contend that the shift from A to B or B to A only occurs when the preferred carrier's signal offers no signal and leaves at risk calls from areas where the preferred carrier's signal is too weak to seize or maintain a voice connection but not weak enough to cause the rollover. We disagree with this contention as stated earlier. The standards which govern AMPS telephones (ANSI/EIA/TIA-553-1989) clearly describe the process of A/B and B/A on page 2-12, "If the mobile station cannot complete this task on the strongest dedicated control channel, it may tune to the second strongest dedicated control channel and attempt to complete this task within a second 3-second interval. 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 (A/B); if the serving-system is disabled, it may be enabled (B/A). The mobile station must then enter the Scan Dedicated Control Channels Task (2.6.1.1)."

There are approximately 35,000 cell sites in the country, and certainly for cellular, coverage is usually not the issue. Frequency re-use and frequency management is the real issue. Carriers have only 3 real tools to manage frequency re-use: antennae type, antennae downtilt, and cell site power level. Most of the cellular build-out that has happened in the last 3 years has been to add cell sites to permit further re-use. Coverage has been growing only gradually, and then only in unique circumstances, like state parks and the Pinelands of New Jersey where the difficult siting issues are. In the most heavily used parts of cellular systems, coverage has been

adequate to good. Carriers usually do not leave blank spots, but are trying to avoid interference. Carriers do regular drive testing of their system to verify "best server" and "second best server". Carriers also use RF modeling and propagation tools to assist in determining appropriate levels to set power at each site.

We also have a fourth concern, that if a channel is lost as result of a moving event, a redial may very well connect the caller to another carrier and another PSAP. The Alliance makes the point that, often, a carrier will assign a voice channel and then release it because the level is too low. We have seen calls dropped on a few occasions, usually several miles from where the channel was originally acquired. "Strongest signal" does nothing to mitigate this phenomenon, which is usually associated with a moving caller. It may be dependent on the caller's direction of travel and the total cellular traffic at that particular moment in time. However, the control channel and up to 19 (typically 16 or 17) voice channels are connected to the same antenna combiner and its antenna. The control channel transceiver and the voice channels transceivers are on par. We agree with the statement in the Trott report in section 3, page 4. The report stated, "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 the cell site." If the control channel is adequate, then so are the voice channels and a conversation can be carried.

Although we would prefer to leave the issue of standards changes to the wireless industry and manufacturers, we are puzzled by their statement in the Trott report on page 5, section 6, and their statement on page 6, section 7. On page 5 Trott states, "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." And then on page 6, "No new standard is needed for this action." That position appears to be in conflict with our copy of the standards approved April 19, 1989. On page 2-11 of ANSI/EIA/TIA-553-1989 standards, section 2.6.1.1.1 "Scan Dedicated Control Channels" states, "If the serving-system status is enabled, a mobile station must examine the signal strength on each of the dedicated control channels assigned

nationwide to System A. If the serving-system status is disabled, a mobile station must examine the signal strength on each of the dedicated control channels assigned nationwide to System B." Nowhere in the standard could we find a process where the full list of forward control channels for both A and B (42 in the U.S., 52 in Canada) are scanned.

This has been the public safety community's basis for assuming that Alliance's proposal would involve a change of standards, and this is why we supported the WEIAD-3 suggestion that the proposal be submitted to the standard-setting body known as TR-45. If our assumption is incorrect, we still believe that only an objective systematic analysis, not undertaken thus far, will determine whether "strongest signal" is worth the reduction by half of the cellular capacity available to transmit wireless 9-1-1 calls, in addition to the other serious problems enumerated above.

"Strongest Signal" Proposal
CC Docket 94-102

Each day, nearly 83,000 wireless calls are successfully completed to 9-1-1 and other emergency numbers. Wireless users rely on wireless carriers to complete these calls, and the wireless industry is committed to the best solutions to insuring that emergency calls get through to the appropriate Public Safety Answering Point.

CTIA opposes the "Strongest Signal" proposal - *which we understand to be the strongest forward control channel (i.e., from the cell site to the mobile) which implies – but in fact is independent of -- the automatic assignment of the best voice channel from the mobile to the cell site for analog-only cellular phones when "9-1-1" calls are attempted* - because it will reduce the reliability of wireless networks and do more harm than good.

- **Does Not Ensure Best Voice Channel.** Use of the strongest forward control channel does not increase the probability of the mobile being assigned the strongest available voice channel.

- **Diminution of the Benefits of "Enhanced" 9-1-1 Service.** The serving switch must be able to validate the wireless customer to provide the PSAP with the call-back information that provides the predicate for this proceeding. Since the "Strongest Signal" proposal will route calls randomly, half of all calls from "strongest signal" units will not be handled by the customer's wireless carrier, and therefore will not be validated by the serving switch. The Public Safety community petitioned the Commission to adopt rules that would extend enhanced 9-1-1 capabilities to all wireless users.

- **Increased Call Set-Up Time.** Handset manufacturers will have to redesign wireless phones to screen dialed digits before placing a call in order to identify 9-1-1 calls and initiate the scan of both bands seeking the strongest signal. Because the need to scan both bands, the normal call set up times will be doubled or tripled, causing users, particularly in an emergency situation, to hang up and redial, over and over again.

- **Increased Likelihood of Blockage.** The "Strongest Signal" proposal is more likely to result in fewer, not more, successfully completed calls. Think of a four lane highway -- why would the State Highway Commissioner deliberately block two of the lanes to emergency vehicles. It is much better to use both carriers' networks to deliver 9-1-1 calls.

- **Removes Incentives for Carriers to Deploy Advanced Location Features.** The "Strongest Signal" proposal removes the incentive for wireless carriers to deploy advanced 9-1-1 location technologies as a way of differentiating themselves in the market, since customers could not be certain that any one 9-1-1 call would be handled by his/her chosen carrier.

TIA Should Address This Issue. The "Strongest Signal" proposal, while superficially simple, will trigger many consequences, not all intended, on wireless carriers' ability to complete emergency calls. TIA is the most appropriate forum to resolve these issues.