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Ms. Magalie Roman Salas, Secretary
Federal Communications Commission
Office of the Secretary
445 – 12th Street, S.W., Room TW-A325
Washington, D.C. 20554

RE: CC Docket No. 02-46

REPLY to "Pulver.com comments on the Hatfield E911 Report, dated October 30th, 2002"

Dear Ms. Salas,

This letter is in reply to the comments presented by pulver.com. We fully agree with the points made by pulver.com, and would like to amplify upon them by making the following points:

1. Increase in indoor cellular users

Although the majority of calls made from mobile phones are from outdoor callers, the percentage of calls made from indoor locations is growing. We anticipate that within the next few years over 50% of mobile calls will originate indoors.

Regarding the use of mobile phones for emergency calls, we fully agree with pulver.com that "people will expect that their wireless appliances will provide them with emergency services at all locations, including multi-story buildings, subway stations, and similar structures".

2. Difficulty of originating calls from indoor locations

Before discussing the issue of whether it is possible to track E911 calls made from indoor locations, it is important to consider the reliability of the cellular network for emergency calls originating indoors. For a number of reasons, existing cellular networks do not always provide adequate coverage required for reliable indoor communication. The following are a few of these reasons:

1) Building obstructions (exterior and interior walls) attenuate the signal below the level required for maintaining the link.
2) At high floors (usually above the clutter) the handset is exposed to multiple base station signals that create "co-channel interference" or "pilot pollution".

Foxcom Wireless therefore suggests that particular attention be drawn to the need for adequate indoor coverage as a prerequisite to the discussion of In-Building location identification.

3. Utility of landline telephones during emergencies

Some believe that, in the event of an emergency, it will be possible to rely upon the landline telephone system. The sad truth, as we have seen from the tragic events of September 11th 2001, is that landline systems are susceptible to localized failures and may not be available during an emergency. In addition, in many emergency situations, such as a person suffering a medical emergency in a building parking floor, a telephone extension may not be accessible.

4. Available technologies for indoor location identification

Several technologies have been proposed for indoor location identification, including network-based technologies (TDOA and others) and handset based technologies (AGPS and others). However, all of these technologies are flawed in terms of their ability to locate indoor callers. We fully agree with pulver.com's comments that:

"Large steel and concrete buildings, subways and large malls may be difficult or even impossible to cover using traditional wide area location technologies such as AGPS and TDOA (Time Difference of Arrival). Low signal to noise ratio and signal multipath effects in these environments decrease tracking accuracy or even prevent signal acquisition".

And:

"Multiple story buildings pose additional obstacles for tracking, as they require three dimensional positioning. Even if the longitude and latitude of an individual in a fifty

story building were known with great accuracy, that knowledge would be insufficient because the emergency team would have to search every floor. For an accuracy of 200 meters, the location fix may cover many multi-story buildings. Under these conditions, a rescue team could spend hours just searching for the caller."

As of today , none of these technologies can offer a reliable solution that can be trusted in the event of an emergency to locate an indoor E911 caller.

5. Foxcom Wireless' proposal for an indoor location identification system

Foxcom Wireless proposes to enable indoor location identification by use of indoor antennas distributed in the building space. Typically, these types of antenna arrays are used to provide wireless coverage indoors. As a matter of fact, many "major buildings" such as business centers, airports, and corporate buildings are already equipped with distributed antenna systems to provide indoor wireless coverage.

Use of distributed antenna systems for indoor location identification has the potential to simultaneously solve both indoor communication and indoor location identification problems.

With the proposed system, the location of the indoor subscriber is identified by his proximity to the receiving antenna (the same antenna used to serve indoor subscribers). A location detection algorithm is employed to manipulate the signal received from two or more antennas to accurately identify the location of the subscriber. Expected accuracy is up to 10 meters, including an exact identification of the floor where the E911 call was initiated. This algorithm is designed to cope with the reflection and fading characteristics typically associated with the indoor environment.

Care most be given to the interface between the building's location identification unit and the external "E911" system. A standard or procedure should be identified to allow this interface.

Respectfully submitted,

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