navanu

January 25, 2013

Via ECFS

To: Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Notice of Ex Parte Presentations - Wireless E911 Location Accuracy Requirements, PS Docket 07-114, and Framework for Next Generation 911 Deployment, PS Docket No. 10-255

Dear Ms. Dorch,

On Friday the 18th of December I had the opportunity to meet with Henning Schulzrinne, Erika Olsen, Zenji Nakazawa, Tim May, David Siehl, Eric Ehrenreich and Jerome Stanshine of the Public Safety and Homeland Security Bureau with the participation of my colleague Mayan Moudgill via teleconference, for a discussion on the need for improved indoor location accuracy for the next phase of E-911.

Following a brief history of the E-911 mandate and the current trends of mobility, cord cutting and the indoor usage patterns of today's mobile phone users we reviewed the currently deployed technologies deployed for E-911 and their unfortunate limitations when the user is indoors

The challenges and needs of an indoor environment differ significantly from those of the outdoors. While in an outdoor environment a general radius accuracy as required by the current E-911 mandate is largely sufficient, the indoor environment requires a greater accuracy due to line of sight obstructions and their greater density.

This challenge is significant due to the fact that an increasing majority of mobile usage occurs indoors yet the ability to locate them in the case of emergency is dramatically reduced ad hampered.

There are many non-telco technologies currently in deployment or being developed to address indoor location positioning such as:

- Wi-Fi triangulation and pattern matching
- Bluetooth triangulation beacons
- Sound based systems
- Lighting signatures in LED
- TV high propagation signal triangulation
- Augmented reality
- Sensors in devices enabling various approaches of dead reckoning
- GPS augmentation such as high powered terrestrial transmitters circling an urban area or "pseudollites" which are indoor GPS beacons

(A more detailed breakdown of the deficiencies of many of these technologies for emergency services can be found beginning on slide 16 in the attached presentation)

While all these technologies are sufficient for the application they are meant to serve and at times can augment the existing E-911 capabilities, they don't meet the need for a universal, managed, and guaranteed national capability.

All of these requisite characteristics are an inherent component of the wireless carriers sheer existence, which as it happens are increasingly moving the network indoors and closer to the user with the heterogeneous network. Therefore the only requirement is a technology solution that enables this new wireless network to accurately locate a mobile device indoors, without any required deployment changes, so that the existing network rollout and maintenance plans are capable of supporting the new capabilities without adding any additional burdens.

Navanu's Location by Analysis of Multiple Paths (LAMP) is capable of residing within the wireless network base stations to accurately locate a mobile device to within a few meters. The capability currently in early development resides within a small cell or a DAS system – or any wireless broadband access point – as a passive RF analyzer that can isolate a signal from a mobile device and map its location. The cost of deployment is minimal and can range from a few dollars to somewhere under fifty dollars, depending on the small cell's design, while not necessitating any new requirements for site deployments.

While the existing mandated requirements were justified while there was no alternative, there is no longer a need to compromise the safety of the public during an emergency now that the capability exists. It is therefore our suggestion that any new mandated accuracy should match the real world needs and take into account the density and line of sight factors.

A possible approach can have different requirements based on factors such as: rural, residential rural, high occupancy rural, urban, dense urban, high occupancy urban, indoor, dense traffic indoor and high traffic/occupancy indoor. This approach is well aligned with the carriers existing rollout plans of small cells, as these densely trafficked locations are precisely the areas where the carriers feel the need to densify their networks with small cells, and the greater the traffic the denser the deployment.

These definitions are merely a suggested starting point for a conversation on how to account for the density and line of sight realities.

Another suggestion I would make is that the indoor accuracy test bed or some form of it be maintained on an ongoing basis, so that as new solutions develop or as existing solutions improve the committee can follow-up immediately and update the mandate to reflect any new capabilities in a flexible and timely fashion.

While this discussion is focused primarily on mobile E-911 calls and other interactions such as those being discussed in the context of NG-911, there are additional uses of the location capabilities for public safety such as:

- **Road safety:** controlling the device capabilities from the network to comply with state safe driving laws.
- **Geo alerts:** improve the capabilities of the current WLA system
- **Emergency response:** improve the situational awareness of first responders to locate individual or other capabilities.
- **Urban planning:** a better understanding of travel patterns is the first step towards their improvement.
- **Surveillance:** when required the system can better assist security services to monitor an individuals location and activities.
- **Military:** discover suspicious mobile phones based on their location and overall situational awareness.

The focus on government capabilities does not mean that there are no practical application and monetization opportunities beyond emergency services. Some of the opportunities include:

- **Applications:** contextual apps that require ambient location awareness without an effect on the battery consumption or tied to an operating system.
- **Network:** Improved real-time network monitoring and optimizations.
- **Engage customers:** increase engagement and relevance to customers empowering other industries such as retail.
- **Advertizing:** immense advertizing opportunities created by improved targeting
- **Data platform:** empower a whole new generation of applications that simply cannot be replicated in other environments.
- **Big Data:** knowledge services for 3rd parties requiring real world analytics.

The capabilities if deployed will require strict privacy controls, but if done correctly can actually improve customer privacy from today's status quo.

During the presentation a discussion ensued relating to the capabilities of the technology if it were embedded within a Wi-Fi access point, whether it would have the ability to better position a device on the access point that initiated an emergency interaction within the context of NG-911.

During the presentation I responded that once the capabilities were in place to locate the physical location of an IP address attached to the wireless access point, our technology would be able to augment that and provide an improved position fix. However while further contemplating the question I realized that while that answer was technically correct and still remains the optimal use

case, there is another possibility that can either short circuit that requirement which will necessitate a significant amount of infrastructure modifications and will understandably take a while to implement, or we can use it to further augment the precise position of the actual Wi-Fi device.

Because we now have Wi-Fi capabilities plus our sensor embedded within the wireless access point, we can partner with somebody who maintains an active database of Wi-Fi hotspots like Skyhook Wireless for use in their positioning algorithms and locate the access point used for the 911 trigger to further isolate its position. This is something Skyhook already does with a US carrier (If memory serves right its Sprint although I may be mistaken) to locate their residential femtocell's and provision them to comply with their local licenses and other regional parameters or restrictions.

While this wouldn't be perfect due to the fact that there is no guarantee there will be nearby Wi-Fi access points, the fact is that most dense urban environments where the accuracy needs are greatest have quite a few. This is also reflected in the FCC's current initiative to free up more spectrum for Wi-Fi due to the overabundance of hotspots and the resulting interference issues.

I therefore followed up with Tim and Dave in an email on January 20th to notify them of this capability.

Please contact the undersigned for any inquiries concerning this filing.

Respectfully,

/s/
Mordy Kaplinsky

CC: David Furth
Henning Schulzrinne
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David Siehl
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Jerome Stanshine