Before the

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Wireless E911 Location Accuracy Requirements	)	PS Docket No. 07-114
	)	
E911 Requirements for IP-Enabled Service Providers	)	WC Docket No. 05-196
	)	

COMMENTS OF THE VOICE ON THE NET COALITION

VOICE ON THE NET COALITION
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SUMMARY

The Voice on the Net Coalition welcomes the opportunity to work with the Commission, industry and public safety organization to improve the delivery of emergency services in the United States with Internet Protocol (IP) enabled technologies. The VON Coalition and its members played a key role in facilitating the adoption of and compliance with the current E911 obligations for interconnected VoIP providers. The Commission's decision to require interconnected VoIP providers to deliver E911 to its consumers was based in large part on consumer expectations regarding use of VoIP as a replacement telephone service. Wisely, the Commission recognized that various certain VoIP products, devices, services or applications might be an incidental part of the product while others would be adopted by consumers to enhance or supplement (and not replace) their primary voice communications. Expanding E911 obligations to IP-communications services that that fall outside the interconnected VoIP definition at this time would be a costly endeavor, with limited benefits to consumers or public safety. VON thus recommends that the Commission proceed cautiously as it considers expanding the existing E911 obligations to new communications services, applications, and devices.

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COMMENTS OF THE VOICE ON THE NET COALITION

The Voice on the Net Coalition (VON)[1] hereby submits these comments in response to the Notice of Inquiry issued in the above-referenced proceeding.[2] The VON Coalition welcomes the Commission's inquiry into how the delivery of emergency services in the United States can be improved by harnessing the power of broadband and Internet Protocol (IP) enabled technologies. However, expanding obligations to Voice over Internet Protocol ("VoIP") market segments that fall outside the interconnected VoIP definition prior to the transition to a Next Generation (NG) 911 network would be a costly endeavor requiring retrofitting of technology to become backward compatible to the legacy 911 system, yielding no real benefits to consumers or

[1] The VON Coalition works to advance regulatory policies that enable Americans to take advantage of the promise and potential of IP enabled communications. VON Coalition members are developing and delivering voice and other communications applications that may be used over the Internet. VON Coalition members include AT&T, Broadvox, Google, iBasis, Microsoft, Skype, T-Mobile, Vonage and Yahoo.

[2] *Wireless E911 Location Accuracy Requirements; E911 Requirements for IP-Enabled Service Providers, Further Notice of Proposed Rulemaking and Notice of Inquiry (NOI),* WC Docket No. 05-196, FCC 10-177. (rel. September 23, 2010). Comments in this proceeding were originally due January 3, 2011, but the date was extended to January 19, 2011. *Order,* WC Docket No. 05-196, DA 10-2267 (rel. December 1, 2010).

public safety.[3] In particular, VON recommends that the Commission proceed cautiously as it considers expanding the existing E911 obligations to new communications services, applications, and devices.

The VON Coalition and its members played a key role in facilitating the adoption of and compliance with the current E911 obligations for interconnected VoIP providers. By all accounts, interconnected VoIP deployment of E911 solutions has been a resounding success, resulting in the fastest and broadest onetime implementation of E911 in the history of public safety. The Commission's decision to require Interconnected VoIP providers to deliver E911 to its consumers was based in large part on consumer expectations regarding replacement telephony services. Wisely, the Commission recognized that various certain VoIP products, devices, services or applications might be an incidental part of the product while others would be adopted by consumers to enhance or supplement (and not replace) their primary voice communications. This decision to establish clear parameters based on whether a VoIP service was a replacement for voice telephony ensured that the IP industry would continue to invest and innovate in new products that bring tremendous value to consumers.

It is unnecessary and counter to the goals of the National Broadband Plan and the Commission's interconnected VoIP rules to impose additional regulatory costs and burdens on the VoIP market segments that fall outside the interconnected VoIP definition. In addition, it is premature for the Commission to expand the E911 obligations to require automatic location information for nomadic or mobile VoIP. The technology needed to provide accurate location

[3] *See Framework for Next Generation 911 Deployment*, Notice of Inquiry, PS Docket No. 10-255, (rel. December. 21, 2010) at para. 7 (finding that "today's 911 system remains reliant on increasingly antiquated analog or digital circuit-switched facilities. It is thus not capable of supporting certain functionalities made possible by a transition to broadband IP-based communications technologies –functionalities that have become commonplace in other communications systems.").

information for some new applications and from hot spots is not yet readily or ubiquitously available. Industry groups and public safety organizations are working on addressing technical and other feasibility issues related to IP-enabled services next generation E911 deployment. The Commission should issue a Notice of Proposed Rulemaking in this proceeding only after those deliberations are completed, recommendations have been made, and the feasibility of implementing new E911 solutions for IP-enabled services is assessed.

BACKGROUND

The emergence of VoIP has transformed the way people communicate by disassociating the voice capability from the underlying network. People are no longer tied to telephones, locations or service providers. Practically any device that can access the Internet has the capability to make or receive a voice communication. Consumers can talk to people as they play games and shop online, using devices that look more like tablets, game consoles, televisions, and radios rather than telephones. Communication anytime, anywhere – as long as there is a broadband connection.

The requirement that interconnected VoIP providers make available E911 service is less than six years old. Prior to that time, VON worked proactively with the National Emergency Number Association (NENA) to develop solutions that would allow VoIP subscribers to receive E911 functionality, by delivering 911 calls through the existing wireline E911 network. In 2005, using its authority under Title I of the Communications Act, the Commission required that E911 service be provided to interconnected VoIP customers as a standard feature of the service and be available from wherever the customer is using the service, whether at home or away from home.[4] Providers of an interconnected VoIP service with a nomadic feature (allowing the VoIP services

[4] *E911 Requirements for IP-Enabled Service Providers (VoIP 911 Order and NPRM)*, First Report and Order and Notice of Proposed Rulemaking, WC Docket No. 05-196 (released June 3, 2005) at para. 1.

to be used from different locations, as long as a broadband connection is available) also were required to have a mechanism in place that would allow subscribers to update and register their new location because it was not possible for the VoIP provider to otherwise know the subscriber's location.[5] The Commission's decision to require interconnected VoIP providers to provide E911 service was largely grounded in the theory that interconnected VoIP was used as a replacement for traditional PSTN telephone services and that consumers had a reasonable expectation of access to E911 services when using VoIP with telephone-like devices.[6]

The Commission also noted in the *VoIP 911 Order and NPRM* its intention to address in a future order an advanced E911 solution for interconnected VoIP that included a method for determining and updating a user's location without assistance from the user.[7] The Commission also sought comments on expanding E911 obligations to VoIP services not fully connected to the public switched telephone network (PSTN).[8] Finally, the Commission asked whether the use of wireless broadband connections, such as Wi-Fi or WiMax, would impact the applicability of the E911 obligations for interconnected VoIP providers.[9]

The Commission has not issued a subsequent order and six years later, in the wake of significant growth in new voice applications to meet consumer demand and the rise of new market segments that fall outside the interconnected VoIP definition, the Commission is once again reexamining these questions. The current *NOI* asks whether there are any advanced technically-feasible and commercially-available technologies that permit portable interconnected VoIP service providers to automatically identify a user's location though the VoIP provider is

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[5] *Id.* at para. 46.

[6] *Id.* at para. 23.

[7] *Id.* at para. 57.

[8] *Id.* at para. 58.

[9] *Id.* at para. 59.

not providing the underlying Internet access and would require the assistance of a third party to provide that location information. The Commission also asks in the NOI whether it should require automatic detection of a user's location prior to enabling calling features for a VoIP service, application, or device, which perhaps may be better asked after the initial question regarding the availability and cost of automatic location technology is answered. The Commission also asks again whether the VoIP 911 rules should be applied to VoIP services and applications that do not meet the interconnected VoIP definition (found at Section 9.3 of the Commission's rules), and whether it has the statutory authority to do so.[10]

Finally, the Commission recognizes the growth in the use of smartphones, mobile computing devices, and software applications that allow new voice calling capabilities. Accordingly, the Commission seeks comments on the expectation of consumers using these technologies to dial 911 and have the PSAP know where they are located. The Commission also seeks comments on whether any of these new devices, applications, and services should be subject to 911 and E911 requirements and, if rules are adopted, what a reasonable timeframe for compliance would be. Further, the Commission asks whether it should encourage industry solutions rather than regulatory requirements to address 911 calling capabilities, whether requirements should be different based on whether the service is accessed through a CMRS network or a Wi-Fi connection, and whether certain disclosures to consumers should be required if 911 services are not supported.[11]

[10] *NOI* at paras. 29-31.

[11] *Id.* at paras. 36-41.

DISCUSSION

I. Technical and Operational Obstacles to Providing ALI on Nomadic VoIP 911 Calls

Nomadic (or portable) VoIP services are provided through wireline (cable, DSL, fiber) or wireless connections, including WiMax, Wi-Fi hot spots, and Wireless Local Area Networks ((WLANs) at the user's locations. With increasing frequency, many VoIP applications are affiliated with mobile computing devices, either laptops, tablets, or smartphones that rely on wireless technology. Some of these VoIP applications provide outbound calling only, with no discreetly identifiable telephone number attached to the VoIP services, thus making it impossible to provide a call back number to the PSAP.[12] Moreover, VoIP applications typically do not have an inherent location functionality; rather, they must rely on other sources for the location information: including unaffiliated network access providers; third party location solutions providers or platform location APIs. Unfortunately, these sources of location information currently are not well developed and face a number of challenges, including:

- Existing 802.11 standards for enabling automatic location have significant practical limitations as they would require upgrading (and, more likely, replacing) not only tens of millions of Wi-Fi access points, but also the hundreds of millions of existing Wi-Fi enabled handsets and other devices that would also require the updated hardware and chipsets.
- Calculating location based on Wi-Fi signal "Time of Arrival" (TOA) technologies or measuring signal strength has significant limitations and challenges, particularly in indoor environments.

[12] Often the functionality of nomadic VoIP products is not limited to voice calling but also enables the consumer to utilize other information services such as screen sharing, chat, and video calling.

- Commercially available location based services are not sufficient to support emergency location.
- Even if location information can be accurately generated, there are significant practical limitations in making that information useful to PSAPs, particularly in campus and in-building environments where public safety officials likely will not have access to detailed maps of the campus or building.

Limitations in 802.11 location standards. With respect to obtaining location information directly from WLAN access points, the IEEE 802.11specifications[13] that could enable the automatic location of an access point have not been tested or certified by the Wi-Fi Alliance (the body that certifies Wi-Fi access technologies). Thus, these specifications have not been widely implemented either within access points or the chipsets in devices communicating with those access points. As a result, even if 802.11 location standards were adopted and certified by the Wi-Fi Alliance, these solutions could only be implemented through the physical upgrade to (or more likely replacement of) the tens of millions of access points currently deployed throughout the country as well as upgrades to the chipsets in the tens of millions of wireless devices communicating with those access points, including those at airports, coffee shops and book stores, where the Commission may lack authority to require such changes . Thus, relying on these 802.11 standards is not a practical solution.

Calculating a Wi-Fi user's location. Regardless of the manner in which an access point can convey its location to a wireless device (e.g., 802.11, DHCP), there are significant challenges in accurately locating the user communicating with that particular access point at any given time. In the case of a "hot spot" (i.e., a single access point as opposed to a WLAN with multiple access

[13] IEEE 802.11k is designed to provide geospatial location of an access point, and IEEE 802.11y is designed to provide civic location, but neither of these specifications has been appropriately tested and certified – much less deployed.

points), users theoretically can be located by a civic address loaded into the "hot spot" (e.g., Joe's Coffee Shop at 10th and L). However, given the intended propagation of a single access point (oftentimes more than 100m) and the possibility that a device will remain connected to that access point even outside the intended range, there can be significant uncertainty in the location information. For example, a user who connected at the coffee shop may stay connected to the coffee shop's "hot spot" even after the user has walked out of the store. Moreover, if that coffee shop is inside a shopping mall, the user could be in an entirely different store inside the mall when he or she calls "911," yet the PSAP will be provided the coffee shop's location information.

In the case of WLANs, network access providers may be able to determine a user's location by relying on access point or station measurements, e.g., signal strength or time of arrival (TOA), rather than direct communication between the station and access point. Notably, TOA measurements typically require hardware support within the user's device or the access point, and most devices with WLAN chipsets in use today do not include that supporting hardware. Therefore, the most likely approach to calculating location would be the use of signal strength measurements.

With respect to measuring a user's location using the signal strength approach, there are two significant challenges.[14] First, the accuracy of the location provided within a WLAN is only as good as the location information that has been programmed into each of the wireless access points, as well as the signal measurements and propagation model. In deployments that utilize multiple access points (e.g., a WLAN), such as an enterprise or campus environment, companies

[14] In addition to the technical challenges described herein, there are practical limitations. In some situations, WLAN access is not available to "anyone." Many enterprise networks do not enable unauthenticated access to their networks, and instead require some kind of sign-up procedure for "guest access." Oftentimes, this "guest access" comes with restrictions on access to services such as VoIP and/or location.

typically do not determine (much less record and manage) the geospatial or civic location of each access point as part of the WLAN installation process. Therefore, significant effort would be required to determine the geospatial and/or civic location of each access point within a WLAN to enable accurate location calculation – using, e.g., strength of signal – to be made and provided to a PSAP. The expense and time needed to build a database of such magnitude could be prohibitive because the location of access points may change frequently.

Second, wireless indoor location is particularly challenging due, among other things, to the propagation challenges presented inside buildings. Location estimates indoors are complicated by walls, floors, metal pipes, and ceilings, resulting in wireless devices attaching to Wi-Fi access points that are not necessarily the nearest station. In fact, devices can remain associated with a wireless access point even though the user may have wandered outside the range within which data can be reliably decoded. Therefore, as noted above in the "hot spot" example, a simplistic approach that assigns the user's location based on the location of the access point to which the device is associated can result in location estimates that are wildly inaccurate. Similarly, the accuracy of a strength-of-signal measurement can be negatively impacted by a bathroom wall where water pipes can interfere with signal propagation, i.e., reduce the strength of that signal, and suggest that an access point is much farther away from the user than it actually is. Even excluding these effects, WLAN location estimates can have significant uncertainty regions due to the distance of an access point's intended propagation (e.g., 100m at 1 Mbps). In an indoor environment this uncertainty region is exacerbated by the fact that the 100m range can span multiple floors.

Commercial location based services are not sufficient. Although there are available APIs that in theory could be used with VoIP applications to enable the receipt of location

information, those APIs are not designed for use with emergency services. For example, these third party services (e.g. Google, Skyhook) may not provide civic location, or if they do, the civic location may not be able to be validated in the Master Street Address Guide ("MSAG"). Moreover, as free Wi-Fi is becoming increasingly common, requiring those Internet access providers to offer location services will be costly, thereby significantly impacting these business models. So, unless the handset or other device has GPS, or is within the premises of an access network with a location-capability, it may not be able to obtain location information suitable for conveyance to the PSAP since commercial location based services may not provide a viable alternative.

Making location useful for PSAPs. Even assuming an accurate indoor geospatial location could be ascertained, the information conveyed to a PSAP is only useful if the PSAP has something with which to compare it. For example, geospatial location information – particularly if it is accompanied by confidence factors and/or uncertainty – would only be useful if the PSAP has a detailed map of the inside of the building from which the call was made so that PSAP personnel could translate the geospatial location information to a civic address/location within the building. Today, building floor plans are not available to the PSAPs and there are no standards for PSAPs to store or process this information. Moreover, there would be significant practical implications (time and expense) in attempting to map every building in the United States and provide those maps in a standardized form to every PSAP (as well as keeping those maps up to date). Therefore, in considering the technical limitations of wireless location in WLAN networks and "hot spots," the Commission must also consider the practical realities of making that technical information useful to first responders.

Finally, until PSAPs upgrade their networks to IP, the cost of retrofitting legacy devices that do not support location will be significant and possibly prohibitive.[15] Adding location capabilities to VoIP also may imply changing the transport from User Datagram Protocol (UDP) to Transmission Control Protocol (TCP), because otherwise the messages could fragment, resulting in potential reliability issues. Today the majority of Session Initiation Protocol (SIP) handsets (and SIP trunks) utilize UDP transport. As a result, nomadic location often will have to be accomplished by proxies acting on behalf of devices that cannot be retrofitted to support location and/or SIP over TCP/Transport Layer Security. Requiring providers to make these costly changes as a transitional mechanism until PSAPs have upgraded to IP technologies may be detrimental to the VoIP industry while providing only minimal benefit for users or first responders.

II. The Commission Should Not Expand VoIP 911 Requirements at this Time

Many services, products and applications today include an incidental voice communications features that may be categorized as VoIP but that alone does not mean all such services, products and applications are intended to replace PSTN voice services or even share the same market segment as interconnected VoIP services. In examining whether it should expand the current 911 requirements to current services, products or applications or impose the requirements on new services, products or applications, the Commission should consider a number of factors, including the core functionality of the service, product or application, not incidental features, the primary purpose for which the service, product or application is designed

[15] NG911, which will eventually replace the present 911 system, is comprised of managed IP-based networks and elements that augment present-day E9-1-1 features and functions and add new capabilities, including the provision of access to emergency services from all sources, and multimedia data capabilities for PSAPs and other emergency service organizations. See http://www.nena.org/ng911-project. For additional discussion of the challenges of generating and delivering accurate, real-time location information, see *A National Plan for Migrating to IP-Enabled 9-1-1 Systems*, published by the National E9-1-1 Implementation Coordination Office, September 2009, at pp. 6-10 – 6-11.

and marketed, and consumer expectations about the functionality and features of the product. Game consoles, music players (similar to iPods) and tablets (similar to iPads), all of which are capable of providing a voice communication through IP built into the device or available as a third party download, should not be perceived by the user as a substitute for telephone service and the product and device functionalities do not create a reasonable expectation that the user of the device can call 911.

Gaming products such as the Xbox and Xbox Live Service are examples of services and products that includes a voice component but which have as their primary purpose gaming and not the provision of voice communications services. To enrich the gaming experience, some gaming products allow users to have voice conversations. But, those voice features do not convert gaming services or products into a telephone, particularly when that service or application has no ability to connect to any PSTN number, much less a PSAP.

Nomadic VoIP applications are not expected to be a viable replacement for traditional wireless services in the near term. Public resources would be better used for educating consumers and setting appropriate expectations, e.g., limits of nomadic VoIP's location capabilities, the appropriate services and devices from which consumers can expect to make E911 calls. More importantly, given that the Commission has already mandated E911 on wireless calls – including on mobile devices for which a customer may only have a data plan (i.e., no voice service) – and wireless carriers have invested hundreds of millions of dollars to enable location capabilities on wireless networks, the public interest is better served by educating the public to dial 911 on their wireless phones rather than launching a VoIP application that is running over the wireless network and using the VoIP application to make an emergency call.[16]

[16] A small fraction of all emergency calls are VoIP, and of those, it is likely that the vast majority are from static installations (e.g. Cable/FIOS/DSL VoIP). For example, in Laupeer County Michigan during 2010, slightly more

Finally, the Commission should recognize that the market for IP communications continues to develop and that the decisions it makes in this proceeding should promote, not stifle, investment, innovation and development. Proscriptive rules ultimately could cause more harm than good for all consumers and create precedent for actions by other countries.[17] There is a real risk to innovation if the Commission begins to blur the previously established clear lines and expectations created in the definition of interconnected VoIP and mere inclusion of an incidental voice communications capability or consumer adoption of VoIP applications to enhance their traditional voice services were to trigger 911 obligations on these innovative applications, products and services. New burdensome regulations on non-interconnected VoIP providers would create a disincentive for manufacturers, software developers, and application providers – many of whom are not otherwise subject to Commission jurisdiction - to add voice capability to emerging services and applications that were designed for purposes and market segments other than serving as a functional substitute for telephone services. As a result, rather than encouraging consumers to rely on their portable VoIP service or application for 911 calls, the Commission should reinforce rather than confuse consumers' expectations by maintaining the clear definitions associated with providers who currently deliver emergency service connectivity: wireline, wireless and interconnected VoIP providers.

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than 1% of 911 calls were from VoIP providers (see http://www.lapeercounty911.org/stats.htm); and, in McLennan County, Texas during 2009, less than .4 percent of the calls were from VoIP (see http://mcead911.org/our-history/9-1-1-call-volume-statistics).

[17] Other countries (such as Canada) have looked at the benefits vs. costs of mandating location capabilities on nomadic 911 and decided that it is not justified. (see http://www.crtc.gc.ca/eng/archive/2010/2010-387.htm.

CONCLUSION

The VON Coalition looks forward to working with the Commission, NENA, and standard setting organizations on the development of policies that will increase access to emergency services from new, voice-enabled technologies and applications without hindering innovation, development, or investment. However, it is premature to issue a notice proposing any specific rules at this time. With the eventual transition to a next generation 911 network and the continuing evolution and growth of voice applications, we expect that solutions will become commercially available that will address the ability of the 911 network to be interoperable with IP-enabled products, services, applications, and devices. In the meantime, industry will continue to educate consumers about the uses and limitations of these new services.

Respectfully submitted,

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