

**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
)	

Reply Comments of Cisco Systems, Inc.

Cisco Systems, Inc. (“Cisco”) hereby respectfully submits reply comments in response to the above-captioned Notice of Proposed Rulemaking and Notice of Inquiry.¹ While a number of parties have filed comments in this proceeding, Cisco hopes to supplement the record on just a few issues of critical interest to it. Cisco is the worldwide leader in networking solutions for the Internet and IP-based networks generally, and is a leading manufacturer of Wi-Fi® equipment and systems.² In addition, Cisco is a leading vendor to the services provider industry, and actively participates in a variety of industry forums and standards bodies on the topic of emergency calling. Cisco is also a manufacturer of home networking technologies, including Wi-Fi access points, Femto cells, and other home networking devices.

In these reply comments, Cisco recommends that the most effective action the Commission could take currently is to articulate clear goals for the application of location requirements for emergency calling, as opposed to mandating specific requirements for location information. Standards bodies are the best place to resolve location data availability issues, and the Commission should leverage the role of such organizations to the maximum extent possible before considering regulatory mandates. The

¹ Further Notice of Proposed Rulemaking and Notice of Inquiry, In the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, and E911 Requirements for IP-Enabled Service Providers, WC Docket No. 05-196, released September 23, 2010.

² Wi-Fi is a registered trademark of the Wi-Fi Alliance, an industry-created interoperability and marketing forum for IEEE 802.11 based technologies, generically known as Wireless Local Area Networks (WLAN). www.wi-fi.org

Commission can, however, play a role in highlighting the work ongoing, as well as any gaps that remain. Cisco further recommends that the Commission ensure that civic addressing remains an option for location data in multitenant/high rise buildings. Cisco also recommends that in any of its decision-making in this area, the Commission take no action that would force industry to break the layered IP/TCP model, which is the foundation of innovation on the Internet. Finally, the Commission should use its communications with legislators, states, and 911 organizations to promote the need for funding of public safety answering points (PSAPs) to equip them to receive the information that can and will be generated by new technologies.

Further Notice – Wi-Fi and Femto Technologies May Provide Improved Location Data in Multitenant/High Rise Buildings, But Issue Should Be Associated with Emerging Technology Issues in NOI; FCC Should Preserve Option of Using Civic Addresses

The Further Notice poses a series of questions about possible modifications to the existing wireless location standards. Cisco's comment is limited to just two issues – location data in challenging environments and vertical location information.³ In both cases, the issue flagged by the Further Notice is the problem of finding callers in multi-tenant and/or high rise buildings. Significantly, these questions are not raised in the context of changing multiline telephone service rules that apply to enterprise environments, but are focused on how the CMRS carrier might locate a subscriber who has attempted to dial 911 from a cellphone when in a non-enterprise environment in a multitenant/high rise structure.

In Cisco's view, there may turn out to be multiple paths to improving location accuracy in challenging environments. Cisco does not believe that the FCC can or should adopt one methodology at this time, and in fact there may be a need to obtain multiple pieces of information from multiple sources. Accordingly, Cisco recommends that these issues be deferred for consideration along with the issues raised in the accompanying Notice of Inquiry.

³ Further Notice, paras. 22-23.

Cisco does note, however, that one future option for challenging environments may be to utilize information from Wi-Fi devices or Femto cells that have been integrated with the service provider network, such as single devices placed in a home or small business. Those devices could be associated with a civic address,⁴ and that address information could be tapped to better locate a wireless caller in a multitenant/high rise building in situations where the wireless phone is communicating with the Wi-Fi device or Femto cell, and the voice stream is being handed off to a broadband connection such as DSL or cable modem. In a high rise building, access to the civic address could alleviate the need for vertical location information, since the civic address would include information that readily locates the source of the call such as an apartment number.⁵ Cisco agrees with previous comments filed in this docket that these technologies are “early days”, and that the Commission should refrain from mandating a solution. The best course is to treat these capabilities in the context of emerging technologies that are being evaluated in the Notice of Inquiry which Cisco discusses, below.

In Cisco’s view, however, it is important that the Commission’s actions on location information permit future solutions to use civic address. If the Commission insists that latitude and longitude are the only appropriate location identifiers, it may well be ignoring important and useful location information. Moreover, geodetic location information is inaccurate on the “Z” component (altitude), and Cisco is not aware of technology capabilities to cross reference altitude above sea level to a particular floor in a given building. For the foreseeable future, civic addressing is the Commission’s best choice for solving the multitenant/high rise location issue.

⁴ Standards are in place that would allow the device to be associated with a civic address. Industry would need time to implement and bring new product to market consistent with this feature functionality. Significant hurdles are associated with aligning current product lines with the standard.

⁵ IETF architectures further enable a device to discover its location independent of network type – for example, a call on a smartphone could become associated with a civic address that is provided by the WiFi access point (if the device is actively associated to a Wi-Fi access point), but significant implementation issues remain with respect to device capability, network capability and service provider procedures.

Notice of Inquiry – Obtaining location data in the context of IP/TCP networks is best resolved in standards-setting organizations; Commission should encourage that process by articulating clear goals for industry

The Notice of Inquiry asks a number of questions about how to improve location information for VoIP services that today have no 911 requirement, the impact of NG911 deployments in PSAPs on location accuracy, and the application of 911 and E911 requirements to additional wireless services, devices, and applications. Specifically, the Notice seeks comment on consumer expectations about the uses of these new technologies, and whether these uses substitute for interconnected VoIP or cellular mobile radio service that are required to supply location data to PSAPs. It seeks technical and economic information to guide its decision. At paragraph 38, the Notice seeks information about Wi-Fi installations in residential settings and in public hot spots, and at paragraph 40, the Notice asks about Femto cells. In all cases, the Commission asks what it can do to facilitate the development of technology that will allow devices, applications and networks to automatically identify the location of a 911 call.

Cisco recommends: (1) the Commission articulate clear forward-looking goals for the availability of location information to support emergency calling; (2) encourage the responsible industry standards groups to address citizen-to-authority emergency communications, including convening advisory groups (as it already is doing), workshops, and meetings, recognizing that standards in this area are global; (3) take no action that would break, or effectively break, the layered communications model underlying the IP/TCP protocol (such as requiring providers of different layers to interact with each other to obtain information); (4) educate federal legislators concerning the absence of funding to support next generation 911 capabilities and encourage states to move forward as much as possible on their own; and (5) take advantage of emerging Wi-Fi capabilities, and permit the use of civic addresses in addition to GPS coordinates to satisfy location requirements.

Articulate clear goals. The most meaningful and immediate contribution the Commission can make with respect to emerging technologies is to use this proceeding to articulate clear goals that will

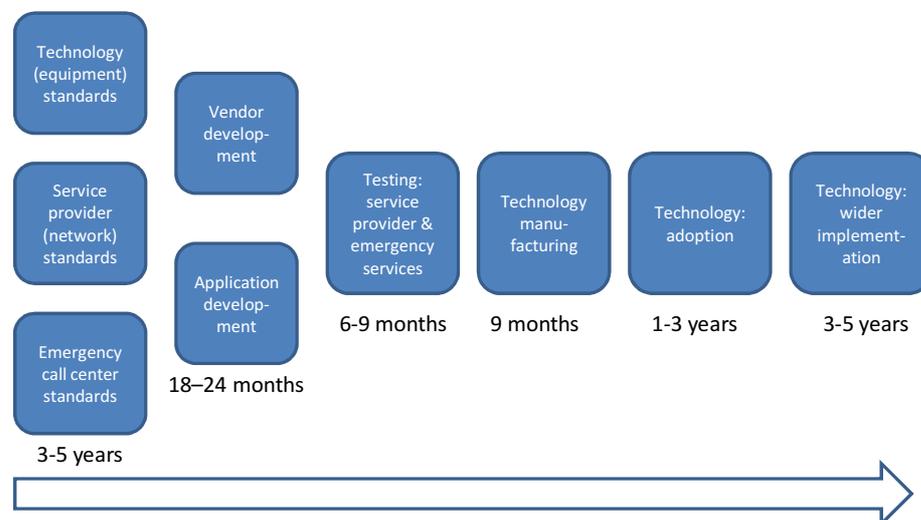
provide guidance to developers of IP-based technologies, products and services. For example, today the Commission's emergency calling rule has extended from the PSTN and CMRS networks to interconnected VoIP. Few firms that develop new technology realize that the Commission is entertaining questions about enlarging the definition of technology that must provide location information in support of emergency calling capability. It will be important for the Commission to articulate the division between those technologies that should reasonably be expected by consumers to deliver emergency calling capability, and those that should not. Developers and standards organizations would greatly benefit from an articulation of what circumstances, or use cases, should support emergency call capability. In this way, the Commission can encourage the assignment of resources within the vendor community to initiate actions to develop that capability. The goals must be both forward-looking and platform-neutral, and should not delve into the mechanics of how the capability is to be provided.

Encourage standards-based solutions. Cisco strongly agrees with previous comments that it is best to look to standards bodies to resolve technical approaches to emergency calling capability to the maximum extent possible. First, the Commission cannot reasonably inform itself about every technology platform and corresponding standard. It is critically important that standards-based approaches are resolved in the open standards bodies such as IEEE or IETF or similar. Providing that the Commission is articulating clear goals, technologists are in the best position to determine where and how to generate location information and assure its accuracy. In the case of emergency call centers, the National Emergency Number Association and the US Department of Transportation have collaborated on a new collection of next generation standards that will support the emergency call center itself. These standards can provide important guidance on the requirements of emergency call centers that can inform the work of other standards organizations. Second, standards bodies sometimes do not communicate with each other in the most effective way. The process relies on knowledgeable engineers to be aware of work ongoing in other forums. It is important, therefore, that the Commission assure itself that the key standards bodies are effectively communicating with each other where it is important to do so. The

Commission can help catalyze that information exchange. Third, industry-driven standards are important to maximize efficiencies and to enable ecosystems that can often provide a better solution than any single vendor can.

In today's IP technology sector, standards are a critical pre-requisite to development, testing, production of technology, dissemination and then implementation to enable both networks and consumers to take advantage of a capability.⁶ In the chart, below, Cisco provides an illustrative picture of a typical technology development cycle. While these activities may overlap to some degree, the activities are roughly sequential.

911 for IP-based technologies: illustrative development cycle



⁶ For example, Cisco recommends that the Commission not require ALI for all terminal adapters or other equipment used in the provision of portable interconnected VoIP services. NPRM para. 30. No method to comply currently exists, and the path forward to compliance is not well-defined at this time.

While this is a complex picture, and a complicated process, the most important work that the Commission can do now is to ensure that standards are under development that will enable solutions to be brought forward with respect to technologies that the Commission believes should have emergency call capability. This is represented by the activities on the far left hand side of the chart. It may be beneficial for the Commission to convene workshops or advisory groups to ensure that the most important work is progressing (or more accurately, to continue to do so), with the goal of avoiding gaps in standards that will impede software-based solutions.

Finally, a standard, once promulgated, should not be mandated by the Commission unless there is a compelling public interest reason to do so. The global nature of standards requires that there be some flexibility in vendor implementation to account for differences in national requirements. Moreover, standards evolve over time and permit technology to innovate. Locking down an approach by naming a technology standard or standards can have significant adverse consequences.

Don't break the Internet model. Simply put, IP-based communication is based on the well-established system of agnostic "layers" of communications in the IP/TCP protocol. This formulation of layers that are agnostic to each other has enabled the innovation revolution in broadband technologies. Applications developers can create new applications without regard to the physical layers that will carry the applications. Requiring different layers to interact, or to be "knitted together" is antithetical to IP communications and the Internet. The Commission must resist any call for an emergency calling "solution" that would break this model.

Moreover, the model does not have to be broken. For example, the IETF is developing an architecture that, when implemented, would allow access networks to interact with devices to find either the GPS or civic location of the device.⁷ It is important that this information is available in open "APIs"

⁷ Specifically, there are two draft IETF documents that are in the process of becoming industry standards. "Framework for Emergency Calling using Internet Multimedia" at <http://tools.ietf.org/html/draft-ietf-ecrit-framework-12> and "Best Current Practice for Communications Services in support of

or application interfaces, so that it is easy for software developers to develop hooks to “grab” the location information as needed to support emergency calling. While the Commission should view the existence of standards as good news, the Commission should recognize also that there are significant challenges to implementation. These are not easy technology transitions.

Fund NG 911. The Commission must remind federal legislators that next generation 911 capabilities are not simply an industry problem, but a funding issue for the public sector. Without funding to migrate PSAPs to new productivity-enhancing and feature-rich technologies, no amount of innovation on the part of private industry is going to enable PSAPS to receive anything other than an analog voice call. In addition, the Commission should encourage state regulators and 911 systems to deploy IP-based technologies where possible. In fact, there may be some operational savings from doing so. In no event should the Commission issue mandates on new technologies if the capability named in the mandate cannot reasonably be utilized by PSAPs that continue to operate on an analog voice basis. Moreover, the existence of next generation PSAPs is critical to the industry’s ability to test and refine emergency call capability for IP-based communications, and helps justify the resources needed to support the development cycle.

Allow Civic Addresses. Technologies such as Wi-Fi have the capability to report civic addresses, and the Commission should ensure that this form of location data can meet future 911 requirements. As

Emergency Calling” at <http://tools.ietf.org/html/draft-ietf-ecrit-phonebcp-16>. These working (not final) documents do not comprehensively state how a device discovers its location, but refer to other documents or standards that cover location discovery mechanisms. See also “NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3)” at <http://www.nena.org/standards/technical/voip/functional-interface-NG911-i3> ; “Recommended Method (s) for Location Determination to Support IP-Based Emergency Services” at http://www.nena.org/sites/default/files/08-505_20061221.pdf ; “NENA i3 Solution – 08-003” (in progress) <http://www.nena.org/standards/technical/i3-solution>

discussed in response to the FNPRM, Wi-Fi devices can be a source of civic address information. Moreover, standards governing managed Wi-Fi networks have made tremendous advances in delivering the location information of client devices, such as Wi-Fi enabled phones. Managed networks include networks with multiple access points that are commonly controlled and managed to operate together. Deployment examples include service provider (WISPs), private entities in areas frequented by the public (stadiums, airports, shopping malls, etc.) for the convenience of their customers, or within enterprises. The recent IEEE 802.11v amendment to the 802.11 standard enables accuracy of 7 meters 60% of the time or 10 meters 90% of the time, and further enables an error of 0 floors 60% of the time and +/- 1 floor 90% of the time – when the system is deployed in a configuration recommended by the standard.⁸ Under the standard, information can be provided in GPS or civic location format. The standard also provides information about the confidence of the location estimate. To achieve this, both network and client device information is utilized, and in fact, client device participation can improve the accuracy of the location.⁹ This new IEEE standard is further evidence that the technology sector can and will find solutions to emergency calling. The Commission can help by framing clear goals.

Cisco appreciates the opportunity to provide comments in this important proceeding.

⁸ The format of the location information may be GPS coordinates or civic addresses, and have been adopted from IETF RFC 3825 and RFC 4776-2006.

⁹ <http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=5716528> In addition, the standard recognizes that movement should be recorded, but leaves specifics of how to capture movement to vendors. The standard allows for values of devices stationary, start of motion, in motion, devices that were in motion and have now stopped or unknown.

Respectfully submitted,

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