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 VONAGE HOLDINGS CORP.

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Vonage Holdings Corp. ("Vonage") values the safety of its customers and today provides them with safe and reliable 911 service. Vonage, as required by the FCC's *VoIP E911 Order*,[1] provides public safety answering points (PSAPs) with automatic number identification (ANI) and subscriber-reported registered location information in the form of a validated street address. The record before the FCC in this docket and Vonage's own extensive testing efforts continue to demonstrate that no autolocation technology available today can provide more accurate and reliable location information to public safety. Vonage therefore continues to believe the FCC's existing standards provide public safety with the best possible location information available for interconnected VoIP subscribers.

The record before the Commission supports Vonage. Over three years after the Commission's last examination of these issues, there is still no evidence that autolocation technologies exist that will get public safety to interconnected VoIP subscribers more

[1] *IP-Enabled Services; E911 Requirements for IP-Enabled Service Providers*, First Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd. 10245 (2005) ("*VoIP E911 Order*").

quickly or reliably than the customer-supplied location information the Commission requires today. For that reason, Vonage reiterates its recommendation that the Commission not displace its existing rules in favor of new autolocation requirements.

As it examines this issue, Vonage urges the Commission to work closely with industry and other stakeholders to evaluate the state of technology and the benefits of any new requirements, just as it has when considering and adopting new CMRS location accuracy standards. It is critical that any new requirements be put in place only if and when they offer a solution that is superior to the Commission's existing requirements. Without such coordination and guidance, the Commission risks adopting new mandates that will not improve serve public safety and may delay the orderly transition to new technology if and when improved location solutions develop and mature.

I. INTRODUCTION AND SUMMARY

Vonage is a leading provider of communications services connecting individuals and social networks through broadband devices worldwide, currently serving more than 2.4 million subscriber lines. Vonage provides feature-rich, affordable communication solutions offering flexibility, portability and ease-of-use. Consumers can use Vonage service, combined with a Vonage analog terminal adapter (ATA[2]) or other CPE and broadband Internet access service, to make calls to and receive calls from the PSTN over any broadband connection anywhere in the world.

Vonage also offers a softphone product, a software download permitting consumers to use a computer as a full-functioning telephone, with its own phone number,

[2] Vonage has historically offered its customers many choices of ATA; in this document, the term ATA is meant to encompass the wide range of such devices available to consumers generally and to Vonage subscribers in particular.

through a screen-based interface that works just like a telephone keypad. Most recently, Vonage has introduced a free Facebook application that permits users with iPhone, iPod Touch, or Android devices to make free mobile calls using Wi-Fi or 3G to all their Facebook friends directly from within their Facebook friends list. In large part because Vonage subscribers have the freedom to make calls from any location where they have broadband access,[3] Vonage has no way of automatically determining the location of its subscribers when they initiate a Vonage call.

Vonage supports the Commission's efforts to adopt E911 requirements that satisfy the expectations of public safety and the public,[4] but that do not sacrifice public safety to rigid, premature technological requirements. The safety of its customers is of paramount importance to Vonage. To that end, Vonage has long sought to ensure that its subscribers receive the most reliable and accurate emergency service possible, working to bring its subscribers emergency calling service even before the Commission adopted its E911 rules for IVSPs.[5] Since the Commission's adoption of interconnected VoIP E911

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[3] Vonage also enables subscribers to adopt phone numbers that are not associated with the subscriber's actual or primary location. For this reason, Vonage cannot rely on phone numbers as a proxy for subscriber location. *Vonage Holdings Corporation Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission*, Memorandum Opinion and Order, 19 FCC Rcd. 22404, 24419-20 ¶¶ 25-26 (2004) ("*Vonage Order*").

[4] *Wireless E911 Location Accuracy Requirements; E911 Requirements for IP-Enabled Service Providers*, Further Notice of Proposed Rulemaking and Notice of Inquiry, PS Docket No. 07-114, WC Docket No. 05-196, ¶ 1 (rel. Sept. 23, 2010); *see also Wireless E911 Location Accuracy Requirements; Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; Association of Public-Safety Communications Officials-International, Inc. Request for Declaratory Ruling; 911 Requirements for IP-Enabled Service Providers*, Notice of Proposed Rulemaking, 22 FCC Rcd. 10609, ¶ 1 (2007).

[5] *See, e.g.*, *VoIP E911 Order* ¶ 25 n.83 (describing Vonage efforts to deploy 911 service); *see also Nuvio Corp. v. FCC*, 473 F.3d 302, 305-306 (D.C. Cir. 2006) (same).

rules in its 2005 *VoIP E911 Order*, Vonage has worked aggressively to fulfill the Commission's mandate and bring E911 service to all of its subscribers.[6]

Today, as required by the Commission's rules, Vonage collects registered location information from its subscribers and, using the native 911 network, routes emergency calls and delivers location information using this subscriber-reported location information. This approach provides public safety with the caller's precise and validated street address just as with traditional wireline services. Armed with this information, public safety can send help directly to the source of the emergency call or call back for additional information as needed. To date, there is no technologically feasible alternative that can provide emergency responders with more precise or reliable location information for Vonage subscribers.

For over six years, Vonage has been exploring the development of autolocation technology so as to ensure its customers continue receiving the most accurate and reliable 911 and E911 service Vonage can provide. Vonage is critically interested in the development of technology that will improve the safety of its customers, but equally interested in ensuring that new technologies are adopted in a manner that maximizes customer safety. In particular, Vonage has serious concerns that anything less than an orderly transition to mature autolocation technology could reduce, not improve, public safety. Untested, inadequate, or unreliable technologies could be substantially less effective than today's solution – providing customer-supplied location information directly to PSAPs.

[6] Vonage has also taken an aggressive approach to emergency calling provision in the U.K., providing 999 dialing to its subscribers even before the regulatory requirement that Vonage do so.

Vonage commends the Commission for seeking updated information on the state of location technologies as it considers its accuracy standard. But, in the interests of consumer safety, Vonage encourages the Commission first to articulate specific standards and performance criteria that an acceptable VoIP autolocation solution must satisfy. By ensuring that specific standards and reliable solutions are in place before mandating autolocation capabilities, the Commission and industry can avoid disruptions and delays that have hindered prior E911 deployments, maximizing the speed at which IVS autolocation can ultimately be deployed. Vonage also is concerned that expanding current E911 rules may delay or drain the limited resources available to facilitate the long-awaited transition to Next Generation 911 ("NG911").

Based on developments thus far, Vonage believes the quickest path to widespread, reliable, and accurate IVS autolocation will be network end-point location information. Existing and proposed automatic location identification ("ALI") technology is significantly less reliable than network end-point location information. This is especially true in dense urban environments. Reflecting this reality, to date, most emergency calls do not use ALI data. In keeping with that fact, the Commission should not prematurely impose technological requirements and risk likely decreases in public safety and IVS autolocation.

Even the most effective existing technologies have significant limitations as IVS autolocation solutions. Assisted-GPS ("A-GPS"), for example, remains of limited use indoors. Wi-Fi approaches, in their turn, offer only limited coverage outside of urban areas. Hybrid approaches to date have been unable to provide sufficiently accurate or reliable data to substitute for today's customer-reported location information solution.

Wireline broadband network providers,[7] in contrast, have access to detailed knowledge of the physical location of their networks and are uniquely positioned to correlate this knowledge to particular devices or IP addresses. Moreover, under their CALEA obligations, broadband providers may be required to have the ability to provide user location information to law enforcement, a capability that could become the basis for a VoIP autolocation solution.[8] Unlike RF triangulation approaches, the coverage of network end-point based solutions will be co-extensive with the network, ensuring that users can access the network's autolocation capabilities anywhere they can connect. Network end-point based solutions also minimize privacy concerns, as they need not enlarge the set of providers responsible for deriving user location information. Finally, network end-point based solutions will be backwards-compatible with IP devices already deployed, minimizing any delay or consumer disruption that could be caused by solutions that require new hardware. NENA and others have already recognized the potential of network end-point based location solutions and have begun to take the steps necessary to make such solutions broadly available. Vonage therefore urges the Commission to encourage continued progress towards development and adoption of network end-point based solutions for IVS autolocation.

II. THE COMMISSION'S CURRENT RULES SUPPORT DELIVERY OF THE MOST ACCURATE AND RELIABLE LOCATION INFORMATION CURRENTLY AVAILABLE.

The current customer-provided registered information system has worked very well. As PSAPs have long explained, accurate and precise location information,

[7] In this context, the relevant broadband network provider is the provider of network access.

[8] *See Communications Assistance to Law Enforcement Act and Broadband Access and Services*, Second Report and Order, 21 FCC Rcd. 5360, 5422, App'x D (2006); *see also Communications Assistance to Law Enforcement Act*, Third Report and Order, 14 FCC Rcd. 16794, ¶¶ 44-45 (1999).

including a street address to which to dispatch emergency service, is of paramount importance to public safety.[9] PSAPs have urged examination of "all solutions" to "ensure that the best possible data, based on the type of calling technology being employed, is provided to the PSAP."[10] Vonage today provides PSAPs with customer-reported and MSAG-validated street addresses, directing public safety to the correct address. CMRS accuracy standards, by contrast, require accuracy that ranges from 50 to 150 meters for handset-based technologies and from 100 to 300 meters for network-based technologies.[11] In densely populated areas, knowing a location within 50 meters (much less 300) may not direct public safety to the right door, the right floor, or even the right building.

Range of accuracy is not the only source of uncertainty in CMRS autolocation information standards. New Rule 20.18 contemplates that 10% of CMRS attempts to locate subscribers will not meet even the 50/150 meter or 100/300 meter standard.[12] These routine margins of error are simply not present when a PSAP receives registered

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[9] *See, e.g.*, *Joint Petition for Clarification of the National Emergency Number Association and the Voice on the Net (VON) Coalition*, WC Docket Nos. 04-36 & 05-196, at 5 (filed July 29, 2005) ("Ensuring that the PSAP is provided an accurate and unambiguous location of an emergency is critical to the functioning of the E9-1-1 system."); Reply Comments of APCO, WC Docket No. 05-196, at 3 (filed Sept. 12, 2005) ("Any approach that relies upon geographic coordinates will … fail to take into consideration dense residential/business areas, where a single coordinate (however accurate it may be) could encompass multiple addresses.").

[10] Comments of NENA, PS Docket No. 07-114 & CC Docket No. 94-102, at 5 (filed Aug. 20, 2007).

[11] New 47 CFR § 20.18(h)(1)-(2). *Wireless E911 Location Accuracy Requirements*, Second Report and Order, PS Docket No. 07-114, FCC 10-176, App'x C (rel. Sept. 23, 2010). The previous rule contemplated that 5% of CMRS attempts would not meet the location accuracy standard. 47 C.F.R. § 20.18(h)(1)-(2) (2009).

[12] New 47 CFR § 20.18(h)(1-2). *Wireless E911 Location Accuracy Requirements*, Second Report and Order, PS Docket No. 07-114, FCC 10-176, App'x C (rel. Sept. 23, 2010).

location information provided by a Vonage subscriber.[13] Vonage delivers location information to multiple PSAPs that are not capable of receiving or using automatic location information of the sort provided by CMRS carriers. For example, a number of PSAPs have been able to accept validated street addresses but not latitude/longitude, either because they are not equipped to accept location information delivered in latitude/longitude format or because they do not have adequate mapping capabilities to dispatch help on the basis of x,y coordinates.[14] These PSAPs can and do accept the registered location information Vonage provides. In other circumstances, as well, Vonage has worked with public safety to adapt Vonage's 911 service to the equipment or infrastructure on which a particular PSAP relies, resulting in delivery of more information to the PSAP than is provided by CMRS carriers. Vonage continues to work with public safety to increase customer safety, as has been its standard practice. In that capacity, however, Vonage notes that public safety has not requested ALI data from Vonage.

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[13] The FCC's current IVS E911 rules require more precise ALI information than is required in other contexts in addition to CMRS. For example, there is no standard approach to MLTS 911 location accuracy. The FCC has thus far deferred to the states on this issue, *see Commission Seeks Comment About Status of State Actions to Achieve Effective Deployment of E911Capabilities for Multi-Line Telephone Systems (MLTSS)*, Public Notice, 19 FCC Rcd. 23801 (2004), and only a minority of states have adopted any standards for MLTS 911 location accuracy. Similarly, mobile satellite services are not subject to E911 requirements, but rather are required to establish emergency call centers to handle emergency calls. *Revision of the Commission's Rules to Ensure Compatibility With Enhanced 911 Emergency Calling Systems; Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements; Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band*, Report and Order and Second Notice of Proposed Rulemaking, 18 FCC Rcd. 25340, 25347-57, ¶¶ 20-39 (2003).

[14] *See, e.g.*, David H. Williams, *The Deadline for the E911 Mandate Approaches . . . Where Do Things Stand?*, Directions, Nov. 30, 2005 (observing that "the vast majority of PSAPs throughout the country are incapable of receiving and using a caller's latitude and longitude").

Vonage also has the capability of delivering 911 calls to multiple emergency service numbers and has often done so at public safety's request. As a result, in areas like Los Angeles, Indianapolis and San Diego, Vonage routes 911 calls to a targeted emergency service number that covers a small geographic area of the city. CMRS carriers in those areas, by contrast, route all their 911 calls to a smaller number of emergency service numbers often covering larger geographic areas, which, in certain locations, can add to the amount of time necessary to dispatch help.

In a small subset of cases where nomadic customers have reported incorrect location information, autolocation information may, in theory, be superior to customer-reported street address. But ALI is not the only—or necessarily the best—way to obtain more accurate location data. Importantly, the training and experience of PSAP staff equips them well to handle the rare call that may arrive with incorrect location information, as even street address location information for traditional wireline calls can occasionally be inaccurate or incomplete.[15] In any event, there is not yet any technically feasible way to automatically and reliably derive the location of an IVSP caller.[16] Even if there were, degrading location information for the vast majority of calls in order to improve location information for this small minority simply does not make sense.

There are many varieties of interconnected VoIP services, and the Commission should not subject these varied services to a single set of autolocation requirements. It is particularly critical that the Commission recognize the distinction between fixed, nomadic, and mobile interconnected VoIP service. For fixed and nomadic services,

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[15] For example, accurate street address information for new developments may not be available to PSAPs.

[16] *See infra* Part III.

moving to CMRS location requirements would degrade, rather than improve, the accuracy and reliability of emergency caller location information. For VoIP mobile products, moving to CMRS location requirements will introduce duplication, inefficiency and confusion.

Vonage's service is primarily nomadic – in other words, Vonage customers can use their ATAs to make and receive Vonage calls over any broadband connection anywhere in the world.[17] The wired nature of ATAs, including their lack of an independent power source, makes it unlikely that these devices would be moved frequently, much less constantly, and they thus do not provide mobile service akin to the mobility of CMRS. Although Vonage service can be used with more portable devices, such as laptops loaded with softphones or USB ports, or with smartphones, only a small minority of Vonage subscribers use their service in this way. The vast majority rely on ATAs for their service. Subscribers that do move their ATAs have multiple methods available to update their 911 Registered Location, and Vonage and its partner voice positioning centers ("VPCs") are, in many cases, able to use this new information to route calls and provide location information within minutes of a subscriber's update. In contrast, ALI data, especially in densely populated urban environments, would provide public safety with far less precise location information.

[17] Fixed IVS is IVS that can be used over one particular wireline or other fixed broadband connection to the Internet. Nomadic IVS is IVS used over devices that can be relocated and used over any broadband connection, but does not include IVS used over devices such as Wi-Fi phones, PDAs and laptops that have their own power source and/or are capable of continuous IVS while moving from broadband connection to broadband connection and/or are designed to be carried with the consumer and relocated frequently. Nomadic IVS is provided over wireline or other fixed broadband connections to the Internet. By contrast, mobile IVS is IVS used over devices such as Wi-Fi phones, PDAs and laptops that have their own power source and/or are capable of continuous IVS while moving from broadband connection to broadband connection and/or are designed to be carried with the consumer and relocated frequently. Mobile IVS includes IVS that is provided over Wi-Fi, WiMax, or cellular broadband connections to the Internet.

III. IT IS NOT CURRENTLY TECHNOLOGICALLY FEASIBLE FOR IVSPS TO AUTOMATICALLY LOCATE THEIR SUBSCRIBERS.

As recently as 2005, the Commission concluded that providers of nomadic (or, as the Commission termed them, "portable") services "often have no reliable way to discern from where their customers are accessing the VoIP service."[18] The FCC's *Vonage Order* specifically recognized that "Vonage has no means of directly or indirectly identifying the geographic location of a . . . subscriber."[19] The following year, the Commission again recognized the current impossibility of locating TRS and VoIP calls that originate on the Internet.[20] No new evidence before the Commission suggests it is now technically feasible to automatically locate IVSP subscribers generally or Vonage subscribers in particular.

Vonage has been working aggressively for years to identify and evaluate technologies that may enable Vonage to automatically locate its subscribers. Unlike vendors and solutions integrators, Vonage is not invested in the success of any particular technology or solution, and thus is particularly well-suited to help the Commission to evaluate potential autolocation solutions. Vonage likewise encourages the Commission to consider convening a technical advisory committee that includes representatives from public safety, IVSPs, technology vendors, and network providers to evaluate possible IVS autolocation solutions. Vonage's own evaluation and testing demonstrate that even

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[18] *VoIP E911 Order* ¶ 25.

[19] *Vonage Order* ¶ 23.

[20] *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Order, 21 FCC Rcd. 14554, 14557, ¶ 10 (2006) (explaining that "the current state of technology does not allow a means of automatically determining the geographic location of TRS calls originating via the Internet, including VRS calls" and noting "that a similar issue exists with respect to VoIP service").

the most promising technologies are far from providing reliable and ubiquitous autolocation capability, much less capabilities that would improve on the Commission's current subscriber-reported information requirement.

The Commission asks if interconnected VoIP providers should be required to incorporate an ability to automatically detect a user's Internet connectivity, identify a user's location, and/or prompt a user to confirm his or her location prior to enabling calling features.[21] Vonage respectfully suggests that such a requirement would be counterproductive. Prompting the user to confirm his or her location prior to enabling calling features rapidly could become an annoyance to users. Certain ISPs change user IP addresses frequently, meaning that users would be prompted to confirm location information multiple times in a short timeframe. Out of frustration, users likely would cease reading or responding to the request, much as occurs with long and overly complex privacy policies, or might attempt to modify their VoIP software in an effort to override the prompt. In extreme situations, users simply would abandon compliant interconnected VoIP providers in favor of non-compliant providers or providers offering no 911 service whatsoever.

The record already assembled in this docket, furthermore, establishes that the Commission's initial Rule 20.18 requirements were not technologically feasible for CMRS providers if compliance testing is conducted at the PSAP level.[22] Stakeholders across the industry offered comments in response to the first section of the NPRM

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[21] *Wireless E911 Location Accuracy Requirements; E911 Requirements for IP-Enabled Service Providers*, Further Notice of Proposed Rulemaking and Notice of Inquiry, PS Docket No. 07-114 & WC Docket No. 05-196, ¶ 30 (rel. Sept. 23, 2010).

[22] *See, e.g.*, *Wireless E911 Location Accuracy Requirements*, Second Report & Order, PS Docket No. 07-114, ¶¶ 12-18 (rel. Sept. 23, 2010).

confirming that current accuracy standards cannot be achieved at every PSAP using existing technology.[23] Recognizing the technological barriers, the Commission modified its rules in the *Location Accuracy Order*.[24]

IVSPs face additional hurdles not faced by CMRS providers in deriving autolocation information. Unlike CMRS providers, IVSPs typically do not have their own wireless networks available to provide location information.[25] Without this essential piece of an autolocation system, IVSPs cannot duplicate the network-based or assisted GPS technologies on which CMRS providers rely to automatically derive location. As the industry shifts to Next Generation 911 and an IP-based managed emergency services network infrastructure, IVSPs may be able to derive more such information in conjunction with the ISP. But designing and building a network infrastructure to provide such capability today for the small number of users whose user-provided location data is inaccurate would force enormous and burdensome investments across industry sectors and in many instances would require consumers to replace or upgrade hardware and software, at tremendous cost to IVSPs and consumers. The resulting system would provide little improvement over the current location information system while draining significant portions of the limited resources available for the much-needed NG911 transition. This fundamental disparity between IVSPs and CMRS providers

[23] *See generally* Comments of NENA, PS Docket No. 07-114, CC Docket 94-102, at 1 (filed July 5, 2007); Comments of Qualcomm Incorporated, PS Docket No. 07-114, CC Docket 94-102, WC Docket 05-196, at 4 (filed July 5, 2007); Comments of T-Mobile USA, Inc., PS Docket No. 07-114, WC Docket 05-196, at 2 (filed July 5, 2007) ("T-Mobile Comments"); Comments of Verizon Wireless, PS Docket No. 07-114, WT Docket 94-102, WC Docket 05-196, at 14-22 (filed July 5, 2007) ("Verizon Wireless Comments").

[24] *Wireless E911 Location Accuracy Requirements*, Second Report and Order, PS Docket No. 07-114, FCC 10-176, App'x C (rel. Sept. 23, 2010).

[25] Independent IVSPs like Vonage also do not have access to the underlying broadband network, and thus face location challenges not faced by providers such as cable IVSPs that control the underlying broadband access network used to provide their service.

independently renders IVSP compliance with proposed CMRS accuracy standards technically infeasible.

A. No Currently Available VoIP Autolocation Solution Provides Ubiquitous and Reliable Autolocation Information.

Although some technologies show promise, Vonage has yet to identify a comprehensive autolocation solution for IVSPs that provides location information more accurately than the existing self-reporting approach. This assessment is consistent with Commission's observation in the *VoIP E911 Order* that currently "there is no way for portable VoIP providers reliably and automatically to provide location information to PSAPs for these services without the customer's active cooperation."[26] Most significantly, each solution evaluated by Vonage relies to a certain extent on RF to resolve the location of a device, and therefore effectiveness is limited in cases where RF signals are unable to reliably penetrate certain buildings, structures, and terrain.[27] In addition, many proposed VoIP autolocation technologies are still prototypes and, even if potentially effective, will take years to deploy and even then may only be available in limited areas.[28]

While Vonage continues to examine existing and emerging technologies to determine whether they could enable Vonage devices to automatically locate themselves without requiring customer intervention, no sufficiently accurate in-building RF autolocation solution exists today that can identify a dispatch address for all IVS devices. Vonage is unaware of any E911 autolocation identification technologies presently

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[26] *VoIP E911 Order* ¶ 57.

[27] Comments of Vonage America, Inc., PS Docket No. 07-114, CC Docket No. 94-102, WC Docket No. 05-196, at 25-32 (filed Aug. 20, 2007).

[28] *Id.*

capable of widespread deployment that match the accuracy of the Commission's current requirements. For this reason, it is not technologically feasible or in the best interests of the public and public safety for the FCC to replace its current subscriber-reported location requirement with an autolocation mandate.

IV. BEFORE CHANGING ITS EXISTING REQUIREMENTS, THE COMMISSION FIRST SHOULD IDENTIFY SPECIFIC STANDARDS AND TECHNOLOGICAL FEASIBILITY.

The FCC should not require all terminal adapters or other equipment used in the provision of portable interconnected VoIP to be capable of providing location information automatically without first engaging in thorough study, testing and review. Such a requirement would impose a tremendous burden on industry, forcing companies to source new materials, redesign equipment and devices, alter existing manufacturing agreements, provide new training to personnel and consumers – often after equipment delivery and service initiation, and replace potentially significant retail and warehouse inventory.[29]

Additionally, significant privacy concerns arise with ALI, including the potential for location-based information to be exploited for non-911 purposes without the consumer's knowledge or consent. Such concerns appear in both the FTC's recent Preliminary Staff Report on Consumer Privacy and the Department of Commerce's Internet Policy Task Force's Green Paper on Commercial Privacy, both of which emphasized the importance of collection and use limitations for personal data such as geolocation data. Consumers have expressed fears and concerns about the unauthorized

[29] *See*, *e.g.*, Comments of the Wireless Communications Association Int'l, Inc., PS Docket No. 07-114, CC Docket No. 94-102, WC Docket No. 05-196, at 4-5 (filed Aug. 20, 2007).

collection and use of their geolocation data, which must be considered and addressed for any such solution to be successful.[30]

Critically, the Commission has not yet clearly defined its IVSP autolocation goals or established criteria to evaluate whether particular autolocation technology can meet those goals or improve on current solutions. This is an essential first step, as all autolocation technology offers tradeoffs between, for example, speed deriving location and accuracy of location fix. Once the FCC has identified its goals and performance parameters, it will be able to objectively evaluate new and emerging technology, and thereby adopt achievable and technology-neutral location requirements that maximize public safety. Further, by identifying its priorities, the Commission will spur industry action towards those goals and thereby ensure they are reached as quickly as possible. Vonage continues to recommend that the FCC, at minimum, adopt four performance criteria for evaluating autolocation solutions: accuracy; timeliness; coverage; and civil addressing.

Accuracy – The Commission's existing requirements provide a baseline against which all potential new accuracy requirements should be measured. Specifically, no new location solutions should be adopted unless they ensure delivery of location that is more accurate than the subscriber-reported address used today.

Timeliness – Most autolocation technologies present a tradeoff between delay and accuracy. Longer acceptable time limits in which to fix and deliver location increase accuracy and reliability, but longer time limits also create risks of unacceptable delays in

[30] *See, e.g.*, *What They Know* series, Wall St. J., July 2010-January 2011, http://online.wsj.com/public/page/what-they-know-digital-privacy html (recounting consumer opinions regarding privacy issues and personal data collection and use practices).

dispatching emergency services. With guidance from public safety and other interested parties, the Commission should define the maximum acceptable period for a technology to automatically determine location.

Coverage – Any IVS autolocation solution should ensure that location information is available anywhere in the United States that the subscriber is able to access the network.

Civil Addressing – For non-mobile IVS devices located at identifiable addresses, any autolocation solution should be capable of delivering street addresses rather than longitude and latitude coordinates.

Once the Commission has established its goals for using these criteria, it can take additional steps to encourage development of autolocation technology that meets those goals. Similarly, having these criteria in hand will permit the Commission to evaluate the performance of existing technology to determine when new requirements that improve overall location performance are technically achievable. This approach is important to ensuring that achievable solutions are quickly deployed. By contrast, adopting requirements that are technologically infeasible and thus fail to satisfy the requirements of the Administrative Procedure Act would likely (and unnecessarily) delay deployment. As many commenters in this docket explain,[31] it would be arbitrary and capricious for the Commission to adopt autolocation standards that are not technologically feasible.[32] Similarly, the Commission lacks the express statutory authority that is necessary to

[31] Verizon Wireless Comments at 10-14; T-Mobile Comments at 11-12; Comments of AT&T, Inc., PS Docket No. 07-114, CC Docket 94-102, WC Docket 05-196, at 6-7 (filed July 5, 2007).

[32] *Alliance for Cannabis Therapeutics v. DEA*, 930 F.2d 936, 940 (D.C. Cir 1991) ("Impossible requirements imposed by an agency are perforce unreasonable"); *Bunker Hill Co. v. EPA*, 572 F.2d 1286,

support adoption of technology-forcing measures. Against this backdrop, any adoption of infeasible requirements would almost certainly delay improvements in autolocation requirements by subjecting them to lengthy court challenges and diverting industry efforts and energy away from achievable solutions.

If the Commission were to decide to impose an ALI requirement on portable interconnected VoIP service providers, it should take into consideration, at a minimum, the time required for the nation's voice positioning centers and PSAPs to convert to a new system. The timeframe required will depend on the solution but would likely further delay transition to NG911. In addition, the Commission should consider the manufacturing lead-time VoIP service providers will face if the requirements result in providers modifying their equipment.

In addition, any change to existing location information requirements must be accompanied by a transition plan that allows for an orderly migration to any new requirements or technology. Because the FCC should have as its paramount goal ensuring that any changes to its E911 rules improve rather than degrade public safety, it is essential that any transition to new requirements or technologies be carefully managed. In particular, the Commission must ensure that emerging technologies are sufficiently mature to be reliable and to improve on existing solutions. In addition, a clearly defined transition will enable all of the entities involved in providing 911 and E911 service to work together to integrate new solutions as quickly and effectively as possible.

1301 (9th Cir. 1977) ("The record must establish that the required technology is feasible, not merely *possibly* feasible." (emphasis added)).

V. BROADBAND NETWORK END-POINT LOCATION HOLDS THE GREATEST PROMISE FOR UBIQUITOUS AND RELIABLE IVS AUTOLOCATION.

As detailed above, no existing or emerging RF-based technologies for location identification can improve on the FCC's current subscriber-reported location requirements. There is no single RF-based technology, for example, that both provides nationwide coverage and reliably locates users both inside and outdoors. Moreover, triangulation technologies provide location fixes that are sufficiently broad – typically tens or hundreds of meters – that they cannot direct public safety to the correct street address for the caller. In addition, RF technologies do not provide sufficiently precise elevation information (if elevation information is available at all) to determine from which floor of a building an emergency call has been made.

Network end-point location approaches do not have these flaws, and provide additional benefits. First and foremost, network end-point based solutions are by definition available anywhere the network is available, removing the coverage concerns posed by device-based solutions. Second, network end-point based solutions minimize privacy concerns because they rely on information already available rather than requiring additional entities to derive user location. Third, network end-point based solutions will be backwards-compatible with existing CPE, requiring, at most, software updates, and thus will avoid the customer disruption and delay that attends any solution that requires upgraded hardware.[33] Finally, because traditional wireline PSTN emergency calling location information is likewise derived from the network end-point information, network

[33] *See, e.g., Joint Petition of CTIA and the Rural Cellular Association for Suspension or Waiver of the Location-Capable Handset Penetration Deadline,* 22 FCC Rcd. 303 (2007); *Request for a Limited Waiver of United States Cellular Corporation,* 22 FCC Rcd. 360 (2007); *Request for Waiver of Location-Capable Handset Penetration Deadline by Verizon Wireless,* 22 FCC Rcd. 316 (2007).

end-point location approaches would best fulfill public and public safety expectations about the reliability and accuracy of autolocation information.[34]

Standards bodies have already recognized the promise of network-end point location solutions, and are actively working to develop standards to make network end-point location available for call location purposes.[35] Wireline facilities-based broadband network operators know the physical layout of their networks – including network endpoints – and can correlate these locations with devices on the network via unique device identifiers such as the MAC address of a cable or DSL modem. In addition, in most cases last-mile network operators have relationships with the ISPs that provide access to the Internet, facilitating an association of a physical location with a unique identifier at the network level such as an IP address. The network operator is thus in a unique position to leverage its knowledge of the network to provide a degree of location accuracy that simply is not available to IP-based end-user applications that sit on top of the network, including IVS. While it is not technically feasible today for IVSPs to use network end-point approaches to automatically locate their subscribers, the FCC should recognize the promise of these approaches and encourage industry and standards bodies to continue their efforts to swiftly develop network end-point standards and technology.

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[34] Because the Commission has concluded that IVS is more analogous to wireline toll than CMRS service, it would be appropriate to move toward location technologies that are likewise analogous to those available for traditional wireline phone service. *Assessment and Collection of Regulatory Fees for Fiscal Year 2007,* Report and Order and Further Notice of Proposed Rulemaking, MD Docket No. 07-81, 07-140 FCC Rcd. 1, 7, ¶ 16 (2007); *Universal Service Contribution Methodology; Federal-State Joint Board on Universal Service,* Report and Order and Notice of Proposed Rulemaking, 21 FCC Rcd. 7518, 7545, ¶ 53 (2006).

[35] *See* Comments of Cisco Systems, Inc., WC Docket Nos. 04-36 & 05-196, at 5-6 (filed Aug. 15, 2005) (discussing standard-setting efforts).

A. NENA and Others Have Recognized the Autolocation Capabilities of Broadband Networks.

The Commission correctly recognized in its *VoIP E911 Order* that NENA's leadership "will likely play a critical role in the provision of E911 services by interconnected VoIP service providers."[36] NENA has steadily worked to finalize and release its interim VoIP architecture for next generation 911 services, now known as the "i3" architecture.[37] Like the i2 architecture before it, the i3 architecture underscores the autolocation capabilities of broadband networks through use of a network element—the Location Information Server ("LIS")—responsible for determining the physical location on a network.[38] Although NENA ultimately determined that the method by which an end-user's VoIP device would obtain its location from the network was "out of scope" for the i2 solution,[39] the LIS requirement has been incorporated in the next generation "i3" E911 standard.[40]

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[36] *VoIP E911 Order* at ¶ 21

[37] *See generally* National Emergency Number Association (NENA), Technical Committee Chairs, Detailed Functional and Interface Specification for the NENA i3 Solution – Stage 3 (Sept. 30, 2010), http://www nena.org/sites/default/files/TSD%20i3%20Stage%203%20Public%20Review%20093010.pdf ("NENA i3 Architecture"); NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3), NENA 08-002 (Dec. 18, 2007), http://www nena.org/sites/default/files/08-002%20V1%2020071218.pdf.

[38] NENA i3 Architecture at 64-65 (§ 4.2); *see also* National Emergency Number Association (NENA) VoIP/Packet Technical Committee, NENA Interim VoIP Architecture for Enhanced 9-1-1 Services (i2), NENA 08-001, Version 2, at 93-96 (§ 5.8) (rel. Aug. 11, 2010) ("NENA i2 Architecture"), http://www.nena.org/sites/default/files/20100811_08-001%20v2.pdf.

[39] NENA i2 Architecture at 98 (§ 6.1).

[40] *See, e.g.*, NENA i3 Architecture at 191 (§5.9); Alliance for Telecommunications Industry Solutions, NENA i3 Standards Status, www.atis.org/esif/Docs/NGES/NGES-033_NENA_i3_Stds_Status_final.ppt; Alliance for Telecommunications Industry Solutions Emergency Services Interconnection Forum, Location Acquisition and Location Parameter Conveyance for Internet Access Networks in Support of Emergency Services, Revision 1.0, at § 4.2 (2007) ("Draft ATIS Report"), http://www.atis.org/esif/Docs/NGES/NGES-050-002-R4f.doc.

As NENA has explained, "[t]he LIS is a critical component in the support of emergency services for VoIP."[41] The NENA architecture provides that the LIS shall "be configured and maintained by the entity that provides/maintains the physical or logical access facility for endpoint equipment" on the network.[42] For residential markets, campuses, and enterprises alike, this entity is the network administrator and/or ISP/access provider.[43] And in fact, i3 contemplates extending the LIS to facilitate call routing for legacy calls.[44]

NENA's determination that Internet access providers should make location information derived from the network available echoes the findings of the Network Reliability and Interoperability Council ("NRIC") VII Focus Group. That group, tasked with addressing long-term E911 issues, has set forth its recommendation of architecture properties that should be required of future emergency communications networks.[45] The NRIC Focus Group report, recognizing that "newer technologies make it impractical for the entity providing communications services to know where the user is," recommends that every Access Infrastructure Provider ("AIP") supply location information to endpoints on the network.[46] The AIPs described by the NRIC focus group include the

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[41] NENA i2 Architecture at 94 (§ 5.8.1).

[42] *Id.* at 23 (§3.3.11).

[43] *Id*. For enterprise markets, this role might be assumed by the IT administrator that serves as the access provider for the enterprise. *See id.*

[44] *See, e.g.*, NENA i3 Architecture at 130 (§ 5.3).

[45] *See generally* Report of the NRIC VII Focus Group 1B: Enhanced 9-1-1 Long Term Issues, *Architecture Properties that emergency communications networks are to provide by the year 2010* (Sept. 23, 2004) ("NRIC Report"), http://www nric.org/meetings/docs/meeting_20040923/NRIC VII Focus Group 1B Report_Sept. v10 _120304_.pdf.

[46] *Id.* at 6.

network providers that own the "last mile" connection, as well as ISPs.[47] For data networks such as the IP-based networks used by VoIP services, the NRIC focus group explained that "the data provider . . . can supply endpoints with location, and the endpoints can provide this location on the call signaling when placing an emergency call."[48] Finally, the recommendations of NENA and the NRIC focus group and NENA's i3 standard are consistent with and based on ongoing work being done within the Internet Engineering Task Force ("IETF") to develop mechanisms to determine and acquire location information for communications using IP-based technologies.[49]

In short, wireline broadband networks are inherently capable of implementing a method of providing location information to devices and applications on the network, and organizations tasked with providing best practice recommendations and operational standards urge that this path be taken to improve E911 for users of interconnected VoIP.

B. CALEA Obligations of Network Operators May Include Autolocation.

As a practical matter, even if the desire to facilitate E911 autolocation for VoIP does not drive the implementation of a network end-point based solution correlating physical location with network location, network operators may be required to deploy similar capabilities to comply with the provisions of the Communications Assistance for

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[47] *See id*. at 19.

[48] *Id*.

[49] *See, e.g.*, IETF Geopriv Working Group Internet-Draft, HTTP Enabled Location Delivery (HELD), (Sept. 2010), https://datatracker.ietf.org/doc/rfc5985/; *see also* IETF Geopriv Working Group Internet-Draft, A Location Dereferencing Protocol Using HELD (Dec. 16, 2010), https://datatracker.ietf.org/doc/draft-ietf-geopriv-deref-protocol; IETF Network Working Group, Request for Comments: 4776, Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information (RFC 4776) (Nov. 2006), http://www.ietf.org/rfc/rfc4776.txt.

Law Enforcement Act ("CALEA").[50] In 2005, the Commission concluded that CALEA obligations apply to "facilities-based broadband Internet access … providers,"[51] a determination subsequently upheld by the U.S. Court of Appeals for the D.C. Circuit.[52] Section 103 of CALEA requires that covered entities provide certain assistance capability requirements to law-enforcement, including "call-identifying information."[53] CALEA defines "call-identifying information" as "dialing or signaling information that identifies the origin, direction, destination, or termination of each communication generated or received . . . ."[54] The Commission has yet to determine what call-identifying information means in the broadband context.[55] But if the Commission defines call-identifying information in the broadband context to include network end-point location information, network operators may be obligated to provide similar location information in the near future.

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[50] 47 U.S.C. § 1001, *et seq*.

[51] *Communications Assistance for Law Enforcement Act and Broadband Access and Services*, First Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd. 14989, 15001, ¶ 24 (2005); *see also Communications Assistance for Law Enforcement Act and Broadband Access and Services*, Second Report and Order, 21 FCC Rcd. 5360, 5365, ¶ 15 (2006).

[52] *See generally Am. Council on Educ. v. FCC*, 451 F.3d 226 (D.C. Cir. 2006).

[53] 47 U.S.C. § 1002(a)(2).

[54] 47 U.S.C. § 1001(2).

[55] *See Communications Assistance for Law Enforcement Act and Broadband Access and Services*, Second Report and Order and Memorandum Opinion and Order, 21 FCC Rcd. 5360, 5365-66, ¶ 14 & n.28 (2006).

VI. CONCLUSION

Vonage applauds the Commission's E911 efforts for IVS, and is eager to continue working with the Commission to ensure that robust location solutions are developed and deployed as quickly as possible. As the Commission considers this issue again, however, it should be careful to preserve public safety by adopting only those solutions that are technically feasible and that will improve on the Commission's current requirements delivering accurate and precise customer-supplied location information to public safety. As an important first step, the Commission should articulate criteria for an acceptable solution, addressing requirements including accuracy, timeliness, coverage, and civil addressing. Device-based solutions and hybrid solutions to VoIP autolocation under development and testing continue to exhibit significant drawbacks – such as limited indoor or rural coverage, or inability to determine elevation – that restrict their potential effectiveness as an IVS autolocation solution. The Commission should therefore take note of the progress towards and benefits of network end-point based solutions, and take steps to encourage the swift development of a network end-point based approach to IVS autolocation solutions.

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