

Capabilities Used to Provide Interconnected VoIP E911 Service and CMS Parity

Executive Summary

The NET 911 Improvement Act of 2008 (the Act) requires the Federal Communications Commission (FCC or Commission) to adopt regulations that grant interconnected VoIP providers (IVPs) rights to access enhanced 911 (E911) capabilities necessary to provide E911 service to their customers. The Act also grants IVPs the right to such access on the same rates, terms, and conditions that are provided to a commercial mobile service (CMS) provider. This document defines the term “capabilities” and summarizes the capabilities currently used in the provision of E911 services by IVPs. Next, the definition of “CMS Parity” is discussed. Finally, additional VoIP E911 implementation issues are addressed.

The Commission should develop regulations that support the transition to open standards and open networks, both of which should be forward-looking. IVPs should be given direct access on a non-discriminatory basis to inputs and information needed to provide E911 service to customers. A transparent process with efficient dispute resolution mechanisms is critical to successful E911 implementation. Because nationwide E911 deployment is not static and the capabilities used to provide VoIP E911 service will change as technology advances, the Commission should develop regulations that facilitate an IVP’s ability to provide E911 service without dictating or restricting the capabilities to which IVPs require access.

I. Definition of Capabilities

The Commission should define “capabilities” broadly to include interconnection, elements, services, testing, agreements, and any features necessary to an IVP’s provision of E911 service. The Commission should adopt a non-exhaustive list of capabilities.

II. E911 Elements Necessary to the Provision of VoIP E911

1) ESQKs/p-ANIs

An Emergency Services Query Key (ESQK, also called Pseudo Automatic Number Identification (p-ANI)) is a digit string that uniquely identifies an ongoing emergency services call and is used to correlate the emergency services call with the associated data messages. It may also identify an emergency services zone and may be used to route the call through the network. IVPs require access to the appropriate system or systems used to provision the ESQK or p-ANI pool for the selective router and the ALI database that serves a particular PSAP’s operations. IVPs also request cooperation of the various PSAPs for the creation of the appropriate records in the Master Street Address Guide (MSAG, see discussion below) in order to provision the p-ANI pool. p-ANI availability is an essential element for nomadic VoIP E911 deployment. Many E911 selective routers use 25-year old technology that is capable of processing no more than a few specific area codes (those area codes traditionally used in nearby areas) or none at all. As a result, p-ANIs are necessary to route a non-regional telephone number through the local selective router. IVPs cannot obtain p-ANI resources directly. Where p-ANI inputs are unavailable, nomadic VoIP E911 calls face significant routing challenges. IVPs, therefore, require a standardized system to obtain p-ANI resources from ILECs or directly from a numbering administrator. The quantity of p-ANI numbers required would be determined by projected IVP call volume for each PSAP.

The Alliance for Telecommunications Industry Solutions (ATIS) and the North American Numbering Council (NANC) adopted p-ANI guidelines for the administration and assignment of non-

dialable p-ANI numbers. Interim guidelines (and an interim administrator--Neustar) were adopted and instituted in 2006. The ATIS and NANC permanent guidelines were provided to the FCC in April 2007 for final consideration (the adopted guidelines are available at: <http://www.fcc.gov/wcb/cpd/Nanc/nanccorr.html>). They will not go into effect until the FCC provides direction on the technical requirements document, selects a permanent numbering administrator, and issues any applicable order implementing them. Under the present p-ANI guidelines IVPs are not directly granted ESQKs, a vital resource to the interconnection of IVPs to the native 911 network. The Commission should revise the guidelines and grant IVPs direct access to ESQKs to comply with the NET 911 Improvement Act of 2008.

2) Real-Time ALI Database Access

An Automatic Location Identification (ALI) database relates a specific telephone number to an address. This database accepts a PSAP query with a telephone number and responds with a corresponding address. In the case of an ESQK/p-ANI, the ALI database “steers” the query to an appropriate IVP database and then steers the response back to the PSAP. ALI databases are typically owned by ILECs or PSAPs. Because IVPs must be able to process both “native” and “non-native” telephone numbers in any given geographic area, they require real-time access to the ALI database system to provide time-of-call updates. Database owners will need to provide requirements for the ALI update interface or ALI steering protocols in use by the ALI system.

3) Emergency Service Numbers

Emergency Service Numbers (ESNs) are typically three to five digit numbers representing a unique combination of emergency service agencies (Law Enforcement, Fire, and Emergency Medical Service) designated to serve a specific range of addresses within a particular geographical area, or Emergency Service Zone (ESZ). ESNs facilitate selective routing and selective transfer, if required, to the appropriate PSAP and dispatching of the proper service agencies. PSAPs that use ESNs can deploy hundreds or thousands of ESNs behind a single selective router for wireline carriers or IVP providers, but typically deploy only one ESN for wireless carriers. In areas where they are used, IVPs require ESNs in order to properly route E911 calls. IVPs need this E911 element to be created in ILEC systems on a PSAP-by-PSAP basis.

IVPs are blind to potential ILEC and PSAP ESN assignments and changes and must have access to the information necessary to route calls based on ESNs. In order to provide E911 service in ESN areas, IVPs need (1) continuously updated information about the number of ESNs per PSAP, and (2) continuously updated information about the geographic boundaries of an ESN.

4) Master Street Address Guides

IVPs require access to the various Master Street Address Guides (MSAGs) that are used throughout the country. An MSAG is used by a municipality or other entity to assign a particular police, fire, or rescue agency to a given street and number range. MSAG entries match the IVP customer's Registered Location to the assigned ESN for that location. IVPs need this E911 element to be created in ILEC systems on a PSAP-by-PSAP basis. The MSAG can be controlled by a variety of entities throughout the country. The FCC should make clear that IVPs should have direct access to MSAGs.

5) Shell Records

Following accepted E911 deployment practices, the established ALI database provider in each geographic area must construct and provide “shell records” (also called MSAG ledgers) for the PSAPs.

Shell records contain the customer's true telephone number and location information and must be transmitted to the PSAPs for the provision of effective E911 service. Shell records allow PSAPs to receive ANI and the Registered Location of the E911 caller. Shell records are used to associate the p-ANI with the IVP and the proper ESN, if required, for each E911 call. This E911 element must be created in the ILEC systems on a PSAP-by-PSAP basis. ILECs alone have access to the information (ESNs and/or MSAG) within their databases. Without access to that information, IVPs cannot create functional E911 databases. IVPs must submit the p-ANI and MSAG information to the ILEC for association to the corresponding shell records in the ILEC's own E911 database (which are maintained by its ALI provider), thereby allowing ALI "steering" to be enabled. Only after ILEC processing is completed will IVP E911 calls be properly "selectively routed" and inquiries from the PSAPs seeking Registered Location information for IVP customers be properly "steered" to correct IVP database. In order for the E911 system to work properly, the information in the ILEC database must match exactly the information in the IVP database. If the information does not match, a "failure to provision" error will occur and the E911 system will not operate properly.

6) Selective Router Interconnection

Selective routers are used to electronically route 911 emergency calls to the proper PSAP based on the ESN code that has been assigned to the caller's location. IVPs need direct interconnection to selective routers or the emergency services gateway (ESGW) that serves all of the selective routers or 911 tandems in a particular region.

In some regions, the ILEC has created a closed facility with a limited number of ports for "new" connections to the native 911 network. Instead of updating the facility, the ILEC serves as a gatekeeper for PSAP traffic, limiting the number of competitors. The FCC should make clear that owners/operators of selective routers may not limit the number of ports into the native 911 network or act as a gatekeeper to the Selective Router.

A) Voice Transport

IVPs require access to voice trunks in order to provide E911 service. This can be done through an arrangement for a trunk to an ESGW that serves multiple selective routers. Alternatively, IVPs need access to ordering information, locations and specifications for trunk types for each selective router in a particular geographic service area. SS7 trunk types are typically preferred, but IVPs should be given flexibility on the type of trunking arrangement they prefer. Some IVPs may want to order more than one trunk for each selective router in order to provide redundancy and diversity. IVPs may also want to obtain Internet access and a SIP gateway co-located with the selective router or 911 tandem.

B) Data Transport

IVPs require access to data trunks in order to provide E911 service. For each ALI system in use in a service area, IVPs require ordering information, locations and specifications for data transport trunk types for each server, including any servers maintained at or by the PSAPs. Again, some IVPs may want to order two trunks to each of the ALI server locations, one each from two location diverse origination points.

III. CMS Parity

The NET 911 Improvement Act of 2008 stipulates that IVPs have the right to access E911 capabilities, including interconnection, from those entities that own or control such capabilities, on the same rates, terms, and conditions that are provided to CMS providers. The elements required for VoIP

E911 interconnection (listed above) typically overlap those elements required by CMS carriers. The Act also recognizes, however, that the unique circumstances of IVP providers may require access to unique capabilities not made available to CMS carriers. In recognition of the differences between IVPs and CMS carriers, the Commission should define parity as Merriam-Webster's Dictionary does: "the quality or state of being equal or equivalent." Such a definition will ensure that IVPs receive parity in E911 capability provisioning, even if the capabilities are not exactly the same as those provided to CMS carriers.

IVPs should have the same right of access regardless of whether the capabilities are offered to CMS carriers by tariff, an interconnection agreement or other contract. Further, the Commission should require entities that own or control E911 capabilities to disclose the terms of non-tariffed and non-filed agreements so that IVPs can ensure they are receiving the parity in access to which they are entitled.

IV. Other Necessary Capabilities and Implementation Issues

1) Ownership or Control of E911 Elements

The FCC should define "an entity with ownership or control over an E911 element" to include carriers and non-carriers, including but not limited to state and local authorities (an E911 Capability Provider). At the outset, the FCC should make clear that it has jurisdiction to enforce IVP access to E911 capabilities through its Title I authority. Specifically, to ensure access to such resources, the Commission should clearly state that all E911 capabilities required for the provision of VoIP E911 service fall under the Commission's Title I authority under the Act, regardless of whether they are controlled or owned by telecommunications carriers or not, as they clearly concern the promotion of "safety of life and property through the use of wire and radio communication" under Section 1 of the Act, 47 U.S.C. § 151.

2) ILEC and PSAP Testing

Successful IVP E911 deployment requires ILEC and PSAP cooperation for testing to ensure that the systems and inputs are working correctly.

3) Interim Service Provisioning

Pending the resolution of any dispute between an IVP and an E911 Capability Provider, the FCC should make clear that E911 Capability Providers must provide such capabilities to IVPs that make a *bona fide* request. For example, if an IVP requests a capability that is not included in the Commission's list and makes a *prima facie* showing that such capability will be necessary in its provision of E911 service, the E911 Capability Provider should be required to provide access to such capability pending dispute resolution. E911 Capability Providers should similarly be prohibited from suspending service provided to an IVP pending the resolution of any dispute.

4) Coordination and Dispute Resolution

IVPs cannot transmit calls to a non-capable PSAP or deploy a complete E911 solution where they have not been given access to critical elements from third party suppliers, some of whom are IVP direct competitors. There must be a quick, efficient means to resolve disputes concerning the respective roles and responsibilities of the parties that must cooperate with IVPs so that the IVPs can comply with the FCC's rules.

5) Escalation Procedures

CMRS providers are typically given trouble escalation procedures to efficiently manage problems with E911 system functionality. IVPs will require similar escalation procedures to ensure that IVP E911 problems are quickly and efficiently resolved.

6) Selective Router Database

There is no comprehensive list of selective routers in the country. In fact, there has been a recent trend of PSAPs and 911 authorities operating their own Selective Routers. In order to process a 911 call in these regions, IVPs require access to a comprehensive list of all of the selective routers in the United States and a corresponding list of which PSAPs are connected to which selective routers. For example, in many instances, PSAPs and ILECs are unable to provide selective router coverage mapping information in a usable format, which is critical to designing the network and placing orders to the appropriate selective routers.

7) Pricing Standards

The FCC should establish pricing standards applicable to the E911 elements and services required for the provision of VoIP E911 services. Such pricing should be cost-based due to the public safety nature of the elements and services being provided. The FCC should also identify the selective router as the default demarcation point between the PSAP's and IVP's networks to meet the Act's CMS parity standard. *See Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Request of King County, CC Docket 94-102, Order on Reconsideration, FCC 02-146 (rel. July 24, 2002).*

8) Availability of PSAP and Other Information

The FCC should utilize the authority provided by Congress in the Act to: a) require PSAPs to regularly provide the Commission with contact information, and require PSAPs to update that information as it may change from time-to-time;¹ and b) require LECs, PSAPs, and other owners of selective routers to provide contact information for those providers of selective routers including testing procedures, classes and types of services supported by the PSAPs, and other information concerning 911 and E911 elements.² The FCC should publish this collected information and make it available to telecommunications carriers, wireless carriers, IVPs, other emergency service providers, and vendors (or their agents).

9) Agreement Filing Requirements

The FCC should consider whether service agreements made between IVPs and E911 Capability Providers should be filed with the Commission.

¹ The FCC already has a PSAP registry, available at <http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html>. But, it apparently is only updated as PSAPs provide new information to the Commission. The Commission should *require* PSAPs to update their contact information with the Commission within a particular time frame when any changes are made.

² The FCC should similarly require PSAPs, ILECs, and other service providers to regularly update the Commission with any new or changed information.

10) Development of Standards

The Commission should work with IVPs and other industry participants to develop best practices that promote consistency, where appropriate, including procedures for: (1) defining geographic coverage areas for PSAPs; (2) defining network diversity requirements for delivery of IP-enabled 911 and E911 calls; (3) call-handling in the event of call overflow or network outages; (4) PSAP certification and testing requirements; (5) validation procedures for inputting and updating location information in relevant databases; and (6) the format for delivering address information to PSAPs. Such standards should be incorporated into and made part of those E911 service and elements agreements between IVPs and E911 Capability Providers, as such standards are developed from time-to-time.