

**NENA**  
**VoIP Funding**  
**and**  
**Regulatory Issues**  
**Operational Information Document**  
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## 1 Executive Overview

The current funding model for 9-1-1 service has maintained its regulatory nature, but the perception of 9-1-1 service by the public has changed from an optional service to an expected public good. The public expects to have 9-1-1 service on a VoIP or mobile phone with the same level of reliability as the 9-1-1 service they have on their wireline phone. However, the current funding model is obsolete. It is based on an outmoded regulatory system. It would be a flawed and damaging approach to try to impose the same regulatory system onto Voice over Internet Protocol (VoIP). The 9-1-1 network is migrating from an entirely regulated operation to a dual system of telephony and call center processing components.

The conundrum is how policy makers should develop both a legal and public policy framework for 9-1-1 service that will accommodate a variety of communication services, irrespective of their regulatory classification or legal definition. The solution is a new construct. The funding methodology for this framework should mirror direct IP telephony, recognizing the data-centric migration of the nation's 9-1-1 network. The creation of a market-oriented paradigm that better reflects the dynamics of the telecommunications industry may be an appropriate backdrop for the new regulatory framework.

A complementary and reciprocal dialogue between the Federal Communications Commission (FCC) and Emergency Services<sup>1</sup> should determine the regulatory framework for 9-1-1 interconnection by VoIP providers. Public Safety Answering Points (PSAPs) may assess the financial impact of VoIP by analyzing the collection and distribution of 9-1-1 service fees and by identifying short-term and long-term operating costs. Understanding the relationship between 9-1-1 service fees, the allocation of those fees, and VoIP providers' business models is also important.

Any new 9-1-1 infrastructure should be built on Internet Protocol (IP) technology.<sup>2</sup> Today's enhanced 9-1-1 funding model is based on assumptions that are no longer applicable in today's telecommunications market. The Telecommunications Act of 1996 introduced competition in the local exchange market, but it also had the unintended consequence of limiting the amount of capital to invest in 9-1-1 infrastructure. Finally, the business plan for an IP based 9-1-1 infrastructure needs to provide both capital and operating funding, and from a service provider's perspective, have an acceptable rate of return.

Finally, it is imperative that a universal service mechanism for rural and low-income support areas be included in a VoIP funding model to implement 9-1-1 in areas currently without 9-1-1 service.

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<sup>1</sup> In the context of the PSTN, emergency services in the US has long been associated with the dialing convention of 9-1-1. Dialing this number causes the routing of an emergency call to the appropriate PSAP and then eventually to fire, medical or law enforcement.

<sup>2</sup> NENA's position of E-911 and PSAP connectivity with VoIP/Internet based Emergency Communications

## 2 INTRODUCTION

### 2.1 Purpose and Scope of Document

The purpose of this document is to provide Emergency Services with a strategic planning tool to assess the potential financial and regulatory impact of VoIP. Included in this document is a broad planning methodology that PSAPs can use as a conceptual framework in developing their own strategic approaches to the potential financial and regulatory impact of VoIP. The intention of this document is not to provide a single definitive solution to the funding and regulatory issues related to VoIP. Rather, this document is presented as a survey of the major topical areas related to VoIP funding and regulatory issues tangent to 9-1-1 services. More questions than answers should be generated as a result of reading this document, because questions lead to analysis in a strategic planning approach.

### 2.2 Reason to Implement

This document should be used as a framework from which to develop a strategic response to VoIP funding and regulatory issues. The strategic response suggested in this document is an action plan for VoIP 911 that assesses the financial implications of VoIP and presents strategic responses to potential regulatory action. Technology is evolving at a rapid pace; IP convergence, and its progeny VoIP, represents the next revolution in telecommunications. As a result, the answers to questions posed in this document may change as VoIP funding and regulatory issues develop.

Suggestions in this document may not be appropriate for every PSAP since solutions to funding and regulatory issues related to VoIP technology are still works in progress. This simply is the nature of issues related to an emerging technology, but the value derived from asking “what if” questions will always remain a paramount technique for uncovering needs and developing proactive strategic solutions based on goals and objectives. A VoIP 911 action plan is an appropriate strategic framework through which “what if” questions can be considered and the financial implications and impact of VoIP regulatory can be evaluated.

### 2.3 Reason for Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in this paragraph.

| Document Number | Approval Date | Reason For Changes    |
|-----------------|---------------|-----------------------|
| NENA 58-502     | 06/06/2006    | Initial Document      |
| NENA 58-502.1   | 05/30/2015    | Update web page links |

### 2.4 Recommendation for Standards Development work

Technical standards would not be applicable to a conceptual document that explored the funding and regulatory issues related to VoIP. The paradigmatic change suggested in this document for VoIP 9-1-1 is not based on a technical solution, but rather a market-based economic approach. As a result there will not be any technical components requiring standards. However, the funding methodologies that currently exist for wireline and wireless 9-1-1 vary among the states. The complexity of funding methodologies will only become more complex with VoIP 9-1-1. An operational standard for funding and regulating VoIP 9-1-1 is vital. This document suggests an

operational standard based on the Network Layers Model. Unfortunately, it was beyond the scope of this document to fully develop an operational standard.

## 2.5 Costs Factors

Cost factors are not applicable to this topic.

## 2.6 Acronyms/Abbreviations

This is not a glossary! See [NENA Master Glossary](#) of 9-1-1 Terminology located on the NENA web site for a complete listing of terms used in NENA documents.

| <b>The following Acronyms/Abbreviations are used in this document:</b> |   |
|--|---|
| CLEC   | Competitive Local Exchange Provider             |
| FCC  | Federal Communications Commission               |
| ILEC   | Incumbent Local Exchange Carrier                |
| IP   | Internet Protocol                               |
| LATA   | Local Access and Transport Area                 |
| NANPA  | North American Numbering Plan Administration    |
| PRI  | Primary Rate Interface                          |
| PSAP   | Public Safety Answering Point                   |
| PUC  | Public Utility Commission                       |
| TCP/IP   | Transmission Control Protocol/Internet Protocol |
| URL  | Uniform Resource Locators                       |
| USF  | Universal Service Fund                          |
| VoIP   | Voice Over Internet Protocol                    |

In addition to the commonly used acronyms and abbreviations listed above, this document introduces a number of new terms and definitions related to a discussion about VoIP. The reader may be unfamiliar with these new terms and definitions so additional information is provided below:

| <b>The following <i>new terms</i> are included in this document:</b> |  |
|--|--|
| Access Provider  | An access provider is any organization that arranges for an individual or an organization to have access to the Internet   |
| Circuit-Switched Networks  | Circuit-switched is a type of network in which a physical path is obtained for and dedicated to a single connection between two end-points in the network for the duration of the connection. Ordinary voice phone service is circuit-switched.  |
| Network Layers Model   | The OSI, or Open System Interconnection, model defines a networking framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, proceeding to the bottom layer, over the channel to the next station and back up the hierarchy. In ascending order the layers are: physical, data link, network, transport, session, presentation, and application |



| <b>The following <i>new terms</i> are included in this document:</b> |  |
|--|--|
| Packet-Switched Data Networks  | In telecommunications, packet-switching is the now-dominant communications paradigm, in which packets (units of information carriage) are individually routed between nodes over data links which might be shared by many other nodes. In packet switched networks, such as the Internet, the data is split up into packets, each labeled with the complete destination address and routed individually. |

### 3 Operational Description

#### 3.1 Potential Funding Model

##### 3.1.1 Understanding the evolution of VoIP

Nobody can predict exactly how VoIP and the market for VoIP-based applications and services will evolve, but it is likely that there should be some resemblance to today's voice services environment. The diffusion of VoIP is likely to introduce a variety of communication services based on new business models. Emergency Services needs to understand where VoIP is going technically in order to comprehend the funding and regulatory ramifications of VoIP for 9-1-1 services. Otherwise, the potential exists to develop unworkable or ineffective regulatory strategies.

Few can articulate the kinds of effects VoIP will have on strategic business processes and strategies, creating disagreement over regulatory tactics. Presently, we cannot take full advantage of this new platform because we cannot conceive of all the possibilities. What we do know, however, is that the market will demand 9-1-1, and VoIP providers, if they want to survive in a market driven environment, should make this service available. The inevitable conclusion is that the country's 9-1-1 system requires work in order to keep up with the enormous changes in technology. The whole world is becoming more data-centric, necessitating a fundamental change to the 9-1-1 system.

##### 3.1.2 VoIP and 9-1-1 telecommunications services

Since the Telecommunications Act of 1996, the structure of the telecommunications environment has become less regulated and more responsive to consumer and market driven influences. This environment will be a major contributor to forming a funding model for VoIP 9-1-1. Competition will transform the captive end user into a price and service sensitive consumer who wants choices among local telephony options, including the number of devices from which 9-1-1 service can be obtained.

A potential scenario is for VoIP entities to operate as service providers, outside of a regulated and monopolistic telecommunication framework, replacing individual subscribers as end users in the emerging VoIP funding model. The provisioning of 9-1-1 service would become a value added feature available on any number of a multitude of devices. VoIP may be just one application among many available information and telecommunications services providing 9-1-1 service.

VoIP providers are becoming intermediary brokers, linking the consumer with desired voice services on an increasing data-centric and publicly available network. Furthermore, the application provider



may or may not be the access provider. The potential is for these providers to be located anywhere in the county, or even abroad. As a result, the functional role of the constructs for 9-1-1 service in the VoIP funding model must be to answer the following questions:

- One, from whom will 9-1-1 service fees be collected?
- And, two, what is the criteria and methodology for distributing 9-1-1 service fees?

The provisioning of 9-1-1 service fees to maintain the 9-1-1 network has historically operated on a prepaid basis. In order to have the service you first had to pay for it, but the perception of 9-1-1 service has become that of a ubiquitous public good. With wireless telephony, consumers expected 9-1-1 service to be a feature of the cellular network due to the ubiquitous nature of wireline 9-1-1 service. The exceptional service delivery that originated with wireline 9-1-1 has transcended the specific application, and has come to be expected by the public with all forms of telephony.

### **3.1.3 The duality of VoIP 9-1-1 infrastructure**

As 9-1-1 service has evolved from analog to digital delivery, the 9-1-1 infrastructure system has migrated from a single integrated regulated operation into a system comprised of two components, a telephony portion consisting of regulated and non-regulated industries and a governmentally operated portion made up of an array of governmental functions that support the individual PSAP. Based on the FCC order regarding the Vonage petition, the trend will be towards federal oversight of VoIP, and consequently, the telephony portion of the 9-1-1 service network impacted by VoIP. The call-processing portion would still remain under the control of state and local governments, the entities which are responsible for PSAP and emergency response functions.

Federal oversight is required because of the fact that competition has entered the local exchange market place, and as a result, PSAPs can no longer depend on the local Telcos to be the innovative driving force they once were for 9-1-1 infrastructure improvements. Furthermore, in an area where standards are non-existent, it is important to businesses investing in 9-1-1 infrastructure improvements to know that they can market a suitable product across the United States.

### **3.1.4 The regulatory conundrum of VoIP**

U.S. policymakers face a predicament with VoIP as one of the new Internet Protocol (“IP”)—centric services, applications, and facilities. The conundrum is whether or not policymakers incorporate VoIP into the nation’s pre-existing legal and public policy construct or create a new paradigm? VoIP providers have different business models and service delivery approaches. The preferred collective regulatory method for service providers of this application is a streamlined centralized approach to remit 9-1-1 service fees, minimally impacting the cost of doing business.

The fundamental principal for any future funding model for VoIP should include a fair and equitable way to deliver 9-1-1 service fees. For wireline it was the service address. For wireless, it was the billing address. With VoIP, the handset may not be in a fixed location. As a result, the nomadic quality of VoIP needs a funding model that acknowledges the portability of VoIP devices.

### **3.1.5 A “layers approach” for VoIP regulation**

The policy framework embodied in our existing communications law is often called “stovepipe” regulation. That is because there are distinct technology-based and functionally driven regulations

that apply in a disparate fashion, depending on the services classification. In an environment in which technological change enables companies regulated under one “stovepipe” to invade the turf of companies regulated under another, it’s time to tear down the existing regulatory paradigm and replace it with a new model better attuned to today’s marketplace realities as well as complementary to the funding needs of Emergency Services.

In formulating a new public policy framework for VoIP and 9-1-1 service, perhaps a “layers approach”<sup>3</sup> towards IP networks should be considered. Labeled the Network Layers Model, this approach calls on policymakers to adopt a comprehensive legal and regulatory framework founded on the Internet’s horizontal networks layers. A benefit of this approach for Emergency Services may be to increase PSAP operational efficiencies by developing a methodology to address the public policy issues surrounding not just VoIP 9-1-1 services fees, but also the entire 9-1-1 cost structure.

By reconceptualizing communications regulation along horizontal layers, the logical walls surrounding key components of IP networks can be removed and a new regulatory framework put in place to continue funding 9-1-1 services. As a result, the outmoded vertical separation associated with communications regulation could be replaced by a horizontal system designed to accommodate new technologies and functions, as opposed to attempting to force congruency between new network characteristics and outdated regulations.

Over the next several years, policymakers will find themselves increasingly challenged to make the Internet adapt itself to the already well-defined bricks-and-mortar, service-and-technologies environment that exists. The optimal solution for the VoIP conundrum is to turn it around and begin to adapt our institutions to the reality of how the Internet is fundamentally changing the very nature of business and communications. Trying to impose the current outmoded regulatory system onto the Internet and all its IP progeny, such as VoIP, is a flawed and damaging approach for policymakers and PSAP operations.

### **3.1.6 Horizontal networks and vertical rules**

Instead, policymakers should at least consider a new public policy framework that regulates along horizontal network layers, rather than legacy vertical silos, artificially separating communications-related services, networks, and industries from each other. A fundamental organizing principle of packet-switched data networks is the “protocol layering” concept. Networks employ different functional rules, or protocols, arranged in layered stacks.

As technology has evolved, existing networks and markets have begun converging to common IP platforms. A potential solution may be to adopt a comprehensive regulatory framework that is at least cognizant of the Internet’s horizontal network layers. By using the layers framework as the overall organizing principle for the construction of a VoIP 911 funding methodology, a better technological fit may be achieved.

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<sup>3</sup> The layers approach described is based on an article written by Richard S. Whitt, Senior Director for Global Policy and Planning at MCI, Inc. This article is entitled: “A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model”. It can be found in volume 56 of the *Federal Communications Law Journal*, pp. 587-672.

Key inherent properties of this IP-centric order include blurred distinctions between services, lack of relevant geographic boundaries, and a plethora of virtual interconnected networks. While networks and markets have been evolving towards an all-IP world, the U.S. regulatory framework remains stuck in the past. Previous regulatory action and its implementing rules have divided up the landscape based on traditional service, technology, and industry labels. Telecommunication regulations have failed to reflect the reality of the converging markets and networks, obliterating past service, definitional, technological, and geographic limitations.

The Internet has been built and operated with layers-based concepts that likely will not change appreciably over time. The layers approach should be used as a flexible, dynamic conceptual tool. In a layers framework, the recommendation for public policy is that it should be formulated to reflect the integrity of the distinct layers for purposes of determining whether they should be regulated. The model in this framework consists of four layers. In ascending order, these layers are physical, logical, application, and content. The model suggests that the two lower layers, physical and logical, should be targeted for discrete regulation based on its claim that significant market power resides in these layers, rather than legacy service or industry labels.

In the model, the physical layer roughly corresponds to the network facilities of the cable, telephone, satellite, wireless and other types of communication that transport information. The logical layer roughly corresponds to the software codes and protocols, such as TCP/IP, that interfere with the physical layer below and the application and content layers above. Under the layers framework, VoIP would be placed in the “applications layer” because it is a software-derived application. It would be classified and treated differently from traditional regulated voice service.

What is needed is a new regulatory model, not a replacement scheme based on a set of techno-functional definitions. The recommendation for a regulatory model is one that is based on a market-oriented paradigm. Policymakers should be looking at whether communications services are offered in workably competitive markets. The economic regulation that characterizes today’s networks is unnecessary and any regulation would be required to overcome the built-in deregulatory presumption of competitiveness. The end result should be a market-oriented paradigm not an approach that merely replaces vertical stovepipes with horizontal ones.

## **3.2 Funding for On-going Day to Day Operations**

### **3.2.1 VoIP and PSAP operations**

The FCC will be the agency responsible for creating the economic regulatory framework for VoIP and for determining the methodology for collecting 9-1-1 service fees. This process should be a complementary and reciprocal dialogue between the FCC and Emergency Services designed to mitigate the potential negative impact VoIP may have on PSAP operations and the traditional collection methods for 9-1-1 service fees. States are prohibited from regulating Internet service because of federal preemption, but specific state and local laws may still be applicable.

Whether or not a specific state and local telecommunications tax applies to particular VOIP-based services of course depends on the wording and enforcement of the particular state law. We may expect, however, that many state and local governments might seek to impose telecommunications excise taxes on VOIP-based services. As a result of this action, what options will be available to

PSAPs to ensure an adequate level of operational funding previously obtained through wireline and wireless 9-1-1 surcharges?

An appropriate starting point is to determine the financial impact that VoIP will have on Emergency Services:

- ❑ The first step in this process is to have a complete representation of how the various states collect their wireline and wireless 9-1-1 surcharges, what constitutes an access line or its equivalent, and the method used to distribute those funds to PSAPs to benchmark the existing structure.
- ❑ Second, it will be necessary for both states and individual PSAPs to identify what their short-term and long-term operating costs will be.
- ❑ Third, the projected impact of VoIP on PSAP operations will also depend on market penetration rates for Broadband and VoIP.

This information will help to accurately assess the financial impact of VoIP on 9-1-1 service. By comparing the patchwork of revenue methods that maintain current 9-1-1 operations to replacement estimates of VoIP for traditional circuit switched access line telephony, future funding parameters can be established. The financial impact of VoIP will be a function of VoIP's future capacity.

### **3.2.2 Funding methodology for PSAPs**

The acceptance and conversion of consumers to VoIP is still mostly unknown. VoIP service is not very price elastic and consumers will need to see a demonstrable value-proposition resulting from the deployment of VoIP based on next generation architectures. There will almost certainly be some type of fee structure applied to VoIP, but because of the broad and borderless reach of the Internet, it would be virtually impossible to regulate it from a state or local level.

If VoIP is not regulated through surcharges enacted by a state or local government, and given the FCC's ruling that VoIP is an interstate service, does this make some type of national VoIP 9-1-1 surcharge inevitable? The fact that no single organization owns the entire 9-1-1 system further complicates the situation. VoIP providers might have to reach agreements with several different network owners to provide comprehensive 9-1-1 service. Given this scenario, what is the appropriate funding mechanism for the future collection and distribution of funds? And finally, how will the funding levels for individual PSAPs be determined? In order to answer these questions, we have to move out of the traditional structure.

Currently, the funding methodology for VoIP 9-1-1 is in a formative stage. The right of states to tax or assess 911 services fees related to VoIP has not been completely resolved. We are still in the early adoption stage in the diffusion of VoIP technology. However, market penetration rates for VoIP are forecasted to increase dramatically. For example, Jupiter Research is projecting that 12.1 million households will have VoIP telephony services by 2009.<sup>4</sup> This necessitates the establishment of funding rules and expectations that meet PSAP operational funding needs.

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<sup>4</sup> Jupiter Research, "Broadband Telephony: Leveraging Voice over IP to Facilitate Competitive Voice Services", August 2004.

In the potential funding model section, a market-oriented paradigm was selected as the appropriate policy framework for VoIP 911. To remain consistent with the initial construct, a parallel approach will be required to establish the funding methodology for 9-1-1 services. The recommendation is for this funding methodology to correspond with the technical aspects of delivering VoIP 911. This can be accomplished by operationalizing the market-oriented paradigm, which in turn, will forge a link between the policy framework and the funding methodology.

### **3.2.3 Operationalizing a market-oriented paradigm: the I2 and I3 technical solutions**

The operationalization of the market-oriented paradigm should result in a complete replacement for current 9-1-1 systems and services. Furthermore, it will require a funding methodology that is consistent with the I2 and I3 technical solutions for 9-1-1 service and provide for a migratory funding path between them.<sup>5</sup> With the exception of wireline 911, the telephony component of the 9-1-1 system is becoming less regulated, necessitating a different funding strategy to avoid the mismatch of revenues and expenses that could occur if an area had too few subscribers or a high percentage of VoIP nomadic service. Similar to wireless technology, the nomadic nature of VoIP means that the entity receiving the money may not be the entity providing 9-1-1 to the end user.

This transitory strategy should, to the extent possible, incorporate existing funding distribution methodology, maintain the existing technological infrastructure, and include a wireline replacement revenue plan. A recent survey by the VON Coalition indicates that 100% of those companies surveyed who offer a residential Voice over Internet service are providing a 9-1-1 calling capability that allows a caller to reach a PSAP.<sup>6</sup> Furthermore, 60% of the responding companies are providing access for fixed location customers similar to traditional wireline enhanced 9-1-1 service.

The remaining companies have specific plans to implement this type of service. The goal of this process should be for PSAPs to proactively position their operations to be in line with an eventual funding methodology that is based on a market-oriented paradigm. The funding methodology for this paradigm should be functionally structured to mirror direct IP telephony, recognize the data-centric migration of the nation's 9-1-1 network, and acknowledge local PSAP autonomy over call center operations and 9-1-1 call response handling.

### **3.2.4 Potential funding mechanisms**

As part of the overall funding methodology, specific funding mechanisms should be established that are compatible and applicable to the Internet. The Internet is a growing association of

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<sup>5</sup> The I2 and I3 solutions are NENA standards associated with the implementation of VoIP and E 9-1-1. The functional elements of the I2 (interim) solution include routing calls to the correct PSAP with correct ANI and ALI, accommodating both stationary and nomadic users, and providing MSAG valid location information. The objective of the I2 solution is to provide a single industry adopted solution. The functional elements of the I3 (NG9-1-1) solution include all of the requirements of the I2 solution and the following; end to end IP-based call delivery to PSAP, utilizing extended capabilities of IP to provide location information with the call as well as other sub-sets of relevant data, and supporting VoIP mobility. The objective of the I3 solution is a complete replacement of the current 9-1-1 system and service for all types of calls.

<sup>6</sup> 911 VON Coalition White Paper, "Answering the Call for 9-1-1 Emergency Services in an Internet World", January 2005



interconnected networks; it has its own infrastructure and is more decentralized than traditional telecommunication industries. These differences extend beyond the technology of the Internet, economically impacting the current 9-1-1 regulatory structure. While VoIP may rewrite our understanding of technology in the communications industry, its complexity may compromise a formidable and somewhat stable tax base. If alternative methodologies are not implemented or existing legal interpretations reinforced, uncertainties could lead to confusion and inconsistent billing.

There's a good reason for state and federal taxing bodies to be concerned about a loss of revenues with the lack of VoIP taxation. A tax on telecommunications brings tens of billions of dollars into federal, state, and local coffers. And, voice communication is not limited to the big carriers. It now includes wireless, wireline, telecommunications resellers, VoIP, and Internet access providers throughout the market place. The potential may be for conflicting regulatory classification and broad-impact federal legislation, making meaningful compliance untenable, at best, for VoIP service providers.

### **3.2.5 VoIP service provider**

VoIP taxation may be tested against the concepts surrounding "nexus," which is roughly defined as the level of contact an entity must have with a jurisdiction before it is subject to the tax rules of that jurisdiction. Nexus rules have, at their most basic level, dictated that companies must collect tax in jurisdictions where it has property or payroll (employees). The technology itself could allow VoIP providers to benefit from these rules. Lacking most of the requirements to operate a bulky, capital-intensive, circuit switched infrastructure, a VoIP provider could limit its tax "footprints" to a small number of jurisdictions, reducing or altogether avoiding taxation.

### **3.2.6 Access Infrastructure Provider (AIP)**

An alternative to the VoIP service provider model, is the AIP. The AIP is the entity that provides the physical interconnection capability to the end user. Two examples of an AIP would be a cable TV company that provides Internet access or a DSL company. If the AIP becomes the entity responsible for providing location determination, perhaps the AIP should also collect and remit surcharges since it is local, known, and often regulated. Further investigation is needed to see if the AIP can actually become the most logical point through which to collect and remit 9-1-1 surcharges

### **3.2.7 Bandwidth metering**

Metering refers to the practice of Internet Service Providers (ISP) charging consumers based on the amount of bandwidth their Internet use consumes. The primary pricing schemes adopted by broadband are flat rate pricing and pure duration-based pricing. Flat rate pricing causes inefficient utilization since users do not face the true marginal cost of their usage. For duration-based pricing, it is not impartial to apply the same charging schemes to all users. As a result, the charging schemes on bandwidth should be more precise, making utilization more efficient, reducing the waste of the bandwidth, and following the principle that how much a user pays depends on how much bandwidth the user consumes. A VoIP 911 funding mechanism would need to be worked into the evolving charging schemes for bandwidth.

### **3.2.8 General fund tax**

The cost of a VoIP 911 tax may be met by either VoIP providers or VoIP subscribers, or both. How much of the cost VoIP providers are able to pass on to consumers will depend on how closely the tax is related to marginal cost. In a competitive environment, producers set prices based on their marginal costs. As a general result, the tax will have the effect of increasing VoIP providers' marginal cost. It may be difficult in a competitive environment for VoIP providers to recover the cost of the tax from customers and they may be forced to absorb the tax or offer their services from offshore locations.

### **3.2.9 Surcharge on IP address**

Understanding the Internet as an economic system is difficult to do because of its almost anarchic form. The original phone system was developed as a single network to provide only voice service. The Internet, on the other hand, is home to many applications and networks. In addition, the Internet has no billing infrastructure in place. Instead of users getting charged after they use the service on a usage-sensitive basis, they are charged a flat fee for some kind of connect charge. Establishing a VoIP 911 surcharge on an IP address would require enormous coordination between IP authorities and government bodies.

### **3.2.10 Surcharge based on telephone number**

For decades, telephone numbers have been the single most visible communications identifier. However, phone numbers appear unlikely to maintain their central role because of increasingly inherent limitations. More than likely, phone numbers will be supplemented by e-mail style addresses (or URLs). Clearly due to their widespread use and their ability to be entered into a very limited user interface, phone numbers will continue to be important to come, but as end-to-end IP communications becomes more common, many of these entities will only be reachable by an email-like identifier. Even if we maintain numeric identifiers, increasing number portability makes it attractive to use non-NANPA numbers. The longevity of this option for a VoIP 911 surcharge is doubtful.

### **3.2.11 National VoIP Universal Service Fund**

The potential shrinking of a traditionally stable tax base may go far beyond creating new pressures on state and local taxing jurisdiction, but also threaten the very mechanisms that fund universal service. Consumer advocates argue that since high-speed Internet access is usually required to use VoIP services, people unable to afford broadband access could be the only ones to bear the burden associated with universal service funds. The Federal Universal Service Fund (USF), a telecommunications fund mandated to long-distance telecom companies in 1996 to subsidize Internet and telecommunications access, may be adaptable for VoIP 911. Almost as soon as USF became mandatory, long-distance carriers began passing the costs on to their customers. If VoIP providers can legally recover VoIP 911 surcharges from their customers, this solution has potential.

### **3.2.12 User (incident) fee**

With this solution, a user fee would be assessed for each VoIP 911 call. While this approach would directly attribute the surcharge to individual VoIP users, potentially bypassing the VoIP provider, implementation would be problematic. In fact, the cost associated with this solution may outweigh any benefit to be derived from a VoIP 911 surcharge.



### **3.2.13 VoIP providers and 9-1-1 service fees**

Even though uncertainty remains concerning the regulatory framework for VoIP, a step towards determining a planning direction for PSAPs may be to survey the actions of VoIP providers in regards to 9-1-1 service fees. VoIP providers already recognize that consumers want 9-1-1 service and acknowledge that regulatory fees associated with 9-1-1 service are a cost of doing business. VoIP providers are attempting to understand how PSAPs handle 9-1-1 operations and the impact that 9-1-1 service delivery has on their day-to-day business. Much depends on the type of facilities that a VoIP provider utilizes.

Some providers own their infrastructure. Other VoIP providers with smaller operations must rely on leased infrastructure to provide service. The application of facilities has an operational determination for the collection of 9-1-1 service fees and mandates an analysis of any current funding methodology for 9-1-1 services among VoIP providers. Recommendations for funding PSAP operations may be different depending on whether or not the VoIP provider owns the infrastructure it uses.

Some VoIP providers are currently collecting 9-1-1 service fees. But which providers are collecting 9-1-1 service fees and to whom are the collected fees being remitted? A concern is that some VoIP providers are collecting 9-1-1 service fees and remitting them without a clear understanding of which PSAP would be providing Emergency Services. VoIP providers do not want to write checks to individual PSAPs. The preferred method identified in the NENA/VON agreement is a centralized approach for the collection and distribution of the funds.<sup>7</sup>

Direct interconnection to the 9-1-1 network is generally only available to telecommunication service providers and not information service providers. As a result, there are VoIP providers that assess and remit 9-1-1 service fees but have no access to 9-1-1 tandems and databases. Instead, they potentially must contract with a LEC, CLEC, or VoIP positioning center for these services.

## **3.3 Funding for Upgrading or Migration to the New IP Based 9-1-1 Infrastructure:**

### **3.3.1 9-1-1 infrastructure and IP technology**

It is assumed that any new 9-1-1 infrastructure will be built on IP technology.<sup>8</sup> This is because the current IP revolution in telecommunications is making traditional circuit switch telecommunications architecture obsolete as more and more major carriers migrate to IP platforms. As new communications services emerge that blend voice and data together, it is becoming increasingly evident that today's 9-1-1 systems may not be able to handle these new services.

It is imperative that the 9-1-1 network consider migrating to a new technology platform to accommodate the ever-expanding suite of communications services from a myriad of devices. As most innovation in telecommunications is being done on IP platforms, it is only natural to assume

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<sup>7</sup> NENA/VON Coalition Agreement, December 2003

<sup>8</sup> VON Coalition White Paper, "Answering the Call for 9-1-1 Emergency Services in an Internet World", January 2005

the new 9-1-1 infrastructure will be IP based. Today's enhanced 9-1-1 funding model is based on a foundation that is no longer applicable in today's telecommunications market.

### **3.3.2 Telecommunications Act of 1996 and competition**

The Telecommunications Act of 1996 ushered in a new era of competition in the local exchange market. The intent of the Act was to avail American consumers of new and innovative services that would be competitively priced. The mechanisms adopted by local public utility commissions to foster competition were based on numerous entrants providing traditional telephony services. Regulators expected competition and innovation in the market to flourish. In reality, CLECs simply took customers away from ILECs, or re-sold the same ILEC service.

The result has been the erosion of the traditional incumbent carrier's market share and the reduction in the capital the incumbent has available for investment in new network infrastructure. Given the historical view of 9-1-1 not being a profit center, necessary 9-1-1 infrastructure improvements may have little chance of garnering any of these capital dollars. In other words, there is no business case for funding, investing, and building a new 9-1-1 IP based infrastructure.

Since ILECs no longer have primary control of the 9-1-1 network given the multiple competitive entrants in the market place, maintenance of the network is increasingly outside the span of control for the old ILEC monopoly model. The ILEC finds itself as a 9-1-1 monopoly service provider to entities it directly competes with in the local exchange market. In addition to the erosion of span of control, there is no economic incentive for the ILEC to have uniform integrity across the 9-1-1 system.

### **3.3.3 IP based 9-1-1 infrastructure**

Telecommunications has become consumer driven and data-centric, requiring a new IP based infrastructure to support the network component of the 9-1-1 system. The business plan for an IP based 9-1-1 infrastructure should provide both capital and operational funding. Capital funding would be needed to plan for the migration from an antiquated analog 9-1-1 voice network to a new IP based 9-1-1 network component. Operational funding would be needed to maintain the locally autonomous call-processing component of the system.

The network telephony transport component of the 9-1-1 system should technologically reflect consumer demand for increased speed, capability, and service. The ensuing business plan for an IP based 9-1-1 infrastructure would require a new funding model with a different regulatory schema, perhaps a data layer approach, and a different set of rules for legislative oversight. In reality, the new IP based 9-1-1 infrastructure would expand the 9-1-1 system into a much larger Emergency Services data-centric network on which 9-1-1 would reside as an application. In addition, a new model should divest itself from the provisioning of local exchange services to avoid the existing disincentive to accommodate new, albeit competing, technologies.

### **3.3.4 Demise of fixed locations**

Communications are no longer tethered to a fixed location. Wireless and portable devices abound. Increasingly, these devices are blending traditional voice telecommunications services with data from information services independent of a transmission medium. The separation of application (Voice over IP, Instant Messaging) from the transmission technology (copper wire, cable, wireless)

and the blending or convergence of communications services makes the application of existing funding mechanisms difficult.

There is also a need for the new infrastructure to support mobile technologies and not always put the onus on the service provider. The technology used to provide location information for wireless callers is the wireless carrier's responsibility. If there is an expectation that this caller location technology should be replicated for all mobile and nomadic technologies, then perhaps, it should be funded by 9-1-1 entities?

The immediate impact of this inability to fairly and accurately apply existing funding methodology to new technologies is that the revenues required to support the existing 9-1-1 infrastructure are now at risk. With diminished current revenues required to support the existing aging infrastructure, any ability to save for migratory network upgrades becomes less likely, if not impossible.

### **3.3.5 Keep looking forward**

In today's communications services market the traditional funding mechanisms based on access lines is inadequate to support today's 9-1-1 infrastructure indefinitely. These funding mechanisms are also poorly suited to provide a way to pay for the required infrastructure upgrades to a new IP based platform. It is imperative these mechanisms stay in place to assure continuity of services pending deployment of a new IP based 9-1-1 system; however, it is no longer realistic to expect the existing funding mechanisms to be a long-term funding solution for our existing 9-1-1 system.

Additionally, new funding mechanisms must be crafted that allow 9-1-1 administrators to amass a capital reserve for deployment of a new IP based 9-1-1 infrastructure. These new funding mechanisms should address the following characteristics of the new communications services:

- Mobile and portable usage is likely independent of billing address of subscriber
- Communication application offered independently of transmission medium
- Multi-tiered distribution whereby one service provider may bundle access medium as a wholesaler to an applications provider acting as a retailer to end users (VoIP and their CLEC partners, prepaid wireless)
- Multiple providers which may or may not have regulatory oversight by a state or federal body
- Service providers located internationally
- Difficulty in assessing and remitting service fees at a local government level

## **3.4 Funding for 9-1-1 Implementation in Areas Where There is No 9-1-1 Service**

### **3.4.1 VoIP as a low-cost alternative**

The ability to draw from a universal service mechanism for high cost rural and low-income support areas should be included in a VoIP funding mechanism. Areas without wireline 9-1-1 infrastructure may be able to utilize VoIP technology as a way to bypass the extraordinary capital expense of a wireline 9-1-1 network and use a less expensive data network approach instead. The definition of the Universal Service concept should be expanded and the funding approach changed to match the

needs of the 21<sup>st</sup> and beyond century to ensure that all citizens benefit from the technological advances offered by VoIP.

### 3.4.2 VoIP and grant funding

Grant funds are available for connecting essential community facilities in rural towns and communities where no Broadband service exists. This would help open the door to today's high-speed, high technology in the most isolated of rural communities. VoIP providers may be able to offer a canopy service in conjunction with help from federal granting agencies

Legislators worry that widespread adoption of VoIP services could upset established methods of revenue collection and threaten the availability of affordable rural telephone service.

With the anticipated broad telecom act to deal with broadband voice, universal service reform will be considered.

## 4 NEXT STEP .....

As Emergency Services professionals, we know that the current 9-1-1 funding model is inadequate to upgrade 9-1-1 infrastructure. Furthermore, there is uncertainty and confusion about the components that should be included in a potential VoIP 9-1-1 funding model. Maintaining day-to-day PSAP operations and planning for a migration to an IP based 9-1-1 infrastructure will require both capital and operational funding, but each PSAP will need to develop its own strategic plan for VoIP 9-1-1 and other emerging IP based technologies. Although there is uniformity with technology standards, local PSAP operational autonomy will necessitate that decisions and plans be reached on an individual basis. What is paramount, however, is that as Emergency Services professionals, we do not lose sight of the common goal, maintaining current 9-1-1 systems as we plan for truly ubiquitous IP based 9-1-1 service.

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## 6 Appendix

### Appendix 1

#### Current Funding Model:

##### *Overview*

The current funding model for 9-1-1 service has its foundation in the historic regulated wireline telecommunications environment. The current funding model, for the most part, has been maintained through regulation for the last 30 years, but the perception of 9-1-1 service by the public has evolved from an optional service to an expected public good. With the onset of wireless telephony, 9-1-1 service is expanding its delivery options; access to 911 is no longer limited to wireline phones. Access to 911 is now available as a service element of wireless telecommunications, and the current public perception of ubiquitous 911 is making access to 911 systems a component of telephony involving emerging technologies. A parallel occurrence to the expansion of 9-1-1 service has been the perceptual divergence, within the telecommunications industry, from the public as a captive audience to that of price sensitive and service driven consumers. Telecommunication service providers are aware that consumers are looking to receive a 9-1-1 standard of care regardless of the technology employed. This 9-1-1 standard of care includes location provisioning, redundancy, and the same superior level of service that originated with wireline 9-1-1.

##### *The original funding methodology for 9-1-1*

In the primarily state regulated wireline telecommunications environment, Incumbent Local Exchange Carriers (ILECs) were the dominant entity that provided local exchange service in their franchise service area. This service was provided by ILECs for a guaranteed rate of return that was established by approved tariffs and rates in the regulatory process; ILECs operated as monopolies through the regulatory criteria established by state public utility commissions (PUCs). ILECs operating as E 9-1-1 System Service Providers (E911SSP) were not required to provide 9-1-1 service in their franchise territory until 9-1-1 entities had the ability and the revenues to compensate them for the costs of providing such service.

Many state and local governments enacted statutory requirements, based on federal regulations and state legislative action. These statutory requirements were designed to create corresponding revenue sources from wireline subscriber fees to support 9-1-1 services. As a rule, the principal ILECs for the local access transport area (LATA) became the dominant 9-1-1 service provider for that LATA. Local service providers did not always provide 9-1-1 functionality as a cost component in the provision of local service. It was an optional service on the part of the local service provider that required a separate revenue stream from the regulated rate structure of the monopolistic framework.

##### *911 service fees and wireline operational cost recovery*



Subscriber fees for 9-1-1 service were assessed on access lines and were collected first from wireline subscribers and then later from wireless subscribers. This funding methodology continues to be the dominant approach today. As telecommunications technology has evolved, this basic funding model has been modified to address the entry of new telecommunication service providers into the market, such as private switch providers, Competitive Local Exchange Carriers (CLECs), and wireless carriers. The concept of a 9-1-1 subscriber usage fee on a monthly service bill remains virtually unchanged from its original inception to today's funding practices.

The operational methodology in place today is a transference system, characterized by the breadth of latitude and variance that exists among state and even local funding schema for 9-1-1 service. Generally, ILECs collect wireline funding from a revenue source, subscribers or access lines, and then either directly or indirectly transfer the funding to telecommunication carriers to pay for the 9-1-1 network, and/or to localities to supplement Public Safety Answering Point's (PSAP's) operating budgets.

However, several variations on this generalized approach exist among states. For example, in the New England region, the funding goes to the individual states first, and then, it is distributed to telecommunication carriers and localities. In Texas, the current funding methodology is a dual fee structure. One revenue source is a line charge. The other revenue source is an "equalization surcharge" based on long distance toll charges.

#### *Wireless cost recovery*

In the case of wireless 9-1-1, many state statutes provide for partial or full cost recovery for the wireless carriers, but there are several states with statutes that proscribe little or no wireless cost recovery. Some states' legislative bodies do not appropriate the full amount of revenues to be generated back to 9-1-1 administrative entities, resulting in limited cost recovery for either the PSAP, the telecommunications provider, or both. There are a couple of reasons for this situation.

One, states may have implemented inadequate wireless surcharges and are reluctant to make adjustments. Two, other states are still working through issues related to their wireless cost recovery policies. Thus, some of the larger wireless carriers have implemented self-recovery for some or all of their expenses to meet the Federal Communication Commission (FCC) mandated Phase I and II wireless E9-1-1 requirements, passing on the deployment expense to consumers in the way of a surcharge on subscribers' bills.

#### *Limitations of current 9-1-1 funding model*

Historically, state PUCs have regulated local service providers, determining pricing, services, and entry and exit requirements, but this current structure is outdated in an IP world. The reality is that we now inhabit an increasingly digital world in which it is impossible to distinguish bits carrying "voice" from bits carrying "data." As a result, today's 9-1-1 funding structure has become obsolete for several reasons. One, 9-1-1 is no longer an optional service. Two, there is competition within the local exchange market. And three, 9-1-1 is moving beyond its original fixed wireline circuit switched telephony.



The original enabling legislation and subsequent funding mechanisms for 9-1-1 were based on a specific set of assumptions. The first one being that 9-1-1 funding mechanisms were levied on an access line basis. The second one being that telephone companies provided 9-1-1 network and database administration services to governmental entities, relying on the fixed location access line to craft 9-1-1 tariffs. However, these assumptions are no longer valid with VoIP and other IP-based communications.

The current funding methodology for 9-1-1 service is inconsistent with the market driven operating approach of VoIP providers, especially those relying on intermediary CLECs. The business operations of VoIP providers automatically differentiate them from wholesale providers such as ILECs, CLECs, and wireless carriers. VoIP providers can act as an end user as well as an intermediary player since they enter telecommunications distribution channels at non-traditional points. As a result, they are in both an end-user and subscriber gray area, subject to individual regulatory fees and regulatory oversight through intermediary communications service providers. To illustrate this point, a VoIP provider that purchases Primary Rate Interface (PRI) service from a LEC may have already paid wireline subscriber 9-1-1 fees.

As VoIP gains market acceptance, its related regulatory and statutory environment will influence both the revenue and expense side of the current funding model equation. As new telecommunication services are introduced into the market place, requiring 9-1-1 interfaces into the PSAP, the current subscriber fee model will need significant adjustment to ensure funding of both governmental entity expenses and telecommunication service provider costs. Furthermore, with VoIP, the subscriber fee model has the potential to result in a mismatch of revenues to expenses, especially when considering the nomadic nature of VoIP.

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