The Evolution of IP Communications and the Advantages of Cloud Based Services for Public Safety

A White Paper

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The Evolution of IP Communications and its Impact on Public Safety

IP communications is not new to public safety. In fact, a wide range of services are offered over IP covering an array of platforms to include CAD, Radio and Enhanced 9-1-1 services. Unfortunately, agencies find themselves in an environment in which multiple IP platforms serve several disparate systems. Lessons learned from early adoption of these services allow for a much more informed position in deploying services that rely on IP in the future.

Some of the major driving forces behind the adoption of new services over IP are couched within emerging technologies such as cloud based services and Next Generation 9-1-1 models. In order to fully leverage an underlying IP infrastructure that can support migration to these new services it is critical to understand what exactly it is that the new service can provide. Simply moving a platform that is functional today to an IP platform that provides no greater service than the system being replaced makes little or no sense, both technically and fiscally.

Many services today allow for an economical and rational approach to IP and can drive the decision to implement a highly capable transport system while allowing for the migration of services if and when it makes sense. A thorough understanding of the underlying transport technology versus the foreseeable and future requirements for these systems is an absolute first step that public safety agencies must take. This assessment should take in to consideration ALL aspects of what a public safety agency can provide direct, in a partnered relationship with other agencies or completely outsource. Unfortunately, at this time, NG9-1-1 service being the only driving force behind adoption of this technology makes little or no sense. The benefits of NG9-1-1 will not be fully realized until call origination systems become available that can leverage the true benefits of IP for emergency calling. However, it is prudent to build out a network capable of supporting NG9-1-1 and offering current and advantageous services available today.

Cloud Based Services will Change Public Safety

In today's ever evolving IT environment a trend is taking hold that will change the way we think of traditional computing forever. This trend revolves around the use of the term "cloud computing" or simply "cloud" to describe aspects of computing that provide a function or group of functions to the end user. Cloud based services are reliable, cheap and scalable.

Originally, a cloud based computing environment described multiple computer CPU's tied together remotely to provide a highly capable processing environment. Used mostly by education and research organizations, this type of computing environment lent itself to an inexpensive manner of providing the high CPU cycles required to crunch huge equations or, sift through a considerable amount of data. The most memorable "cloud based" project was the harnessing of thousands of home computers owned by individuals to analyze data received by the Arecibo radio telescope in Puerto Rico. The project known as 'SETI@home', used this cloud environment to try and discern the tiniest of alterations in radio signals from outer space that may indicate intelligent life in distant galaxies. While critics remain skeptical about the results,

this truly signified the advantages of using a large computing platform comprised of thousands of PC's to greatly reduce the time required to research data.

Cloud based services rely on reliable and cost effective transport. Consumer demand for faster and more reliable IP capable transport to support advances in Internet and other on-line services have greatly increased the availability of large capacity transport paths while driving the cost down. For example, the underlying Emergency Service IP Network (ESInet) envisioned to support NG9-1-1 is comprised of multiple transport paths extending NG9-1-1 services to PSAP's at a cost that could be far less than would have been thought possible even five years ago. This trend in greater capacity and decreased cost will continue as demand increases.

In a cloud environment, categories to describe the type of service expected by the end user are necessary to commoditize these functions. Three basic terms describe the type of service being derived from the cloud, and they are infrastructure, platform and software.

Infrastructure as a Service (IaaS) replaces the expensive and bulky provisioning model required to support IT operations. This includes hardware, servers, storage and networking equipment. A client typically pays for the service on a per use basis. Services provided from this model include:

- Desktop virtualization
- Internet access
- Policy based services
- Storage

All of these functions dovetail easily with many proposed public safety IP architectures and can offer public safety agencies a cost effective method of taking advantage of these services while maintaining a reliable and secure computing environment. Because all of these services are provided by a service provider, updates required to accommodate greater capacity or increased OS capabilities can simply be negotiated in a contract as opposed to a forklift upgrade and/or equipment modification. For example, 9-1-1 authorities desiring to deploy the latest and most capable desktop operating system environment could easily accommodate this through the use of an infrastructure contract with a service provider and could avoid the continuous churn of hardware costs associated with greater OS capabilities. A good example of IaaS is the availability of cloud based storage systems provided by Apple (iCloud), Google and others.

The second term used to describe a succinct iteration within a cloud computing environment is Platform as a Service (PaaS). This service allows for the 'rental' of hardware within a cloud environment (e.g. remote) to run applications as desired by the end user. These applications can include e-mail systems, development environments and a variety of others. The only limitation to the end user is their application requirements. For example, multiple public safety agencies desiring to utilize a high end CAD/RMS platform could rent the hardware within a secure cloud environment to defray the costs of hosting and purchasing expensive servers and networking gear and greatly reducing the per agency software purchase costs. On that same

rented platform the agencies could also host e-mail and other similar systems at no additional hardware costs. A good example of a PaaS system are the web creation and hosting services in which users can employ easy to use web site creation tools from a remote service and deploy the web site through the same platform, these platforms include Google Sites, Wix etc.

The final official term used to describe a function within a cloud environment is Software as a Service (SaaS). This aspect may be the most useful and readily available environment to public safety agencies and PSAP's today. SaaS allows for an individual application to be rented by a user to provide a particular function. All maintenance, upgrades, hardware and other related costs would be handled by the entity providing the SaaS solution and would be incorporated in to a single recurring monthly cost. Call handling applications could thrive in this environment allowing for full featured systems to be purchased and utilized at greatly reduced costs between tens of hundreds of different agencies. Many mainstream companies have shifted some services to an on-line monthly rental system for application access with great success. These include Intuit, Microsoft, Accenture and Comcast.

Cloud based services are bound to expand to incorporate other functions that are considered traditional local services today. For example, IT services including remote help desk support are being pigeon holed in as a cloud service. These additional functions are being lumped under a purely marketing term described as Everything as a Service (XaaS).

Finally, in consideration of deploying cloud services to a PSAP or Public Safety agency it is important that the integrity of transactions and overall system security be considered primarily before moving forward. For example, it is not practical for a PSAP to deploy cloud based services over the open Internet. This could be fraught with peril to include denial of service attacks and outright misuse of services. An evaluation of the integrity and security associated with any cloud based service should be thoroughly explored before agreeing to move in to this realm. Technologically advanced public safety agencies could even host their own cloud based system over a privately managed IP network and share all types of service functions to agencies connected to the network.

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