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European Emergency Response Services for the All-IP Present and Future

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Last month a two-year-old boy in Arizona saved his critically injured mother by picking up her iPhone and initiating a Facetime video session to a friend who sent help.[1] One might wonder, when the toddlers of today are adults, will dialing 911/112 services on a landline still be relevant? Do emergency services need to start listening for distress signals from WhatsApp, Facebook, and Twitter? While this may seem far-fetched, it pays to plan ahead. After all, emergency services networks are still adapting to an innovation that is now nearly 20 years old: Voice over IP.

The Evolution of Traditional Emergency Services
Of course over the last 70 years, people in urban and developed areas have gradually become accustomed to being able to signal distress in the event of crime, fire or medical emergencies using their phone. Time is critical: seconds and minutes in response can mean the difference between life and death, between salvation and tragedy.

These emergency response systems are designed for speed but also with the worst-case scenarios in mind; the location of the person in distress should be disclosed to the dispatcher at the Public Safety Answering Point (PSAP), even if the caller could not communicate with the dispatcher.

Of course, this was not difficult when landline phones were paired with systems that would send first responders to the location of the other end of a circuit. The local emergency center is able to look up a fixed address in the emergency service database if they are not given the correct location over the phone. But even fixed address changes can require anywhere from one to fifteen working days to be updated depending on the country.

As mobile telephony services proliferated, solutions were

developed for using GPS and triangulation of signals to towers to find the location of the caller. In some countries this geo-location information is transmitted with the call; in others the operator must consult a central database to find it.

Enter VoIP in the late 90s. With VoIP, voice communications became further separated from the physical telephone line and geographic places. As a result, VoIP users assigned a geographic PSTN number could be anywhere in the world with Internet access.

VoIP services are often divided into two categories with respect to their relationship to the PSTN. "Interconnected VoIP," which is replacing PSTN access line technology with IP. For example, users of a residential PSTN replacement service or customers of a SIP trunking service connected to an enterprise PBX may be in a fixed location and front-ended by a PSTN number.

There is also "Non-Interconnected VoIP," for example peer to peer services between soft-clients and apps.

Users on a mobile app on a smartphone or soft clients on a laptop are nomadic, and do not interface on the inbound call with the PSTN.

But as more people use VoIP, can first responders be absolutely certain of the location of an emergency caller?

The Status Quo
A clue to how inadequate emergency service infrastructure has been with respect to absorbing new modes of telecommunications can be observed in how VoIP e911/e112 is managed in Europe.

In the European Union, the national realities for VoIP and Emergency Calling differ widely. In the United Kingdom, VoIP

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[1] http://www.foxnews.com/health/2014/03/10/2-year-old-boy-saves-mom-using-facetime-app/

services can send emergency calls to a national emergency center. In Belgium, emergency calling from VoIP networks is possible, with the requirement that the IP communications service be mapped to a fixed geographic residence or business. In case of nomadic VoIP applications, the 112 emergency service features cannot be used and end-users must be notified of this not once, but a minimum of three times a year. Similarly, in Austria, VoIP services with phone numbers cannot be used for mobile applications. Service providers must guarantee to the regulator that the customer will use the VoIP services at a fixed location.

VoIP service providers in Europe have four basic approaches to e112:

1. **Doing nothing.** Amazingly, ignoring emergency services has been the norm among VoIP providers in many parts of the world. In the U.S., the FCC forced providers to comply with e911 regulations in 2005. In all countries of the European Union, companies providing a telecommunications service to end-users must offer the ability to dial 112. However, in many cases this is either not enforced by the regulator, or the service has chosen to define itself as something other than telecommunications service to avoid regulations. As more enterprise customers adopt unified communications, this approach will be increasingly unacceptable.

2. **Keeping local or ISDN lines active.** Using a local gateway if the PBX has been replaced with a Unified Communications System. Calls are sent to the PSAP nearest to the location of the gateway, which may or may not be the location of the users of the equipment. This is approach will only work for companies deploying stand-alone VoIP equipment, not hosted or cloud service providers. And for business and enterprise customers who want to phase out PSTN services & equipment, this is an inconvenience and added expense.

3. **Become a CLEC.** This approach would require C7 interconnection to the PSTN, proactive management of regulations and licenses. An expensive and work intensive proposition that would need to be replicated for each country in which the provider offers service.

4. **Outsource to a specialist.** Due to the complications of managing 112/911 services for VoIP, a new category of carrier has emerged in the market to provide solutions. This

carrier will implement the regulations of Emergency Service access country by country. The outsourcing company will provide routing for the call and manage the database updates with information collected on subscriber location. In the United States the market is relatively mature, due to the efficient enforcement of regulations in 2005. In Europe, regulations are more complicated and therefore fewer e112 pan-European service provider solutions exist.

While none of the above solutions are ideal for the fully IP communications solutions of the future, only number four is viable. Outsourcing to a specialist offers the interconnected VoIP provider a flexible solution to deliver security to their clients. Nonetheless, emergency services systems will require re-engineering for the long-term future.

However, one short-term area of improvement is the speed with which central address databases are updated. Instead of days or even weeks, this should be done electronically in real-time via Application Programming Interfaces (APIs) directly from the operators.

But long-term, as telephone networks are replaced with all-IP infrastructure, the emergency location info can be sent in the signaling.

VoIP Operators Must Leverage Third-Party Services

Regulators on the regional or global level will need to work together to define solutions that are consistent and interoperable. These approaches will have to reflect the reality that landline numbers used for VoIP are inherently nomadic as mobile apps, soft-clients become extensions of UC systems and the PSTN is gradually replaced with all IP infrastructure.

Emergency services via telecommunications networks save lives every day. It behooves VoIP operators to leverage third-party services that can enable these essential features.

Consumers may, as a response, simply depend on their omnipresent smartphones and mobile devices in emergencies.

But for businesses replacing PBX/ISDN services with cloud communications and unified communications, emergency services will likely be critical in the vendor acceptance process.

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