

The Next Generation 9-1-1 Proof-Of-Concept System

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ABSTRACT

Implementing IP-based emergency communication system poses technical challenges such as acquiring a networked device's physical location and routing calls based on that location. This paper gives a general overview of a proof-of-concept system that addresses these issues.

Categories and Subject Descriptors: C.2 [Computer-Communication Networks]: Miscellaneous

General Terms: Design

Keywords: NG9-1-1, Emergency Communication

1. INTRODUCTION

Two main problems arise when trying to implement IP-based emergency communication systems. One problem is how to acquire the caller's location. Location is critical for routing the call and quickly dispatching help to the right place. Another problem is how to determine where to route the call. Given caller's location, the system has to route the call to the Public Safety Answering Point (PSAP) which has jurisdiction over this location.

The Next Generation 9-1-1 Proof-Of-Concept system is an IP-based system developed within the NG9-1-1 initiative driven by the US Department of Transportation and the National Emergency Number Association. The goal is to implement and deploy an all IP-based emergency communication system and also integrate it with legacy emergency communication systems used in public switched telephone networks (PSTN) and cellular networks. The design of the system is based on specifications from the Emergency Context Resolution with Internet Technologies (ECRIT) Working Group at the IETF.

2. THE PROOF-OF-CONCEPT SYSTEM

The system is divided into two parts. The first part is call origination networks which represents various communication networks available to the end user. Examples of call origination networks are VoIP networks, PSTN, and cellular networks. The second part is the Emergency Services Network (ESN), which represents a dedicated, authority-

controlled, SIP-based network for emergency response coordination. The POC system deals with civilian-to-authority communication, so all calls originate from one of the call origination networks and are routed to the ESN.

The POC system addresses the location acquisition problem using standardized location discovery techniques. These techniques either allow the end user's device to discover its own location (e.g., GPS, Link Layer Discovery Protocol for Media Endpoint Devices [4], DHCP [1, 2]), or allow components in the network to determine location on behalf of the end user's device (e.g., DHCP).

Once caller location is identified, the call origination network routes the call based on caller location to an ESN, specifically to an Emergency Services Routing Proxy (ESRP). The ESRP then routes the call towards the most appropriate PSAP using a combination of information such as caller's location, call origination type, and/or policy enforced by the authorities. In both cases of call routing, a service called Location-to-Service Translation is used [3]. LoST is a mapping service that translates location and requested service type to a URL where the call can be routed to.

When the call reaches a PSAP, it is distributed to one of the available call takers. The call taker who receives this call is able to communicate with the caller using any combination of voice, video, and/or real-time text which are delivered in RTP packets. The call taker is also able to see the caller's location and retrieve any available information about the caller, the call, and the emergency situation.

The POC system is distributed in research labs at Columbia University, Texas A&M University, and Booz Allen Hamilton as well as in five selected PSAPs across the USA. More information on the POC system can be found at <http://www.its.dot.gov/ng911/index.htm>.

3. REFERENCES

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