The Next Generation 9-1-1 Prototype

Jong Yul Kim, Wonsang Song, and Henning Schulzrinne
Internet Real-Time Lab, Columbia University

Interesting Problems to Solve

1. Where on earth is the caller?
   - VoIP service can be used anywhere as long as there is Internet connectivity
   - Solutions to two problems below depend on caller location
2. How can the phone identify an emergency call?
   - Let phone remember 9-1-1. But if you're in Europe?
   - Use a global standard service identifier such as, *urn:service:sos* or *urn:service:police*
3. To which PSAP should the call go to?

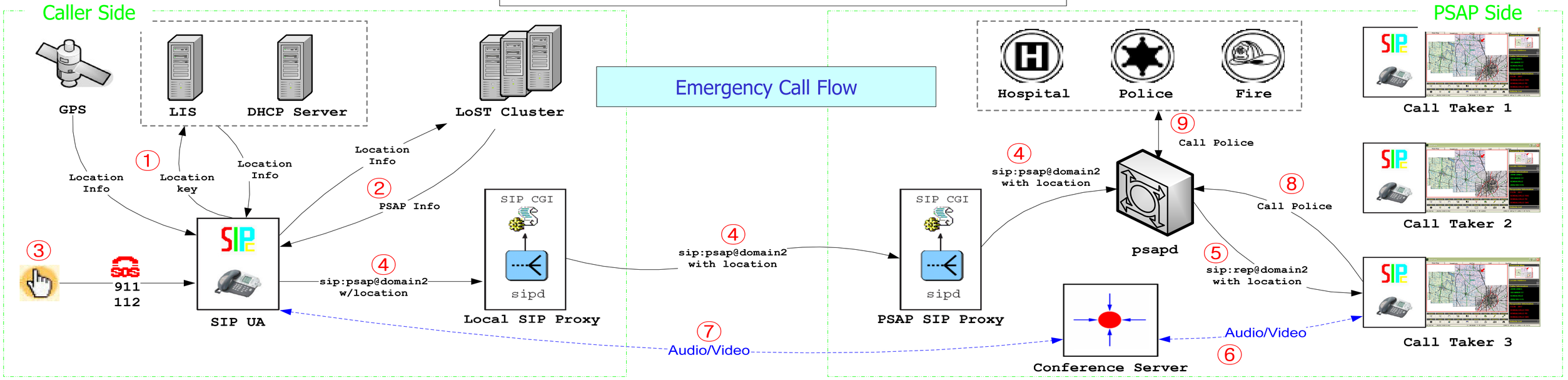
Project Objectives

1. Develop a prototype system that routes emergency calls over SIP based VoIP networks.
2. Use embedded location information delivered via the SIP protocol to make routing decisions.
3. Implement various ways of determining caller location
4. Implement features of IP based Public Safety Access Point (PSAP)
5. Provide opportunities to enhance 9-1-1 system:
   - More robust
   - Additional media like video and text.
   - Better integration with first responders and public safety
   - Cheaper to build and operate.

A Collaborative Effort

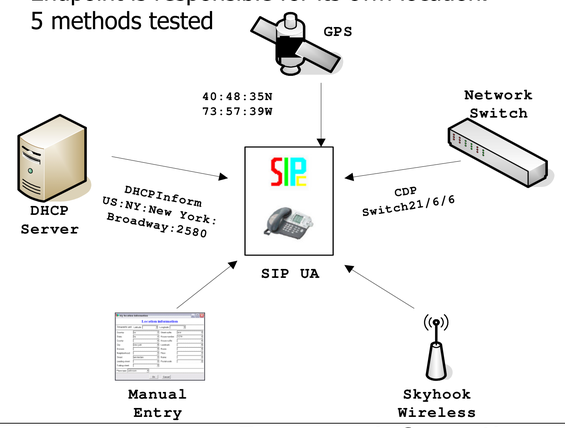
- Funding
  - National Telecommunications and Information Administration (NTIA)
- Requirements
  - National Emergency Number Association (NENA)
- Software Development
  - Columbia University
  - Texas A&M University
- Deployment and Testing
  - PSAPs at Brazos County, Texas and College Station, Texas
  - University of Virginia and PSAP at Albemarle County, Virginia
- Standardization
  - Internet Engineering Task Force ECRIT, GEOPRIV Working Group
- Contributions
  - States of Texas and Virginia 911 offices
  - Corporations like Cisco, Nortel, MapInfo, Quovia, etc.

Emergency Call Flow



Determining Caller Location

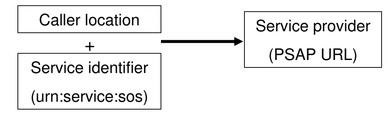
- Endpoint is responsible for its own location.
- 5 methods tested

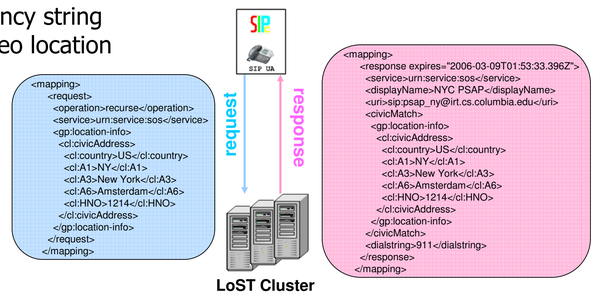


- DHCP server is able to return both civic address and geographic coordinates
- Network switches will be able to broadcast location information through LLDP-MED protocol
- Skyhook Wireless uses signal strength of access points to calculate location

Determining PSAP using LoST Protocol

- Which PSAP should the call go to?
  - Depends on location and required service
- LoST (Location-to-Service Translation)
  - Translates a service identifier and location to PSAP URL and emergency string
  - Supports both civic and geo location
  - Uses web service (SOAP)
- An example of a query and a response





Cool Features of IP based PSAP Prototype

- Implemented
  - Audio, video, and text messaging
  - Caller location on Google Maps
  - Language-based call distribution
  - Fully mute / partially mute
  - Recording and logging of calls
  - Call queuing
  - Automatic call overflow to a backup PSAP
- Future Work
  - CPR-howto
  - Automatic answering based on time and location of call

For more information, please visit http://ng911.tamu.edu. You may also send an email to jyk@cs.columbia.edu or wonsang@cs.columbia.edu.