Problem

Emergency Communication System (ECS) infrastructure is becoming increasingly outdated and obsolete.
- Land lines are disappearing (mobile communication)
- People favor streaming media (as opposed to broadcast)
- Emergency notifications (Reverse 911):
  - Mobile phones have to be registered with the ECS

Solution

Use broadband, software defined networks and virtualized applications to provide reliable common means of ECS.

Network Slicing:
- Through network to the application level
- Enables application virtualization
- OpenFlow will allow the network to be reconfigured on the fly to add new users, service providers, updates, patches, etc.

Home Device:
- Hypervisor runs a virtual machine (VM) for each app
- Thin client (application running at Service Provider)
- Each VM connected to unique virtual network
- Virtual networks share one physical NIC using Open vSwitch

Service Provider:
- Each Service Provider has a virtual network dedicated to their specific application.

Advantages:
- Quality of service, class of service
- Bandwidth control

Implementation

Software:
- Fully Open Source Public Licensed Implementation:
  - Floodlight Controller:
    - Open SDN controller which is Apache-Licensed
    - Used to provide the open flow routing
  - VirtualBox:
    - GNU General Public License
    - Used to run virtual machines for each service
  - LTSP - Linux Terminal Server Project
    - Home systems boot from a LTSP image
  - LinPhone:
    - GNU General Public License
    - Used for 911 VOIP call interface

Hardware:
- HP E3800 OpenFlow switch
  - 24 port OpenFlow switch
- Runs in hybrid mode:
  - Software controls VLAN tagging
  - OpenFlow provides routing

Documentation

Support and documentation via Sourceforge and dedicated website: nsec.if.uidaho.edu

Future Work

- Migration to GENI
- Will enable full use of OpenFlow
- Thin client implementation on the home device
- Optimize LTSP image for ECS applications
- Larger scale implementation
- At scale testing / performance analysis