



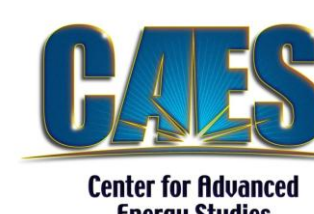
Next Generation Emergency Management Systems via Application Virtualization

"EAGER: US Ignite: Network Slicing for Emergency Communications," NSF Award ID: 1258486, 10/2012 – 09/2013

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Problem

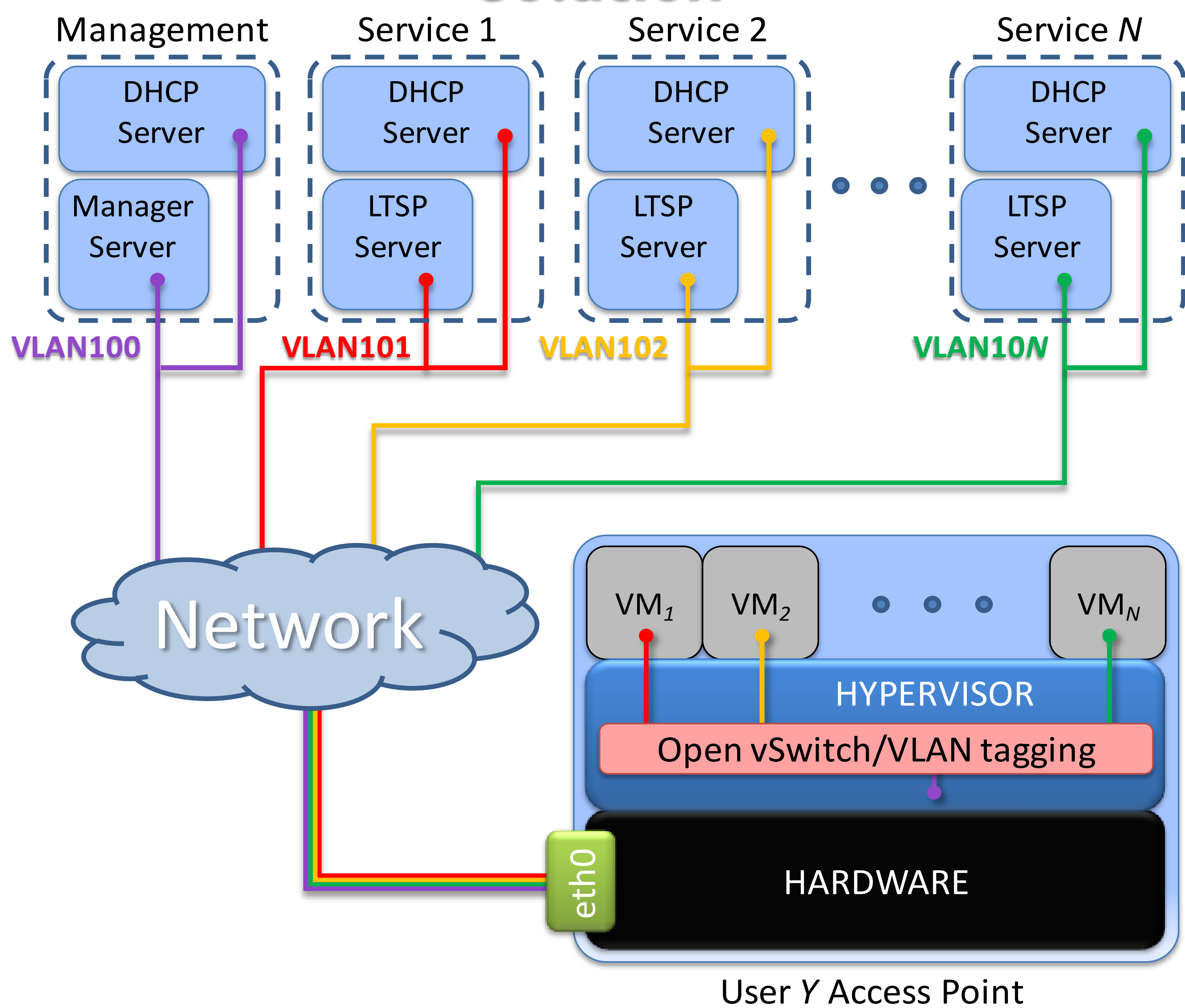
Emergency Communication System (ECS) infrastructure is becoming increasingly outdated and obsolete.

- 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

GENI Rack at University of Idaho (CAES)



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

Visit Website



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