

Improving Next Generation Emergency Management Systems with Network Virtualization

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Easier to connect, more difficult to REACH

Problem

Existing ECS infrastructure is becoming increasingly outdated and obsolete:

- Land lines are disappearing (911).
- People are moving away from broadcast television and radio in favor of streaming media (Emergency Alert).
- Mobile Phones are only reachable if they are registered with the ECS (Reverse 911).

Solution

Linux Terminal Server project (LTSP):

- Uses a Preboot Execution Environment (PXE) boot to run a thin client.

Remotely Controllable Browser for ECS Applications:

- Allows the service provider to push web pages and control browser environment for users for their specific service.

VOIP-Based 911 Interface:

- Allows 2-way voice communication between service provider and users.
- Visually scaled down to start communication with emergency service provider with press of a button.

Remote Hypervisor Management:

- Allows management service provider to push a virtual machine screen to the front.



Mobile Testbed:

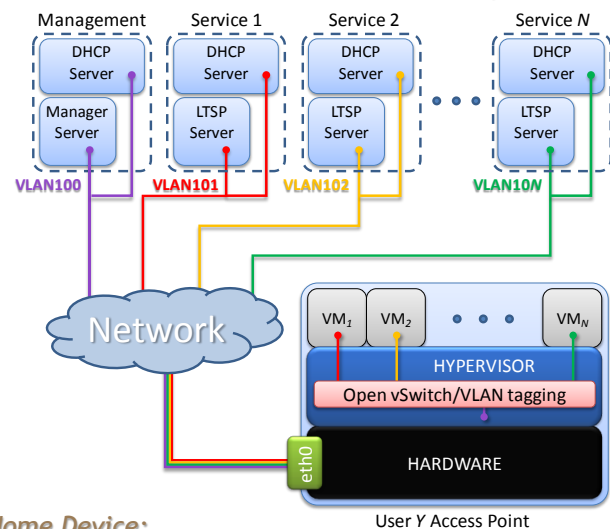
- Mobile demonstration platform.
- Contains virtual servers running various services.
- Servers connected to the network switch configured for multiple vlans.
- Home and Management devices are also attached to the switch.

More info:

<http://www.id-ignite.org>
<http://nsec.if.uidaho.edu>

Approach

Use broadband and software defined networks to provide a more reliable, common means of ECS.



Home Device:

- Hypervisor runs a virtual machine (VM) for each app.
- Each VM is connected to an unique virtual network.
- Virtual networks share one physical NIC using Open vSwitch.

Application Provider:

- VMs on home device act as thin clients.
- Applications actually reside on the server of the application provider.
- Each application provider has a virtual network dedicated to their specific application.

Network:

- Network is sliced to allow each application its own virtual network.
- OpenFlow will allow the network to be reconfigured on the fly to add new users and service providers.

Future Work

- Migration to GENI.
- Thin or 0-client implementation on the home device.
- Optimize LTSP image for ECS applications.
- Detailed performance analysis.
- System at scale testing in production environment.