Virtualized Services via *OpenFlow* Based Software Defined Networking

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Introduction

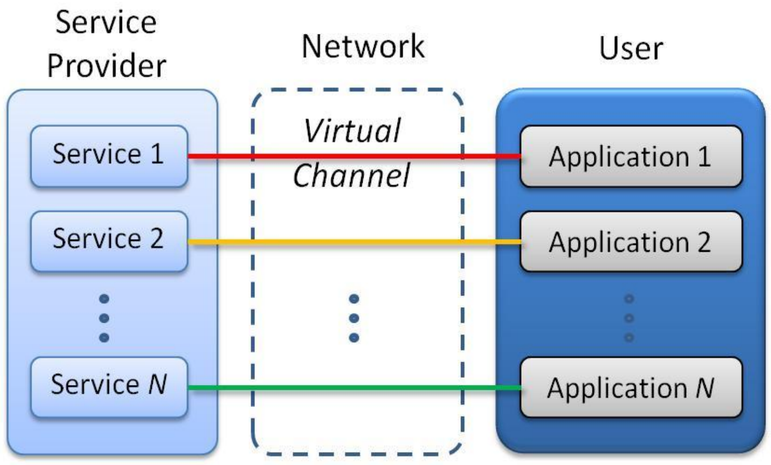
- Existing infrastructure: no dedicated bandwidth or priority based communications
- Current Internet capacity can be overloaded
- Current trend towards cloud
- SDN and virtualized services can alleviate these problems

GENI Rack at University of Idaho (CAES)

General Architecture

Three primary components:
- User end, Provider end, Network

Each service has a virtual *"channel"*:
- Encapsulates service from end-to-end
- Completely virtualized
- Through-network isolation of service



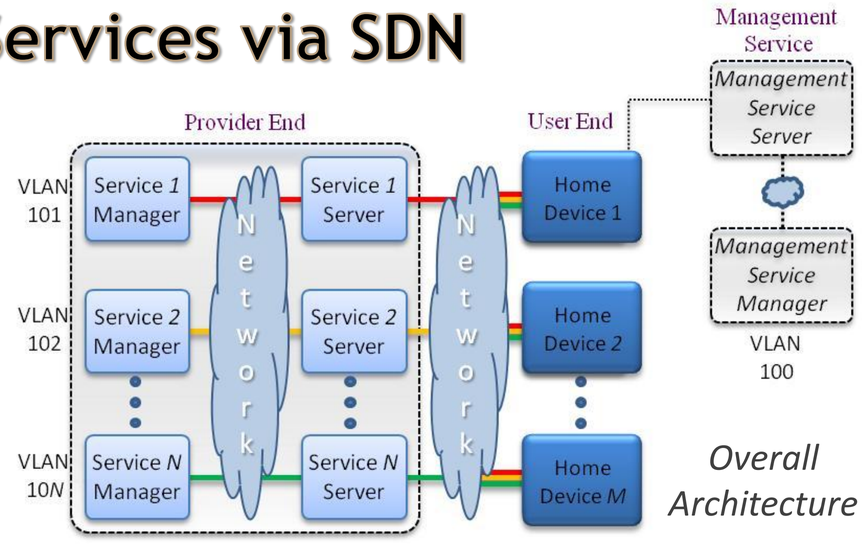
Virtualized Services via SDN

Provider End:
- Server for each application
- VLAN for specific application

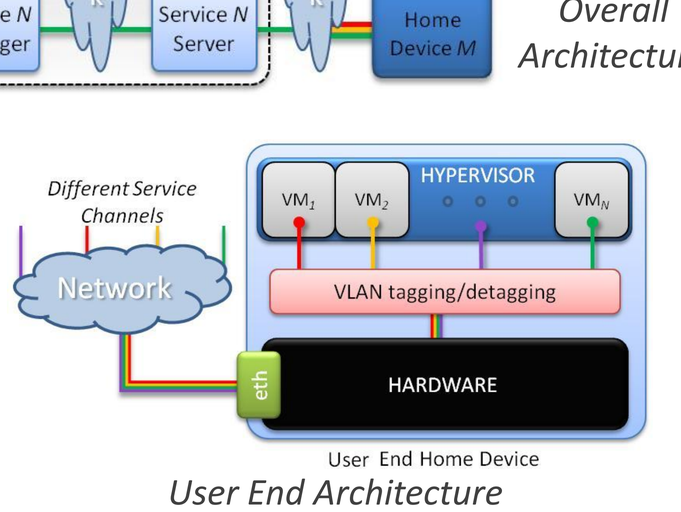
User End:
- VMs pushed to user end via LTSP
- Thin client (VM running on server)
- Hypervisor runs a VM for each app
- Each VM connected to unique VLAN

Network:
- Separate VLAN per service
- Virtualization via SDN
- Packet forwarding controlled by *OpenFlow*

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



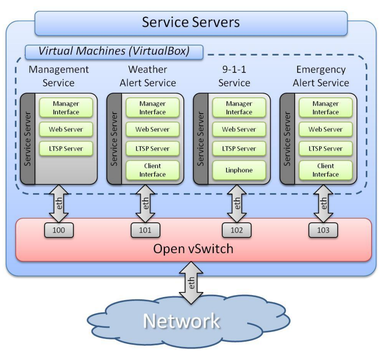
Overall Architecture

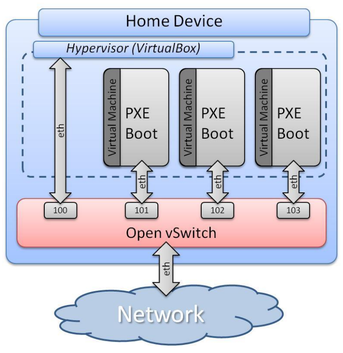


User End Architecture

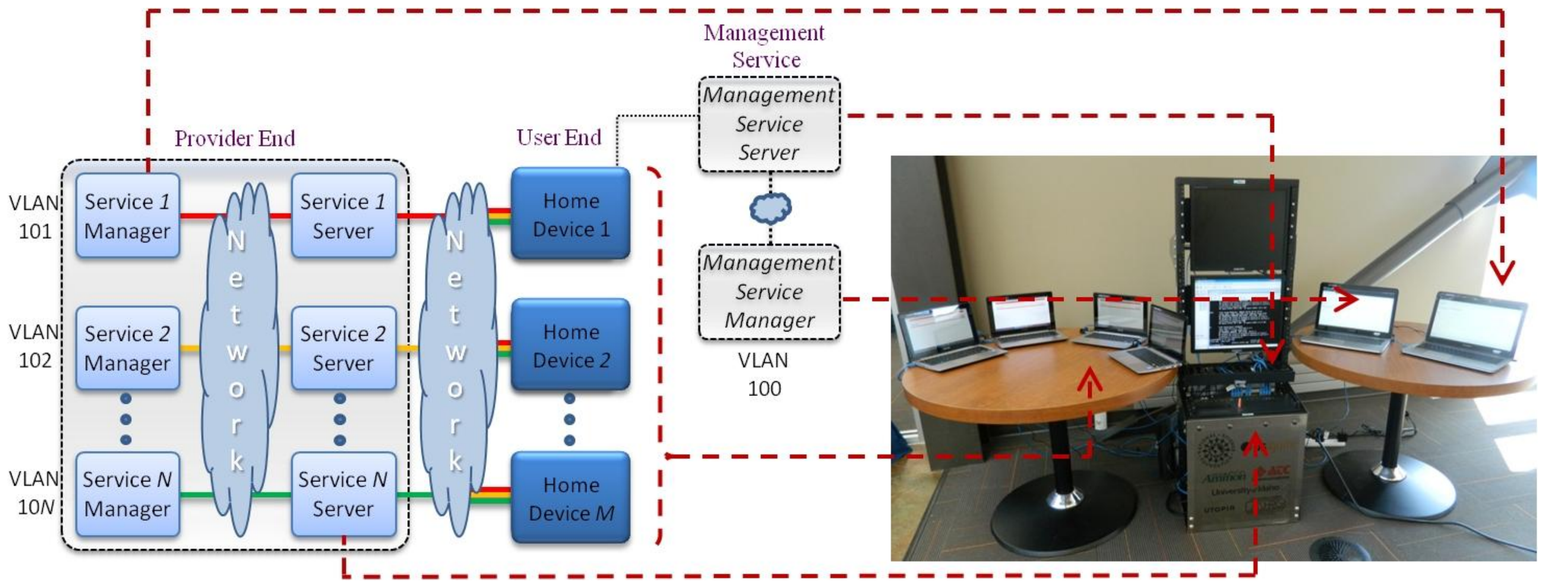
Highlights

- Fully thin client on user end
- Isolation of services
- Dynamic bandwidth control
- Scalability





Implementation



Software: (GNU General Public Licensed)
- Floodlight Controller
- VirtualBox
- LTSP - Linux Terminal Server Project

Hardware:
- HP E3800 OpenFlow switch
- Runs in hybrid mode

Documentation

Support and documentation via *Sourceforge* and dedicated website

nsec.if.uidaho.edu

Visit Website

Future Work

- Migration to GENI
- Dynamic control of packet forwarding via *OpenFlow*
- Larger scale implementation
- At scale testing / performance analysis
- Application delivery via wireless communication
- Full thin client implementation on the home device