

Universal Application Delivery via SDN Based Architecture

"EAGER: US Ignite: Network Slicing for Emergency Communications," NSF Award ID: 1258486, 10/2012 – 12/2014

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Introduction

- Existing infrastructure: no dedicated bandwidth or priority based communications
- Current Internet capacity can be overloaded: no method to dynamically limit bandwidth
- Current trend towards cloud: Remote resources / accessibility / security / cloud computing / cross platform
- Presented SDN based virtualized services/applications can alleviate these problems

Why SDN?

- Dynamic control of network:
 - Bandwidth allocation
 - Priorities
- Resilience/Fault tolerance:
 - Decoupled control plane
 - Easy reprogramming

Architecture

Each service has a virtual "channel":

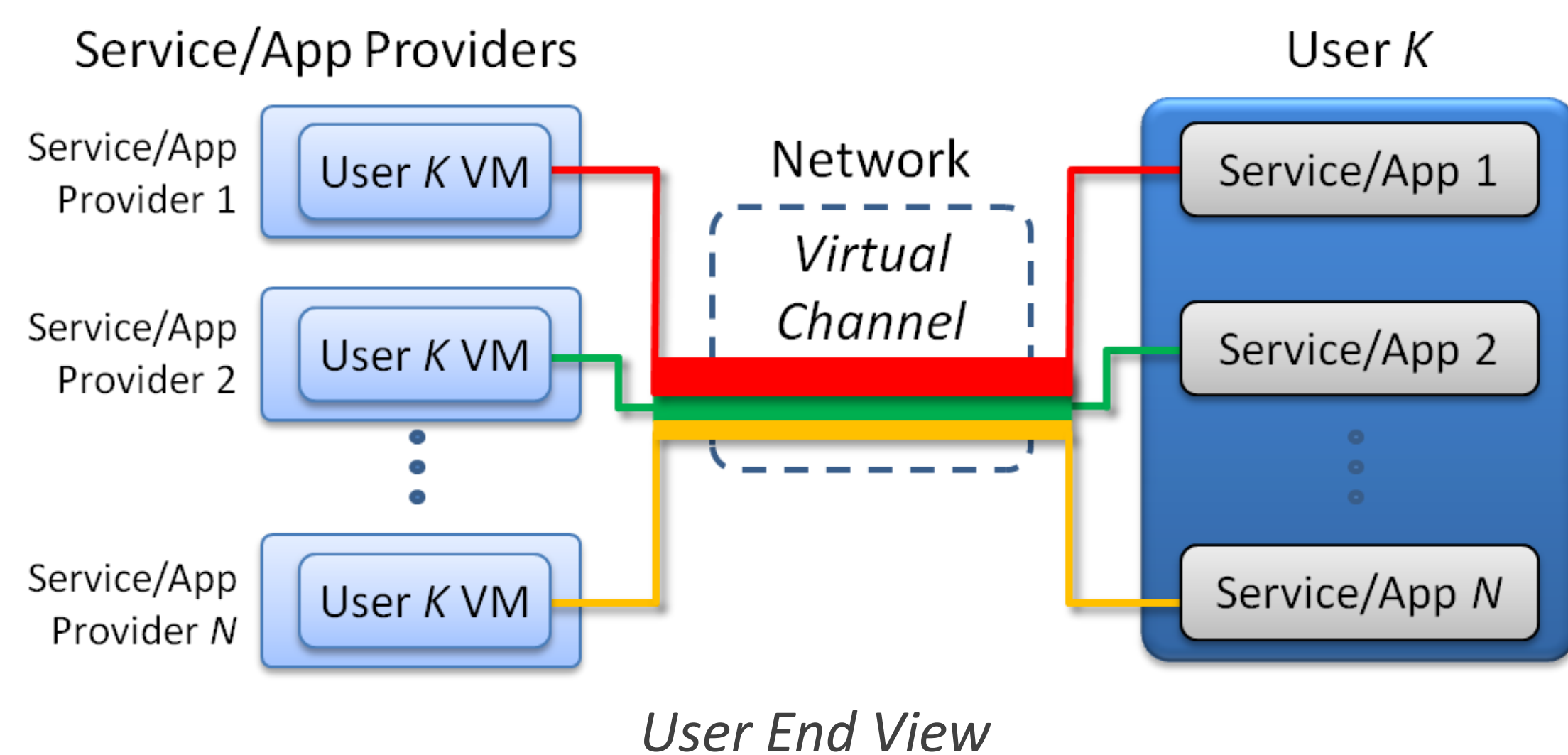
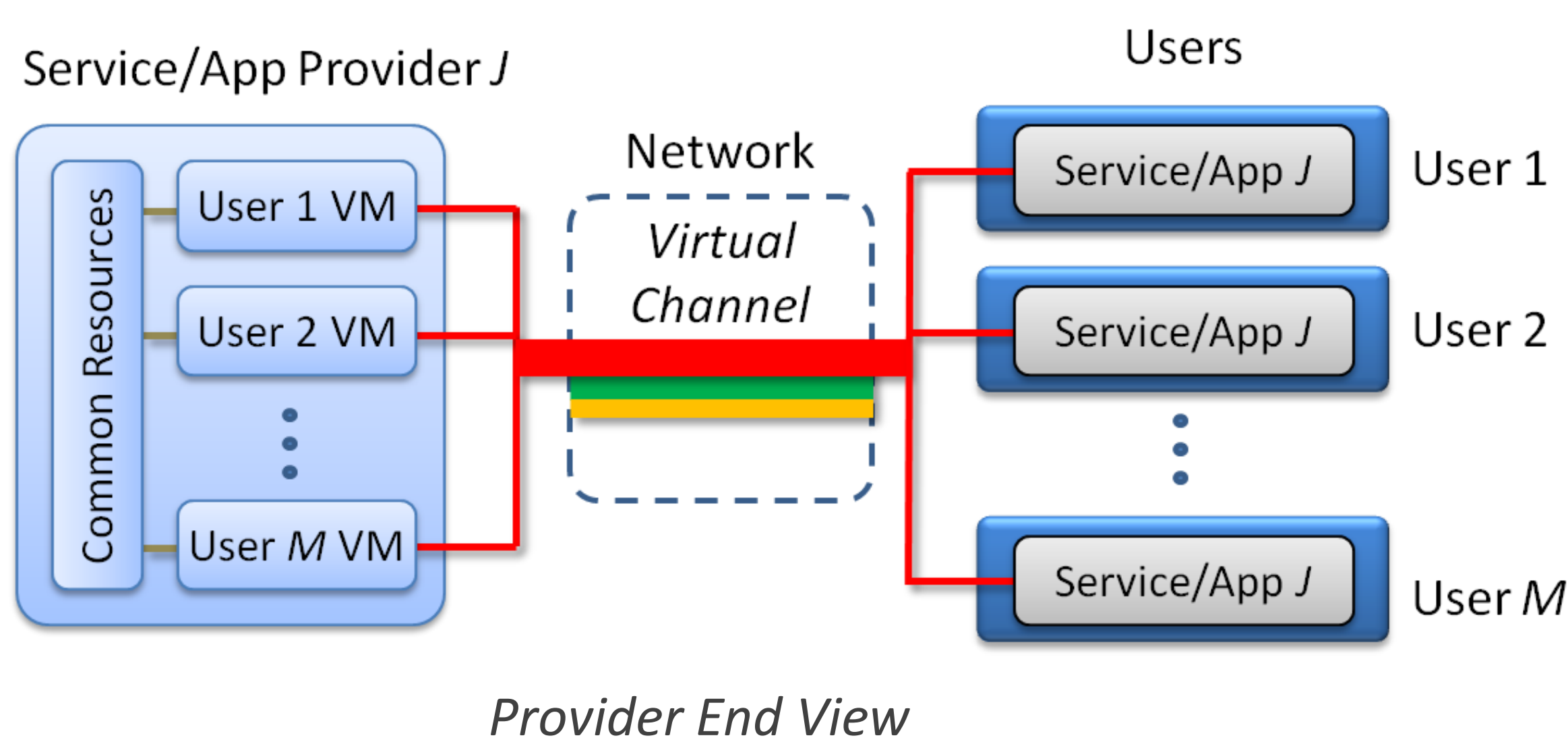
- Encapsulates service from end-to-end
- Completely virtualized
- Through-network isolation of service

Each user Application runs on a VM residing on the service provider server:

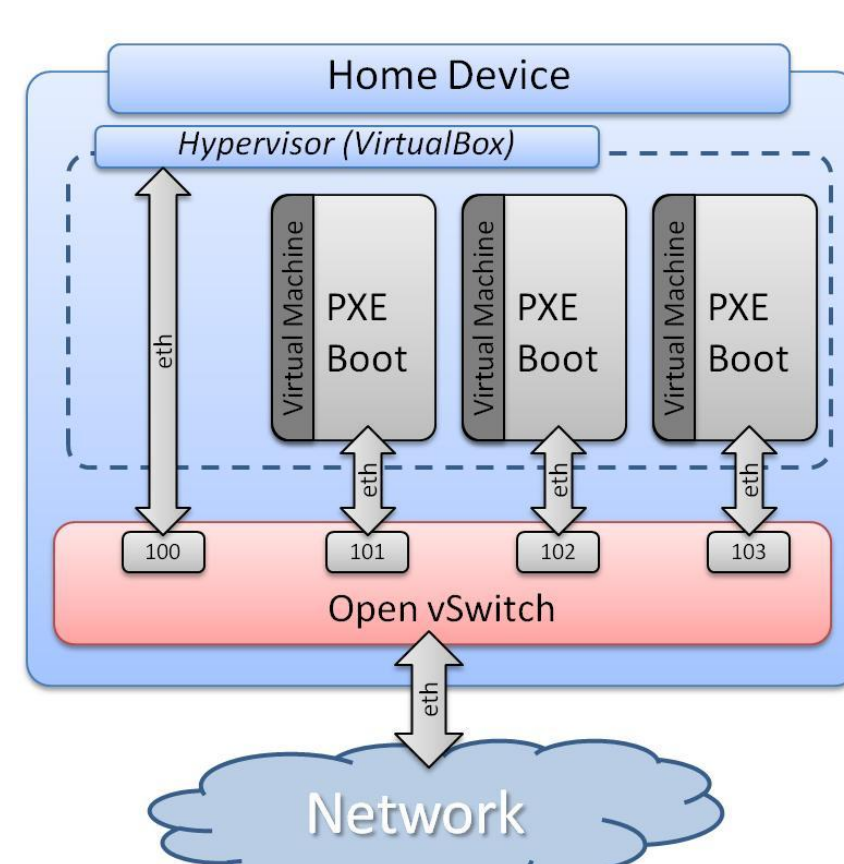
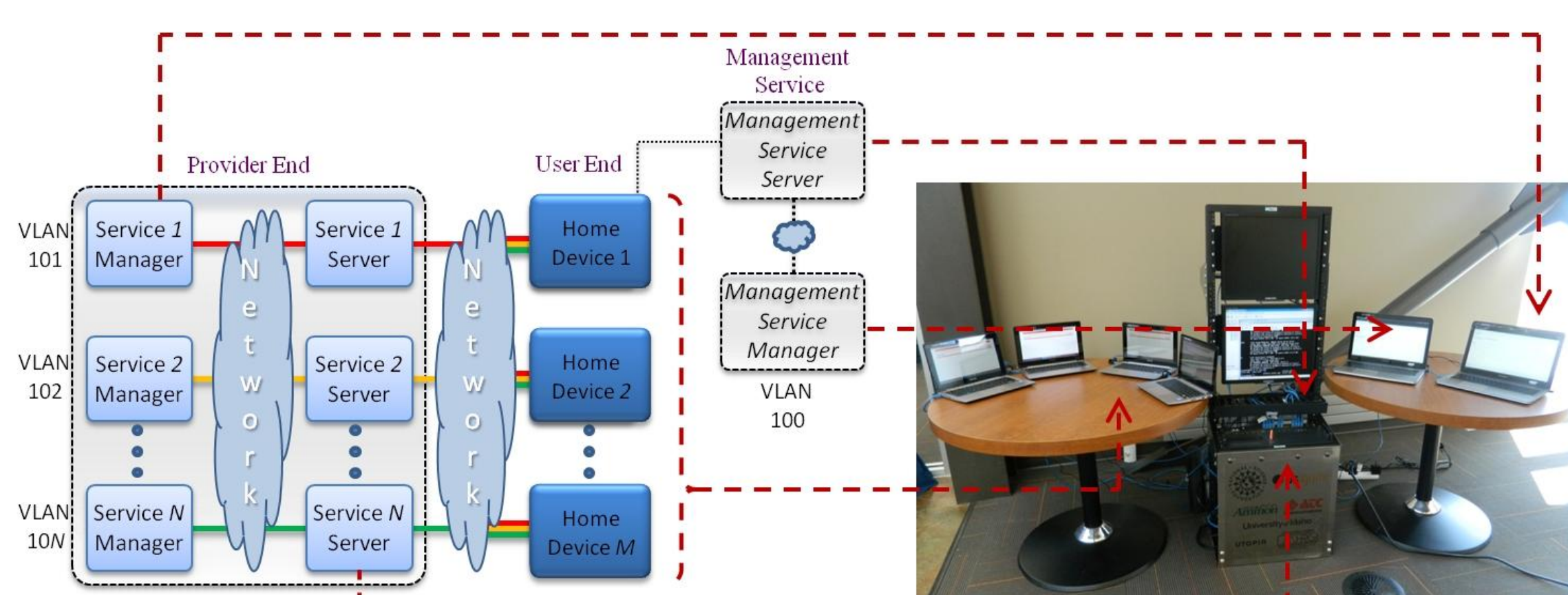
- Thin client implementation
- Virtualization through hardware

Dynamic control of the network:

- SDN enables dynamic control
- Dynamic priorities
- Dynamic bandwidth allocation



Implementation



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)
- Each VM connected to unique VLAN

Software: (GNU Public Licensed)

- Floodlight Controller
- VirtualBox
- LTSP - Linux Terminal Server Project

Hardware:

- HP E3800 OpenFlow switch
- Runs in hybrid mode

Highlights

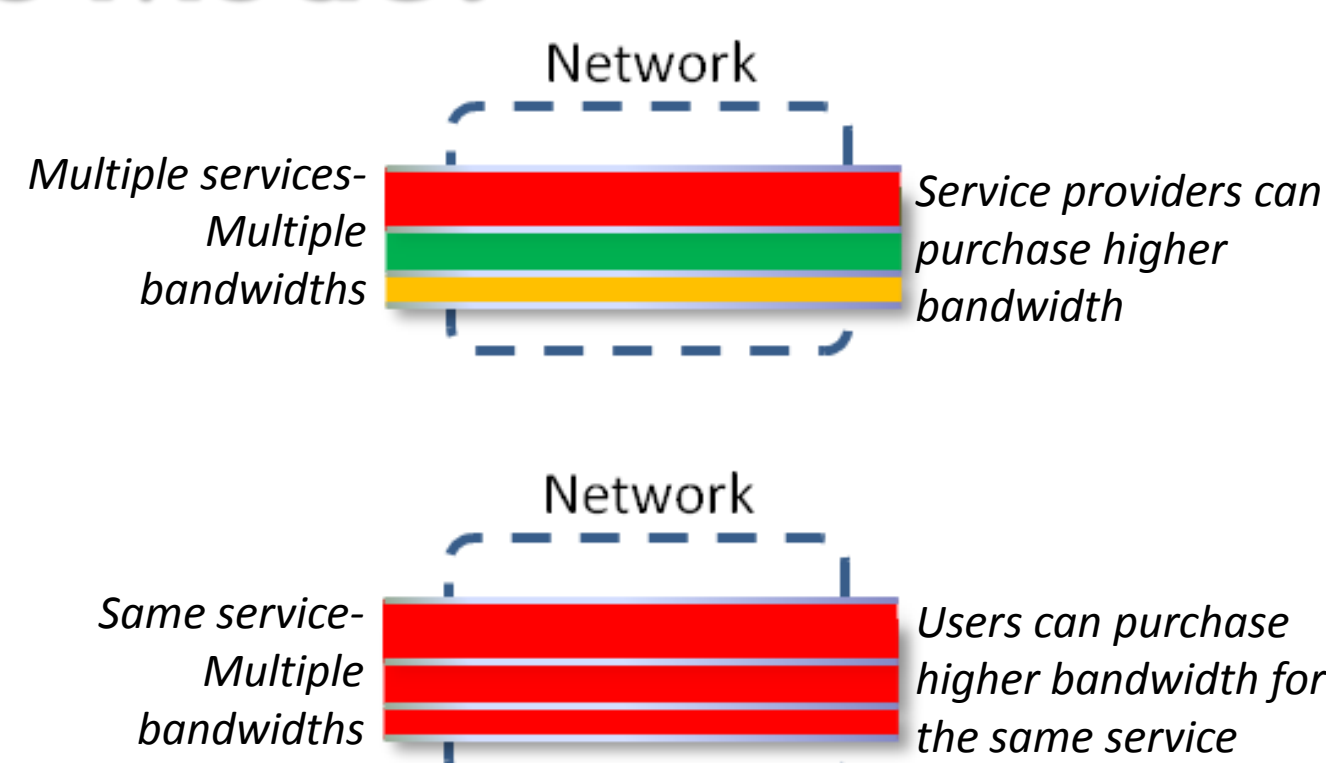
- Fully thin client on user end
- Isolation of services
- Dynamic bandwidth control
- Scalability and resilience/fault tolerance

Examples

- High priority to critical communication:
 - Critical infrastructure communications
 - Government communication
- Dynamic bandwidth control:
 - Time based (night time setbacks)
 - Usage based
 - Situation based (disaster situation)
- Easy network reprogramming:
 - Reduced down times
 - Easy updating

Business Model

- Service providers and users can purchase higher bandwidth / higher priorities
- Dynamic pricing based on dynamic bandwidths



Future Work

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