



SDN Impact in Higher Education

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CUDI
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BROCADE[®]

Agenda

☐ Software Defined Networking

☐ SDN Use Cases

SOFTWARE DEFINED NETWORKING



Software Defined Networking

“...**programmable networks** (or more precisely, network elements that can be configured through a reasonable and documented API)...”

– Ivan Pepelnjak, ipSpace.net

“Software Defined Networking (SDN) is an emerging network architecture where **network control is decoupled from forwarding and is directly programmable...**”

– Open Networking Foundation



OPEN NETWORKING
FOUNDATION



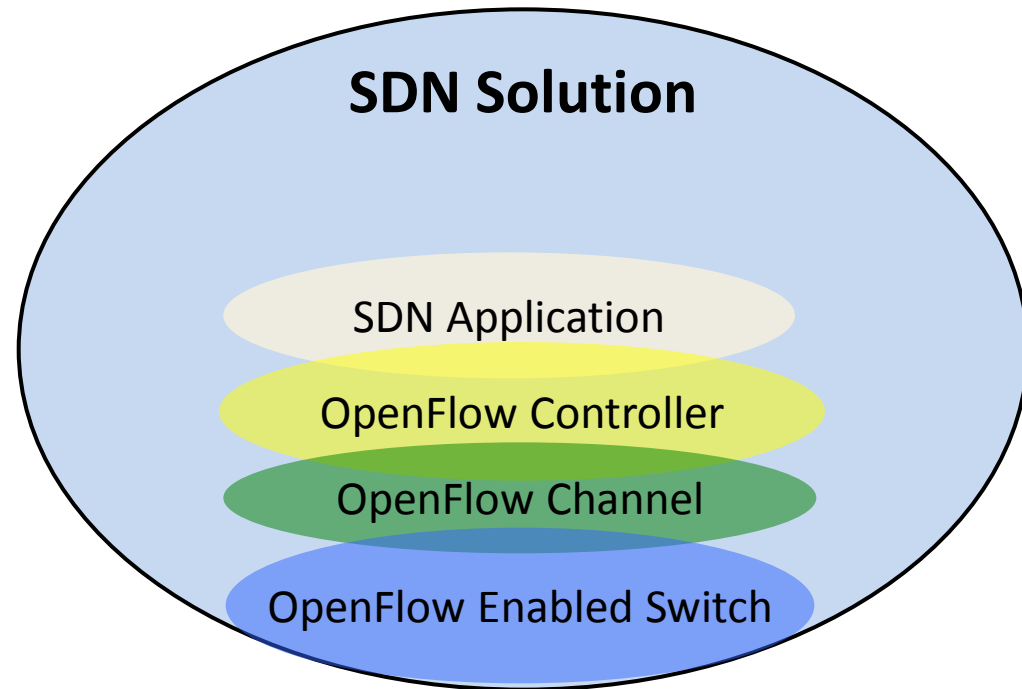
What is Software Defined Networking?

- ❑ Simply a programmable network where control is decoupled from forwarding hardware. In other words, abstraction of a networking element's control plane from physical hardware.
 - ❑ Generally speaking, this allows the “logic” that controls the data path to be decoupled from the physical switch/router.
- ❑ Creates a networking environment that isn't fenced by traditional Ethernet protocols, proprietary operating systems and traditional networking architecture concepts.
- ❑ A concept and a new way to architect networks (fit network to business need not fit business to network).



What is OpenFlow?

- ❑ Component of an SDN solution.
- ❑ Protocol that defines communication between a switch and network controller.
- ❑ Does not provide any mechanism to actually “network”, but rather provides the framework for a server (OpenFlow Controller) to communicate (OpenFlow Channel) with a switch (OpenFlow Enabled).
- ❑ Applications (can be as simple as scripts), must be layered on top of the controller to determine network logic.

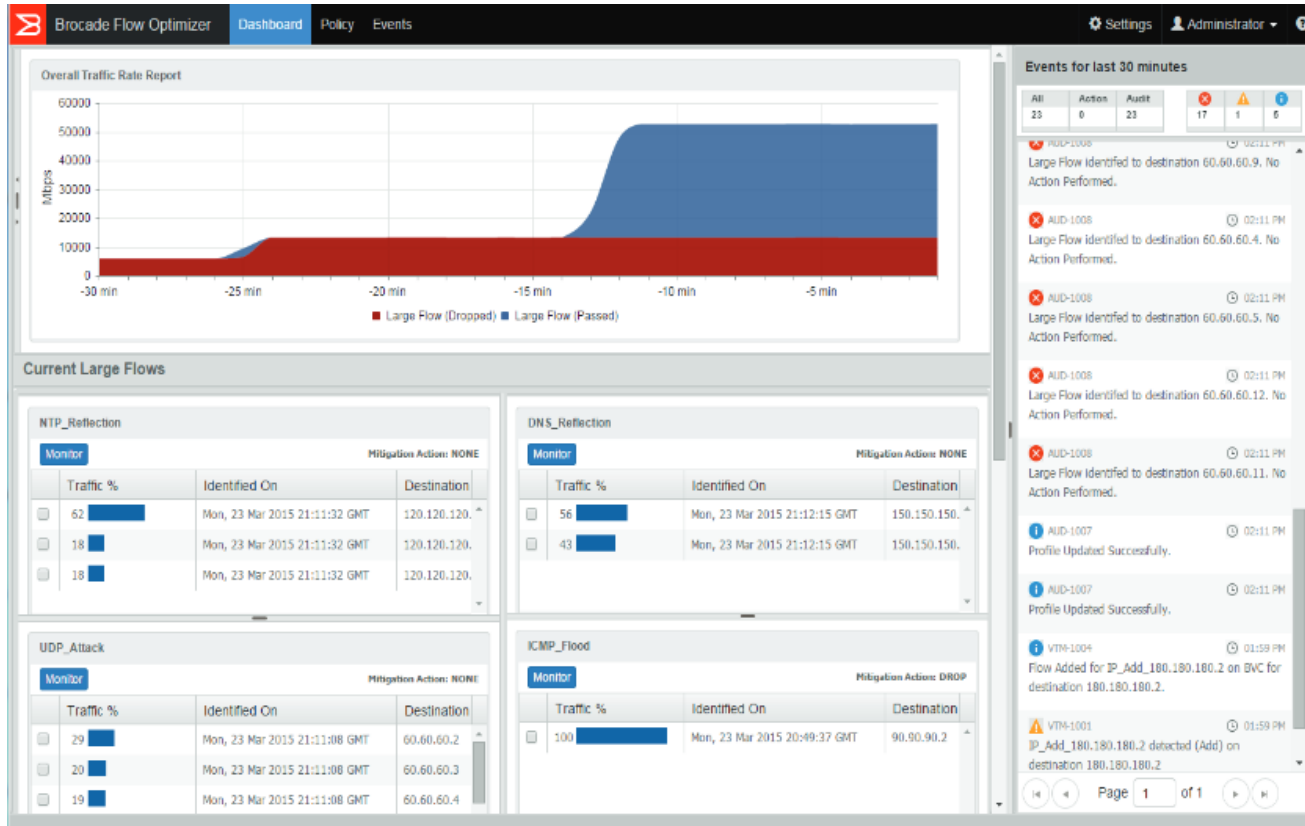


Controllers

- The “*brain*” of the network
- They allow the definition of the traffic flow.



Applications



Then, what's the difference?

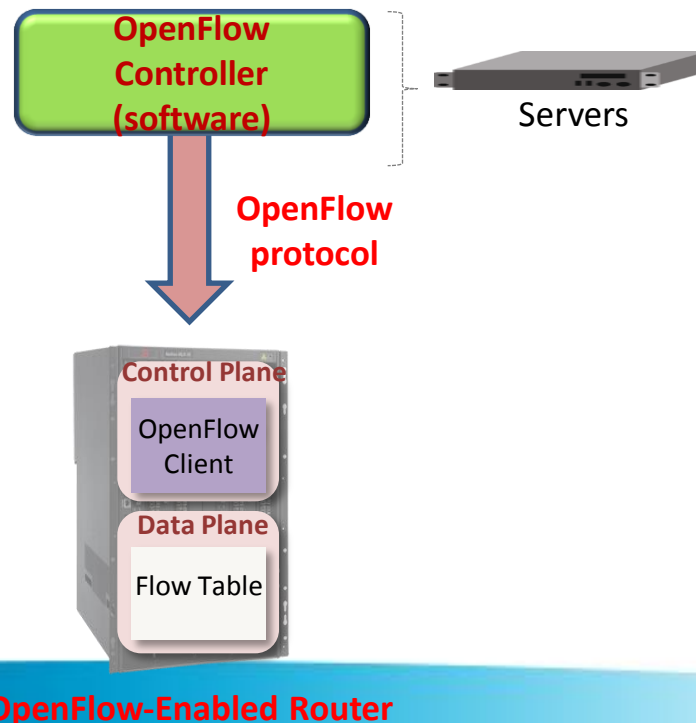


Software Defined Networking

- ❑ SDN makes the network programmable by separating control plane from data plane.
- ❑ Requires a switch that can be programmed with an SDN controller using a protocol.
 - ❑ It is preferable to use a standard protocol such as OpenFlow

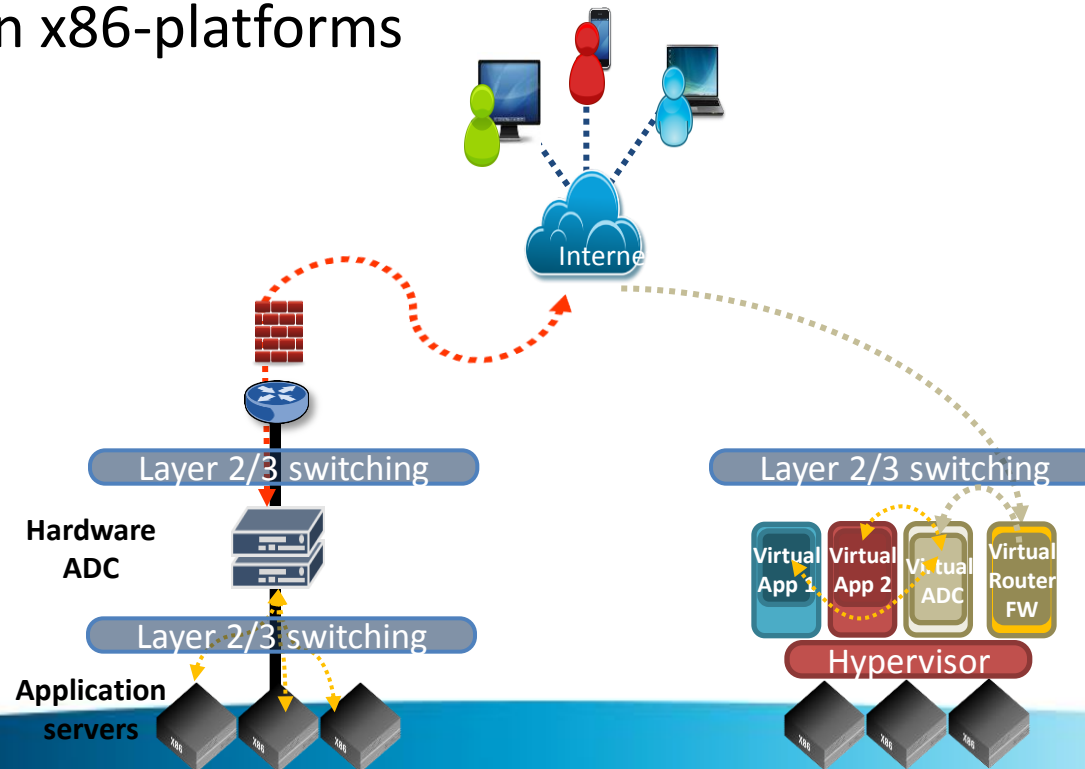
OpenFlow

Protocol that defines communication between a switch and network controller.



Network Functions Virtualization

- ❏ NFV is virtualizing networking elements such as firewall, router, load balancers (application delivery controllers).
- ❏ NFV runs on x86-platforms



Network Virtualization

- ❑ It tries to create logical segments over an existing network by dividing the network logically at the flow level.
- ❑ NV is an **OVERLAY**
- ❑ The goal is to allow people to move VMs independently of their existing infrastructure and not have to reconfigure the network.

SDN is not...

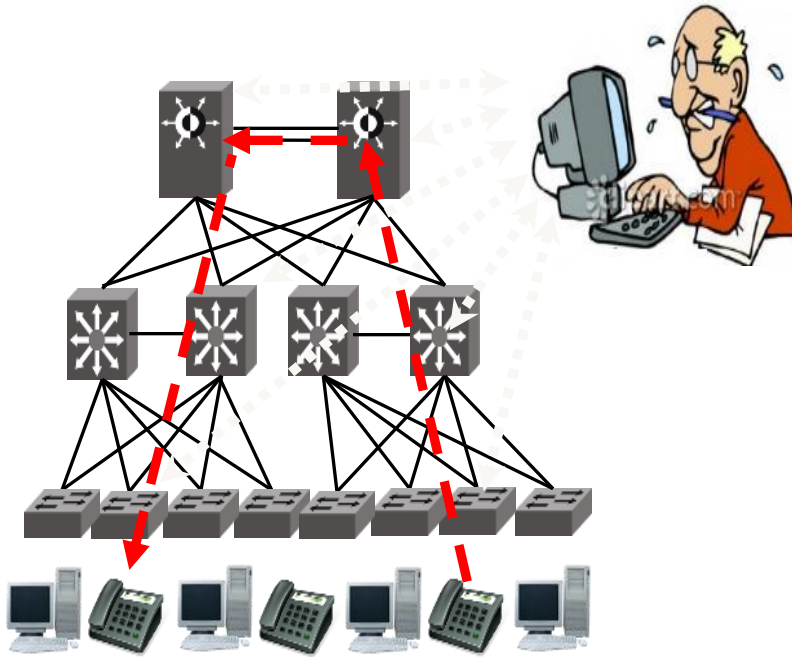
- ❑ A **protocol** that can be enabled and bring new features to the network.
- ❑ Network Virtualization

SDN IS A SOLUTION

SDN USE CASES

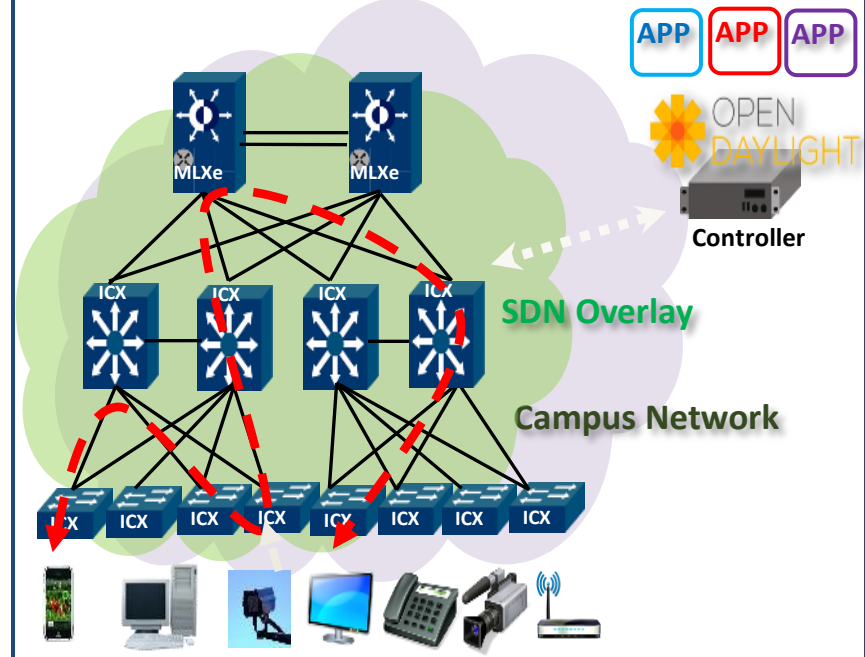
Why SDN in Campus Network?

Traditional Campus Network



- **Static**
- **Operationally intensive**
- **Vendor dependent for new services**
- **Time-consuming**

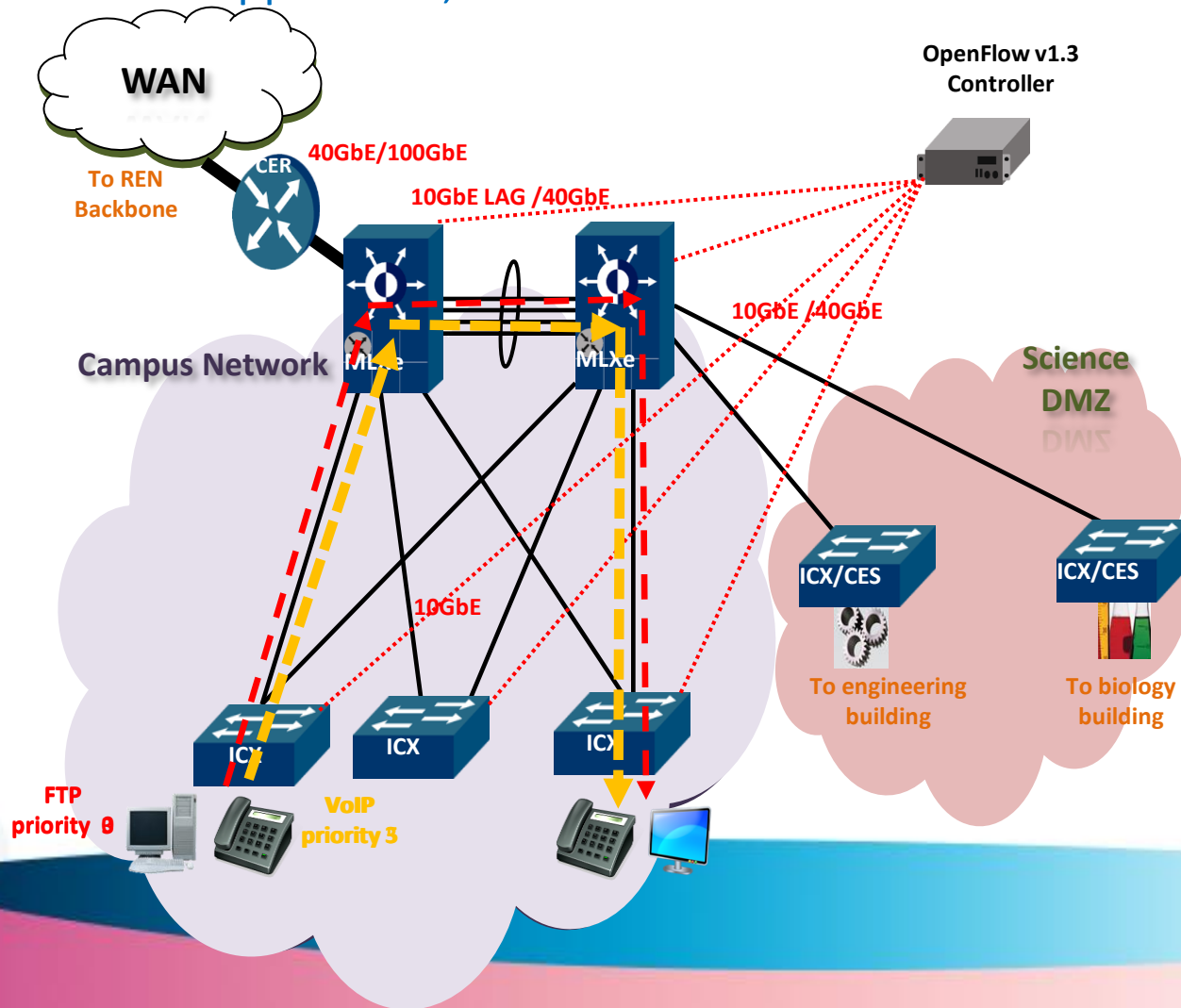
SDN Campus Network



- **Programmable**
- **Automated**
- **Service agile**
- **Simple**
- **Flexible for BYOD**

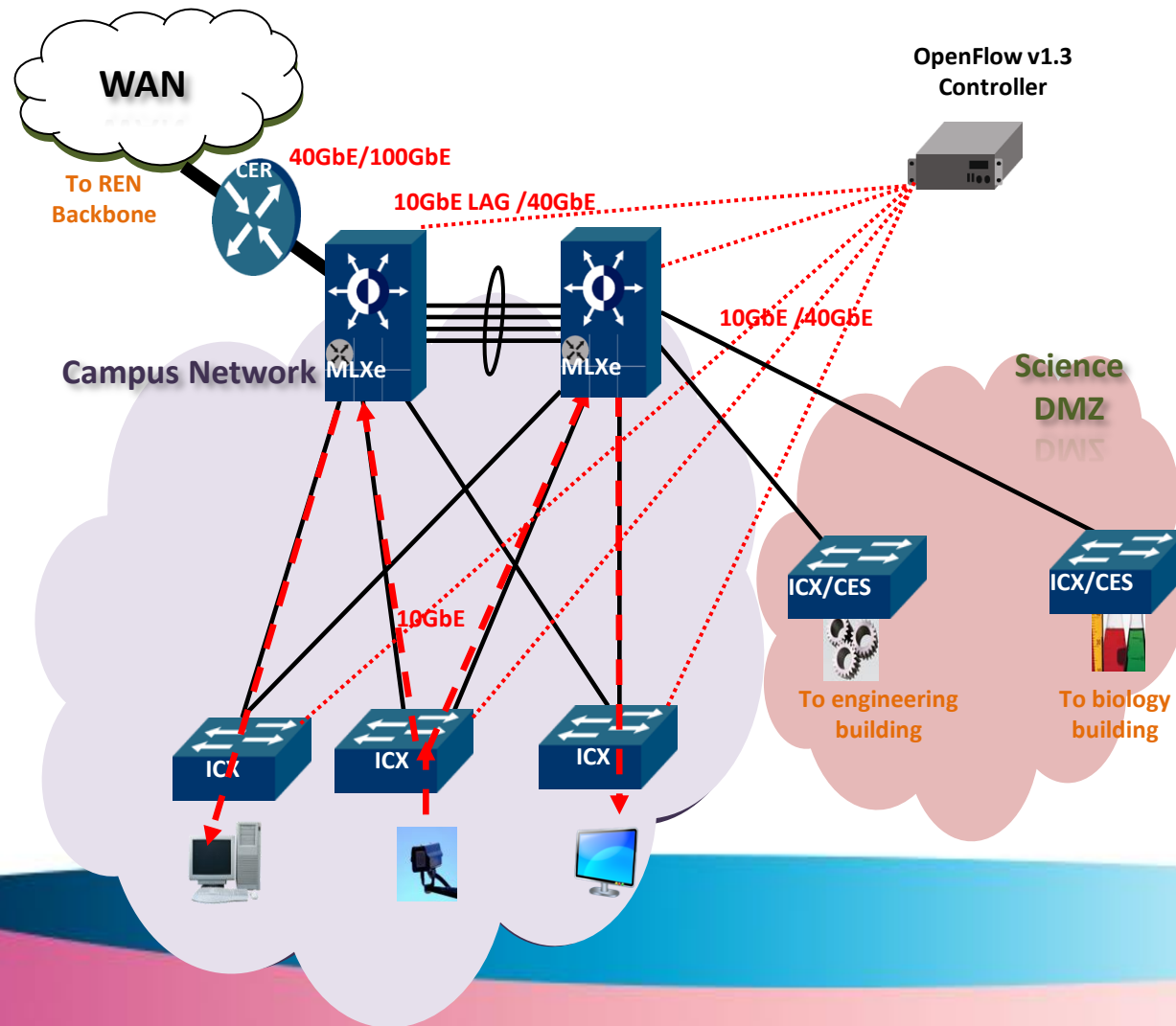
SDN Campus Network Demonstration

Detect Delay Sensitive Apps – VoIP, Real time video



SDN Campus Network Demonstration

Packet Replication – Multicast, IDS, Surveillance

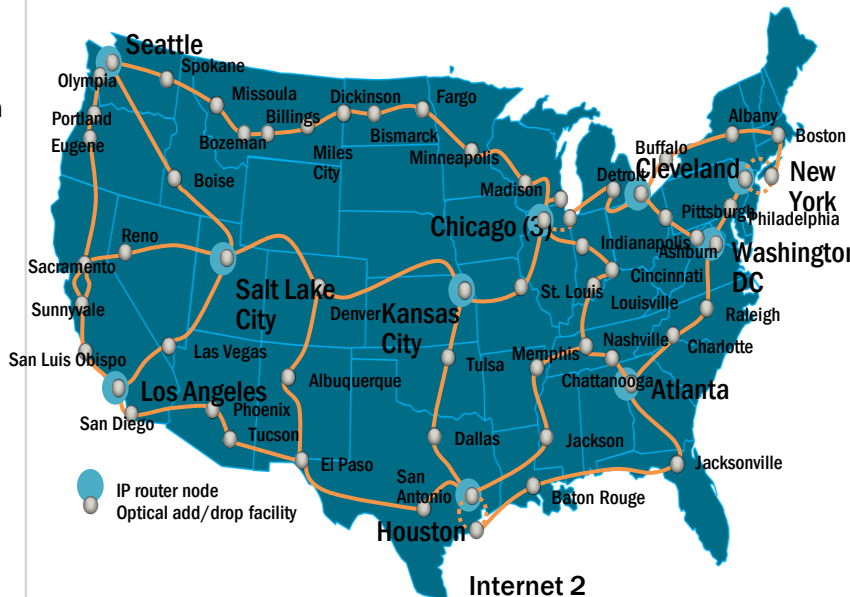


Internet 2



Problems		Benefits
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- MAN LAN project: Advanced production IP network for Research & Education IP services and peering services. Sites include NYC and Wash DC
- Development & deployment of large scale environment for research
- Tighter integration of performance programs with the network portfolio
- Operational support for research
- IPv6 and security services



- MLXe provides high density 10/100G at MAN LAN project for I2.
- Brocade enables their Open Exchange with SDN and OpenFlow with the MLXe solution and 100G
- SDN with OpenFlow enable cloud routing and SDN applications along with high-speed routing & MPLS
- IPv6 and security services are supported by MLX products



Universidad de Guadalajara

IPv6-SDN



OS³E The Open Science, Scholarship & Services Exchange

Workspaces > Home > Circuit Details Workgroup: admin

Summary

Description: circuito-IPv6

Type	Bandwidth	Restore To Primary	Static MAC Routing	Status	Owned By
Local	0 Mbps	1 minutes	Off	active	admin

Endpoints

Interface	Interface Description	VLAN
c1.core.udg.mx - e1/23	e1/23	43
c2.core.udg.mx - e6/1	e6/1	160

Buttons: Edit Circuit, Remove Circuit, Change Path, Force Reversion

Utilization | History | Scheduled Events | Circuit Layout | Circuit Layout Raw

Map showing location: gw1.core.udg.mx

Loading...



Remember when networking used to be exciting?

Now, it's that time again

THANK YOU!

