The ViSION Project

Minor Review Meeting 18 December 2012

CERN openlab - HP Networking

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The ViSION Project

- CERN openlab HP Networking collaboration
 - Traffic orchestration
 - Software Define Networking approach
 - Based on OpenFlow
 - Started in February 2012
 - 2 engineers, 3 years

"We recognized the need to scale our perimeter firewall capacity to cope with the increase of internet traffic," – Jean-Michel Jouanigot, communication systems group leader, IT Department, CERN.

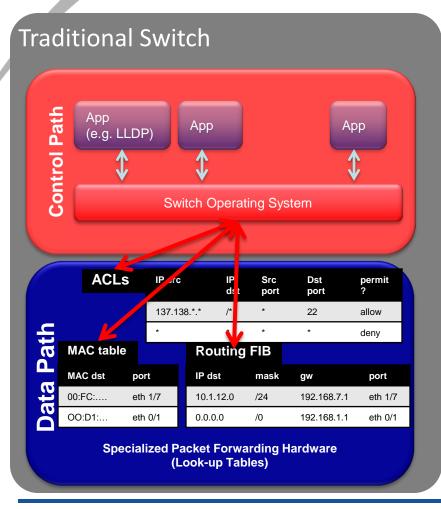


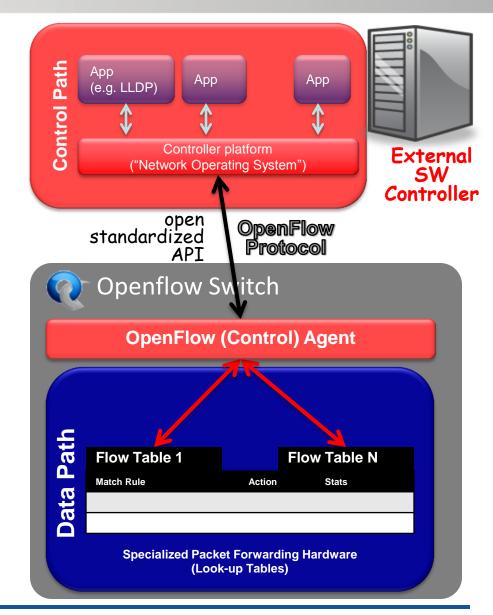


- OpenFlow
 - What it is
 - How it works
- Networking: traditional vs. SDN
 - Applying OpenFlow
- ViSION
 - SDN development platform
 - Use case
 - Testing procedures
 - Status and outlook



OpenFlow – reclaim your control!

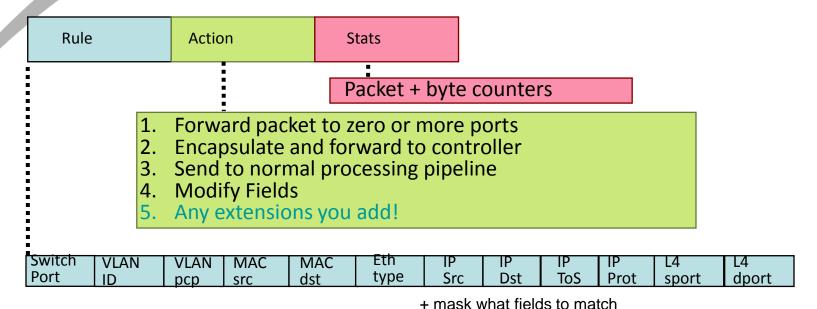






OpenFlow – Flow Table Entries

+ wildcard bits in selected fields (e.g. IP addresses)



Examples

Switching	Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
	*	*	00:1f:	*	*	*	*	*	*	*	port6
Routing	Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
	*	* *	k	*	*	*	5.6.7.8	*	*	*	port6



Traditional Networking

- Closed equipment
 - Software bundled with hardware
 - Vendor-specific interfaces
- Few people can innovate
 - Equipment vendors write the code
 - Long delays to introduce new features
- Fully Distributed Protocols











Operating
System

Specialized Packet
Forwarding Hardware

Network Device (switch / router)

Network
Control
Moving
data



Traditional Networking ++

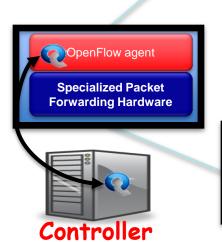
- **Open** equipment
 - Software **decoupled** from hardware
 - **Standard** interface (OpenFlow)
- **Anybody** can innovate
 - ... or at least try to innovate

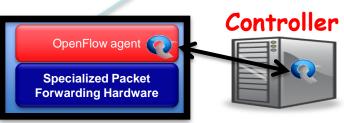
Fully Distributed Protocols



Specialized Packet Forwarding Hardware







Specialized Packet Forwarding Hardware



Software Defined Networking (SDN)

App

App

App

Centralized Control

Network Operating System

Open interface to hardware (e.g. OpenFlow)

Anybody can innovate

Simple Packet Forwarding Hardware

> Simple Packet Forwarding Hardware

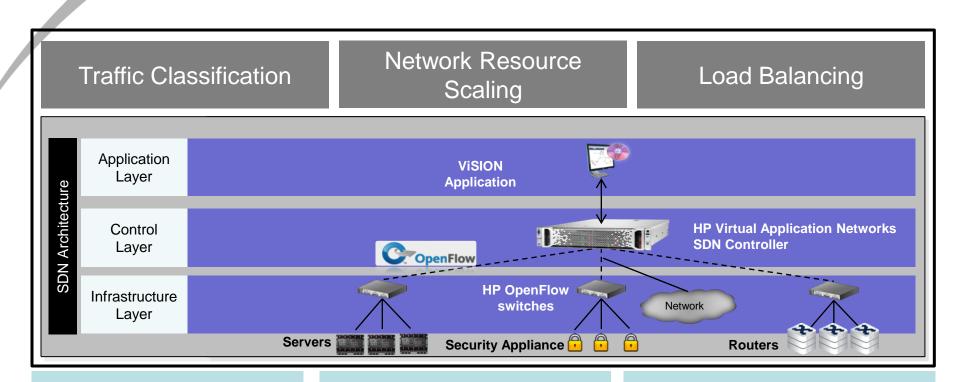
Simple Packet Forwarding Hardware

> Simple Packet Forwarding Hardware

Simple Packet Forwarding Hardware



Extends scalability



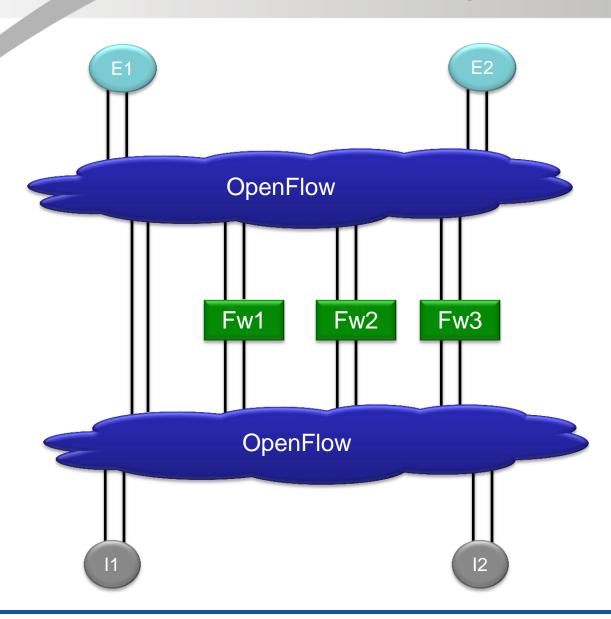
Improved resource utilization

CERIS

Standards-based using OpenFlow



ViSION for scaling CERN's firewall





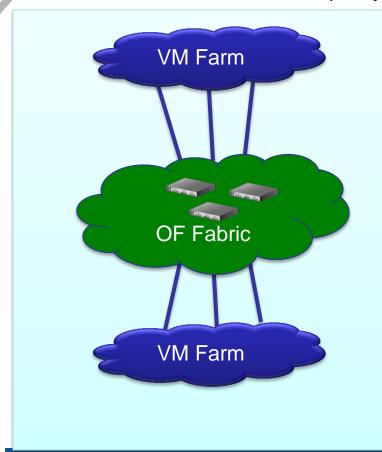
Lab Testing Plans

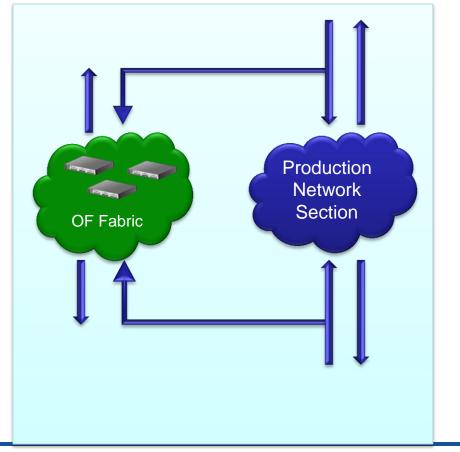
Regression testing

- Deterministic traffic injection
- End to end quality metrics

Mirrored testing

- Test OF setup with real traffic
- Flow pattern analysis





ViSION Test-bed block diagram openla 10Gb **OF Port Collection** NIC FW **FW** Ε 10Gb **OF Port Collection** NIC 1Gb 1Gb 1Gb 1Gb **Firewall** Linux Box Linux Linux Linux Linux Virtual Virtual Virtual Virtual Machine Machine Machine Machine **IPTABLES IPTABLES IPTABLES IPTABLES**

1Gb

1Gb

1Gb



VISION TIMELINE AND OUTLOOK

- Familiarized with SDN and HP kickoff visit
- Identify areas where ViSION can bring value through SDN
- Architectural design approved by HP
- Static flow pusher prototype

Feb 2012

Sep 2012

Feb 2013

- Integration with HPN controller and UI framework
- Developing core libraries
- Proof of concept demo