



Brocade SDN/OpenFlow

Norival Figueira
Office of the CTO

January 9, 2015

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Agenda

- Brocade's focus areas
- Brocade OpenFlow-enabled products
 - MLXe, CES/CER, ICX
- Brocade Vyatta Controller
 - Open Networking Platform
 - Based on OpenDaylight
- Brocade Applications
 - Traffic Explorer
 - Volumetric Traffic Management



Brocade's Focus Areas



Data Center Fabrics

Fibre Channel, Ethernet, IP



Data Center Routing

Core, Border, DC Interconnect



Software Networking

NFV, SDN, Orchestration



Campus Networking

On-ramp to the data center

NetworkWorld – Jan 7, 2015

- **“Why SDN all-stars are heading to Brocade”**
 - <http://www.networkworld.com/article/2866059/sdn/why-sdn-all-stars-are-heading-to-brocade.html>

Recent Publications

- IEEE ICNC 2015 (Feb 2015)
 - “SDN Multi-Domain Orchestration and Control: Challenges and Innovative Future Directions”
 - “Analysis of Data Center SDN Controller Architectures: Technology and Business Impacts”

- IRTF NFV Research Group (NFVRG)
 - “Policy Architecture and Framework for NFV and Cloud Services”
draft-norival-nfvrg-nfv-policy-arch
 - “NFVlaaS Architectural Framework for Policy Based Resource Placement and Scheduling”
draft-krishnan-nfvrg-policy-based-rm-nfvlaas
 - “NFV Real-time Analytics and Orchestration: Use Cases and Architectural Framework”
draft-krishnan-nfvrg-real-time-analytics-orch

Brocade OpenFlow-Enabled Products

Campus

Data Center

Products

- MLXe
- CES/CER
- ICX 6610

Access Edge

Brocade CES/CER



Brocade ICX 6610



Aggregation/Core



Brocade CES/CER



Brocade ICX 6610



Aggregation/Core



Brocade CES/CER



Brocade ICX 6610



Brocade OpenFlow-Enabled Products

Brocade MLXe Series



- OpenFlow 1.0 and 1.3
- OF Hybrid Switch Mode and Hybrid Port Mode
- Full 12-tuple matching support

Layer 2						Layer 3					
Ingress Port	MAC DA	MAC SA	EtherType	VLAN ID	P-bits	IP Src	IP Dst	IP Protocol	IP DSCP	TCP/UDP src port	TCP/UDP dst port

- 1/10/40/100 G line cards
- 20x10G MACSec Module (new)
- IPv4/IPv6, MPLS VLL/VPLS, QoS, Service OAM, Provider Bridging, and Provider Backbone Bridging

Brocade OpenFlow-Enabled Products

Brocade CES/CER Series



- OpenFlow 1.0 and 1.3
- OF Hybrid Switch Mode
- Full 12-tuple matching support
- 24-port and 48-port copper/fiber models
- 1/10 G ports
- IPv4/IPv6, MPLS VLL/VPLS, QoS, Service OAM, Provider Bridging, and Provider Backbone Bridging

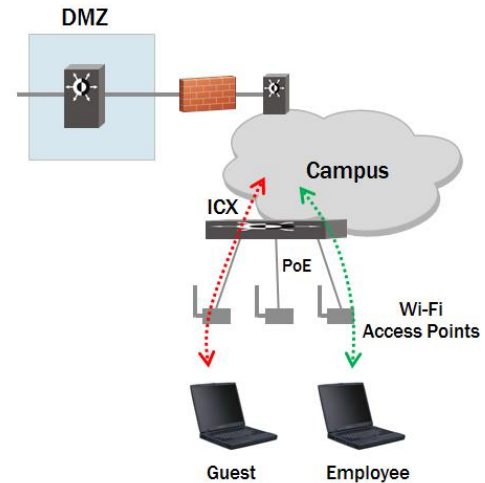
Brocade OpenFlow-Enabled Products

Brocade ICX 6610



- OpenFlow 1.0 and 1.3
- OF Hybrid Switch Mode
- Chassis-class stacking
- 40G uplinks (stacking ports)
- Up to 8 x 10G ports
- Full POE+ power support
- Full Layer 3 Feature capability

Wi-Fi Access Control (OpenFlow Use Case)



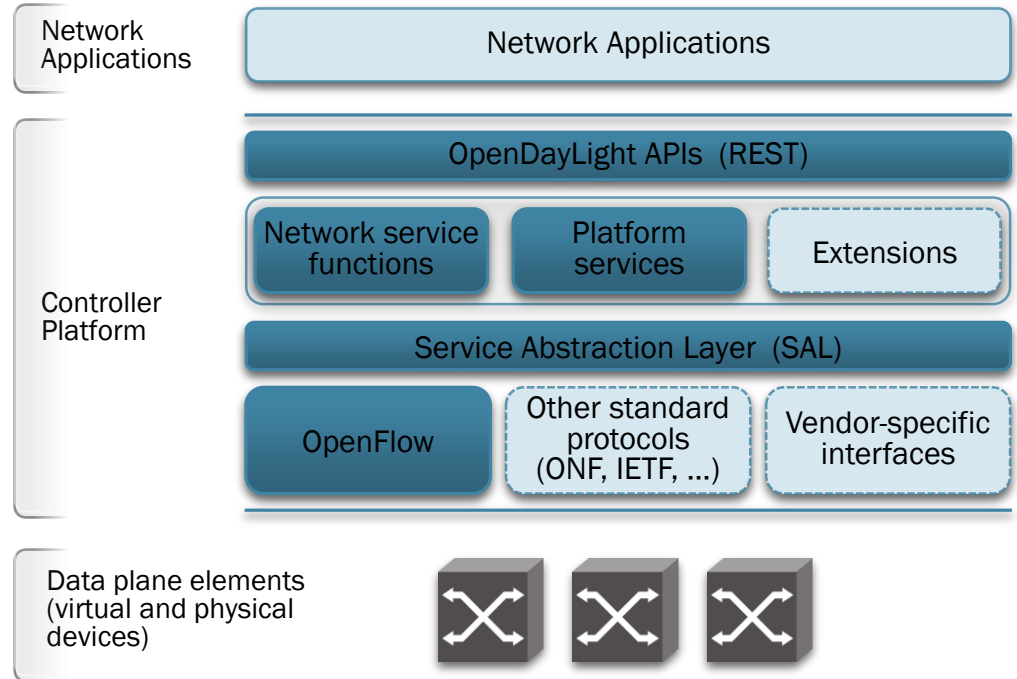


OpenDayLight SDN Consortium

OPEN SDN CONTROLLER FRAMEWORK



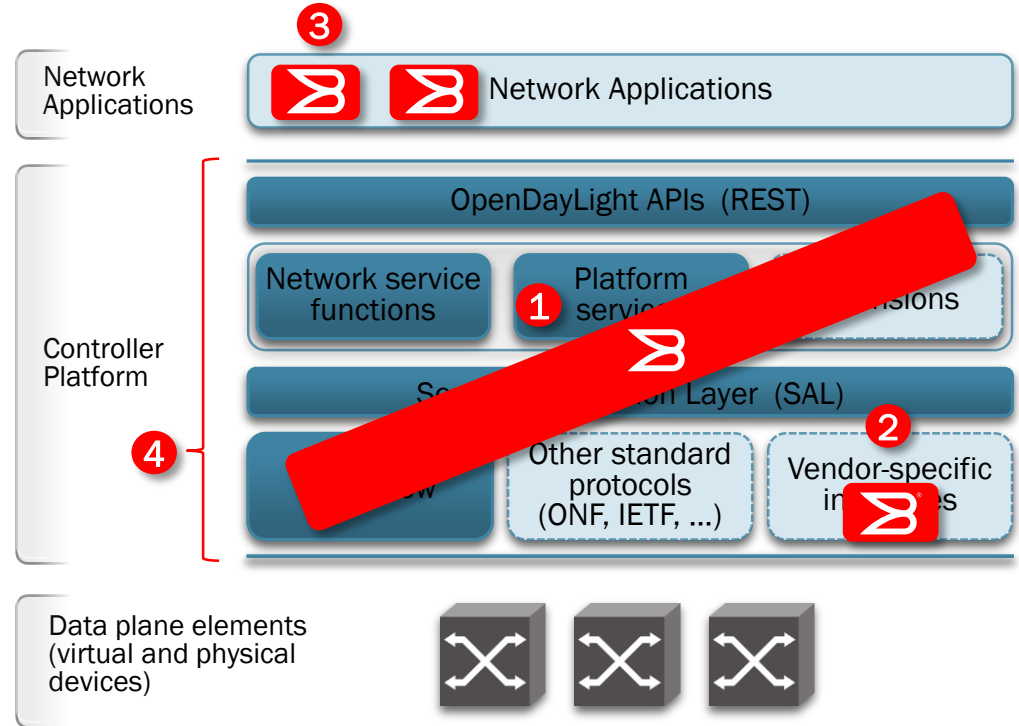
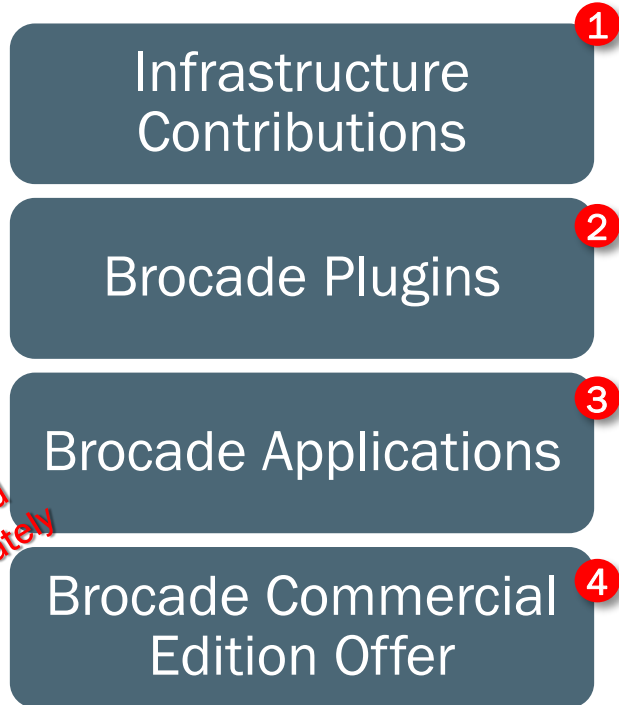
- Open source SDN project under the Linux Foundation
- Brocade
 - One of the founding members
 - Board Chair
 - Chair of the Technical Steering Committee
- OpenDayLight Controller
 - Customers can leverage to simplify the orchestration of infrastructure and services, providing for a truly on-demand data center





Brocade Vyatta Controller -

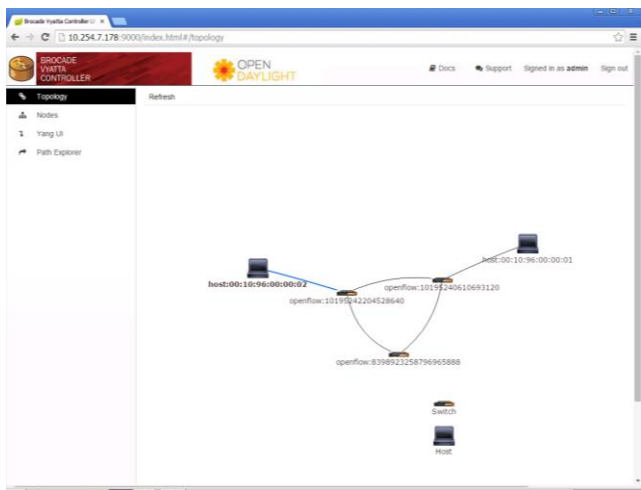
OPEN NETWORKING PLATFORM - BASED ON OPENDAYLIGHT, HELIUM RELEASE



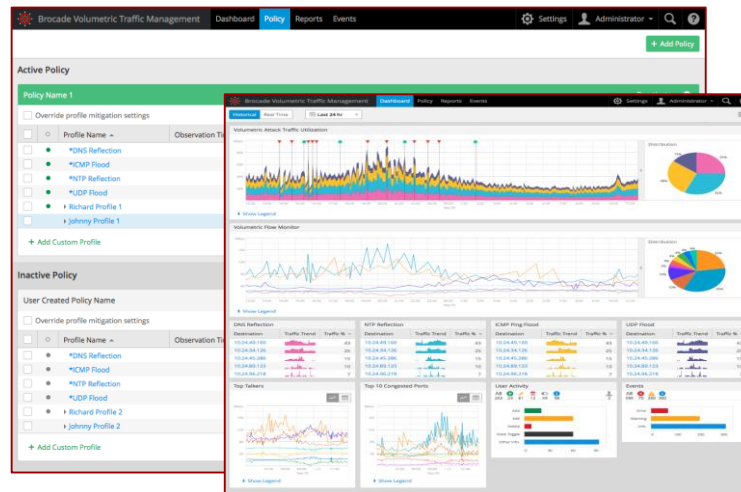


Brocade Vyatta Controller Applications

- Path Explorer
 - Topology awareness and path optimization



- Volumetric Traffic Management
 - Help manage DC “volumetric” traffic (DoS attacks and legitimate "elephant flows“)
 - Planned for early 2015

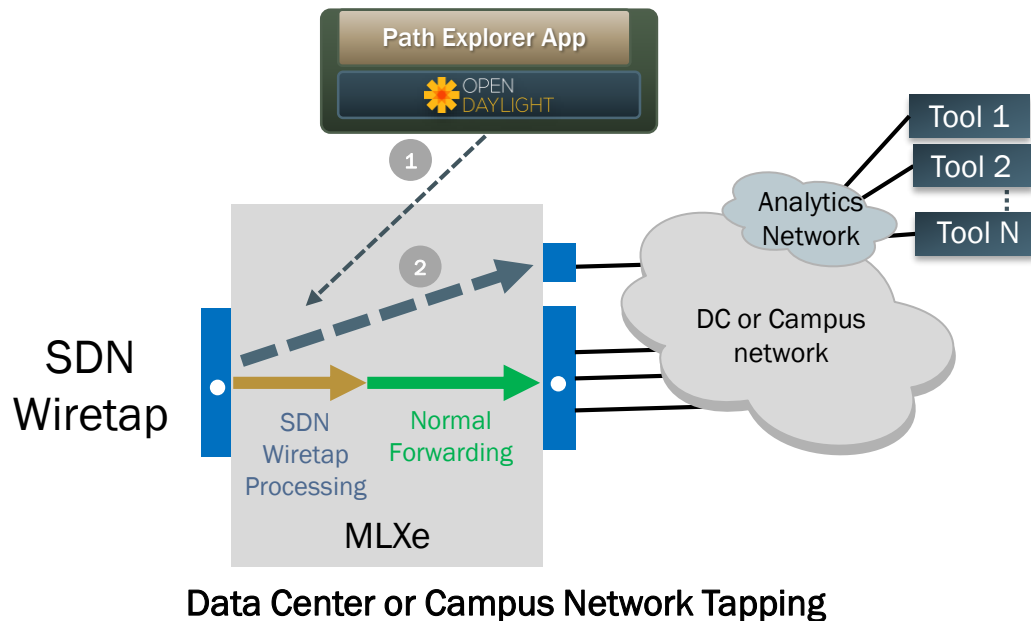




SDN-Based Wiretap for Network Anomaly Detection

CAPTURE AND ANALYZE EVERY REQUIRED PACKET

- What is Anomaly Detection?
 - What just happened, that should not?
 - Find the problem before others see it
- Anomalies
 - Routing: OSPF, OSPFv3, BGP etc.
 - L2-L4 Traffic: TCP, Multicast etc.
 - Voice SIP or Video performance
 - Packets: Small, Big or Alien
 - Accounting: Netflix, Facebook etc.

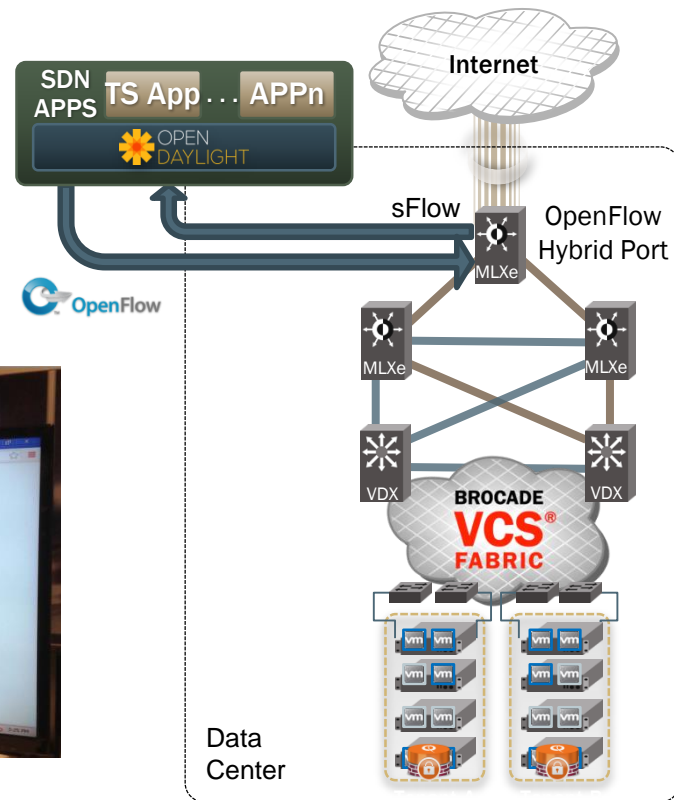
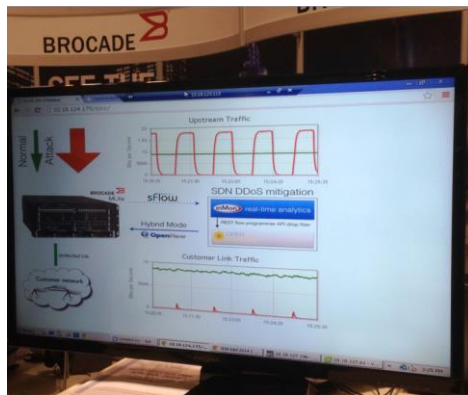




SDN-Based L2-L4 DDoS Mitigation

ONS 2014 SDN IDOL AWARD WINNER

- DDoS attacks causing significant business impact
- In 2014, NTP Reflection attack of 400Gbps broke barrier of sub 100Gbps attacks
- Solution:
 - Hybrid Port
 - Metering + Normal Forwarding
 - Supports 100G port, unlike traditional solutions



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Thank You