

**CUDI 2015**

REUNIÓN DE PRIMAVERA

21 AL 24 DE ABRIL

Puerto Vallarta, Jal.

# Nuevas Redes con SDN

Bernardo Valladares Linares

[bvalladares@extremenetworks.com](mailto:bvalladares@extremenetworks.com)

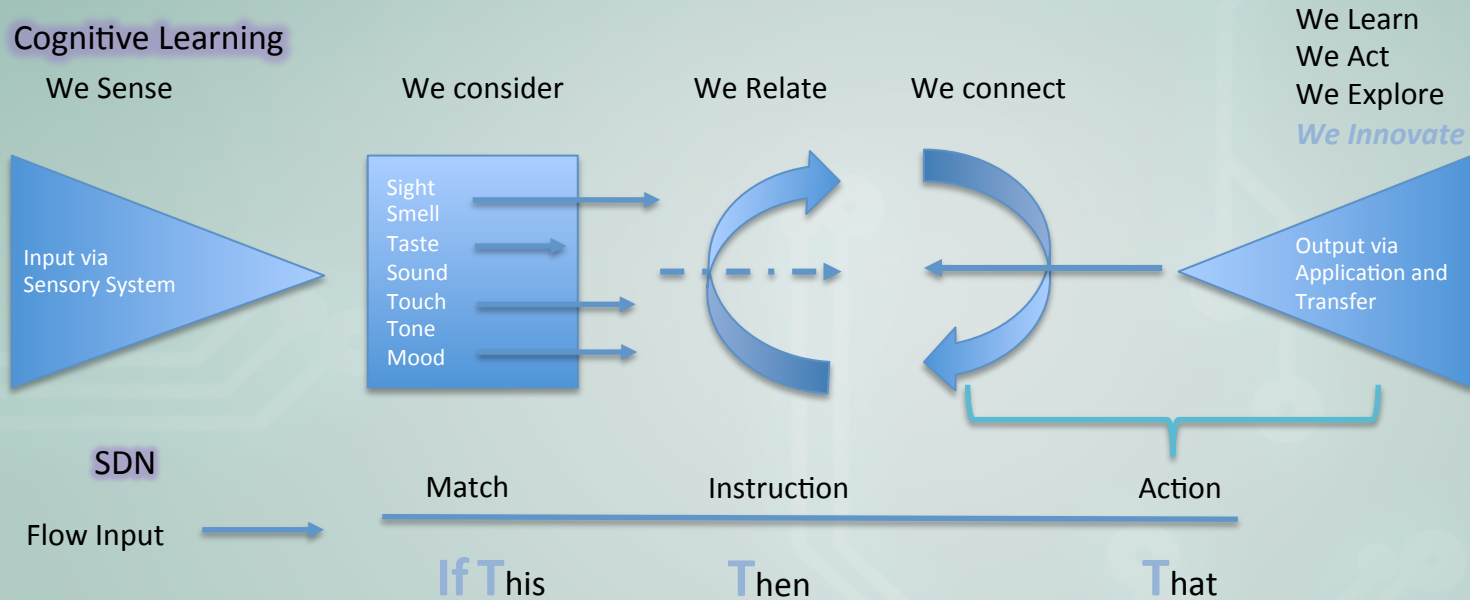
Extreme Networks

Abril 22, 2015



# Why Software Defined Networks?

## Cognitive Learning



- Intuitive modeling of the flow system.
- Similar to how we learn, enabling application developers to use the network as a tool rather than a resource.

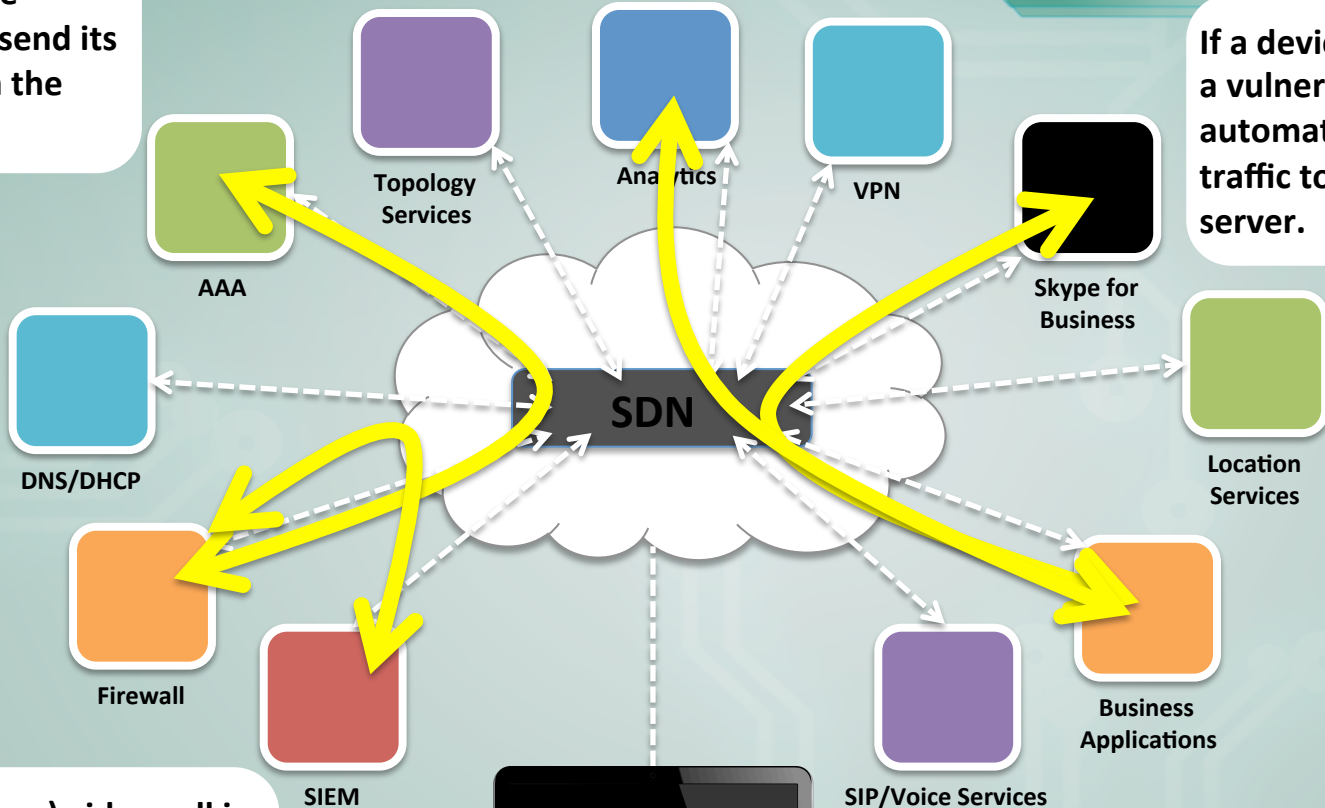
21 AL 24 DE ABRIL

Puerto Vallarta, Jal.



If a medical device connects to the network then send its traffic through the firewall

If a device is found with a vulnerability then automatically redirect traffic to remediation server.



If a Skype (Lync) video call is initiated then apply dynamic priority and optimal network path for the call.

If network demand from business applications is high then rate limit any Netflix traffic



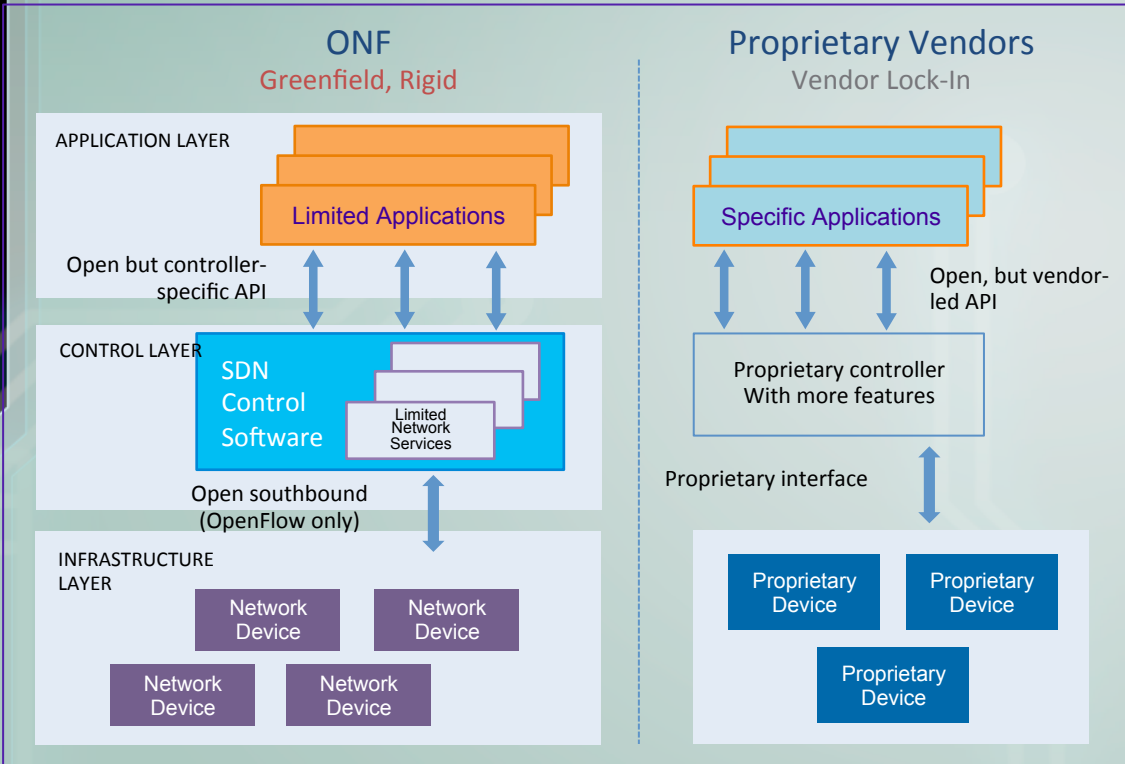
# SDN Benefits

- Openness
  - Decouples the tightly coupled network architecture, and opens up the control plane and the associated protocol
- Agility
  - SDN enables more flexible network control and management
  - SDN promotes the rapid innovation on networking technologies by programing the network

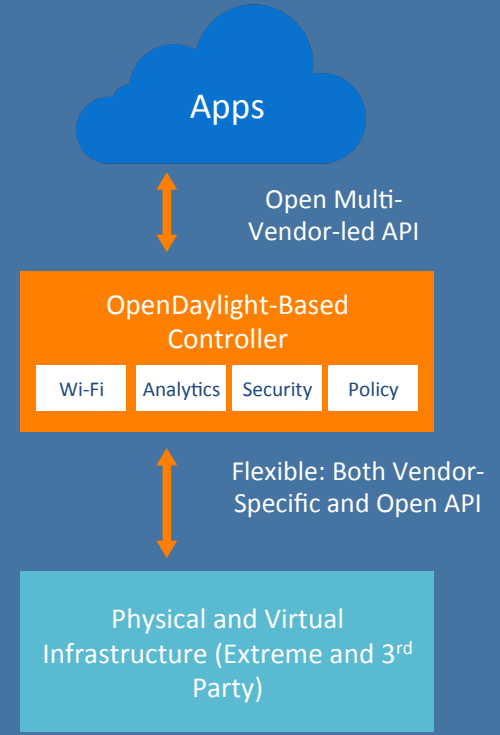
SDN is considered as a promising way to enhance the networks.



# Real-World SDN



ODL - Flexibility and choice



Extreme's SDN Platform



# OneController

The screenshot displays the OneController web interface. The browser address bar shows the URL `192.168.10.1:8181/dlux/index.html#/extreme/index`. The page title is "OneController" and the main navigation menu includes "System Configuration", "Home", "Setup", "Accounts", "Maintenance", "Logs", "Reports", and "Diagnostics". A sidebar on the left lists "Nodes", "Topology", "Connection Manager", "Network", and "Yang UI".

The main content area features a large graphic titled "Extreme Networks OneController" with the text: "We are proud to be an OpenDaylight member." and a "Get Started" button. To the right is a detailed diagram of the "SDN Platform Ecosystem".

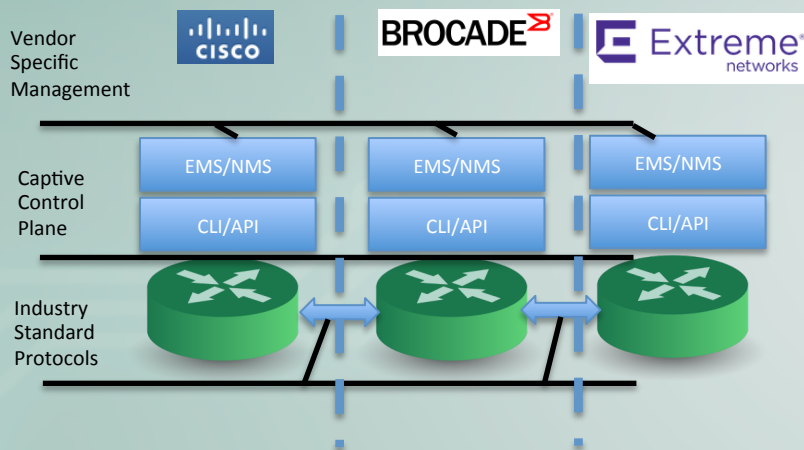
The diagram illustrates the following layers and components:

- Platform APIs:** Includes Analytics, Security, Multi-Tenancy, and Performance.
- Cloud/DC Orchestration:** Includes Citrix, Others, VMWare, Microsoft, and OpenStack.
- SDN Platform:** The central core of the ecosystem.
- Network Abstractions:** Includes NAC, IdentIF, OneController, and Brown/Greenfield Abstractions.
- Element-Specific APIs:** Includes Wireless, Fixed, Modular, 3rd Party, Hypervisors, and Virtual Switch.

Vertical text on the right side of the diagram reads: "SDN Platform Ecosystem - Marketplace, Developer Community, Certifications, Support, SDK, Tools, Collateral".

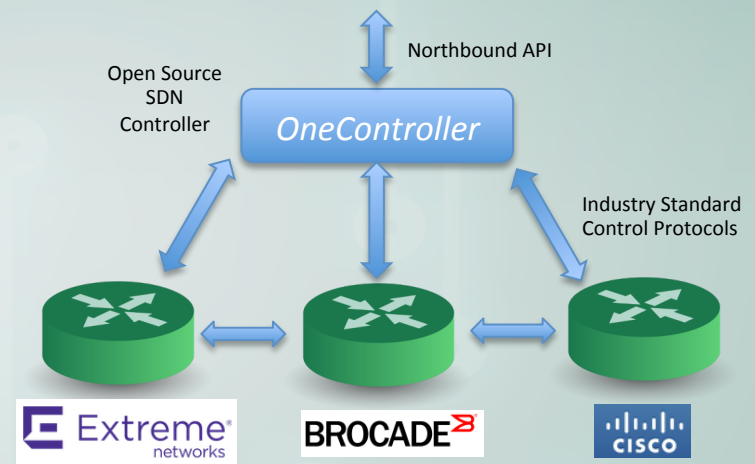
# New Architectures

## Traditional Architectures



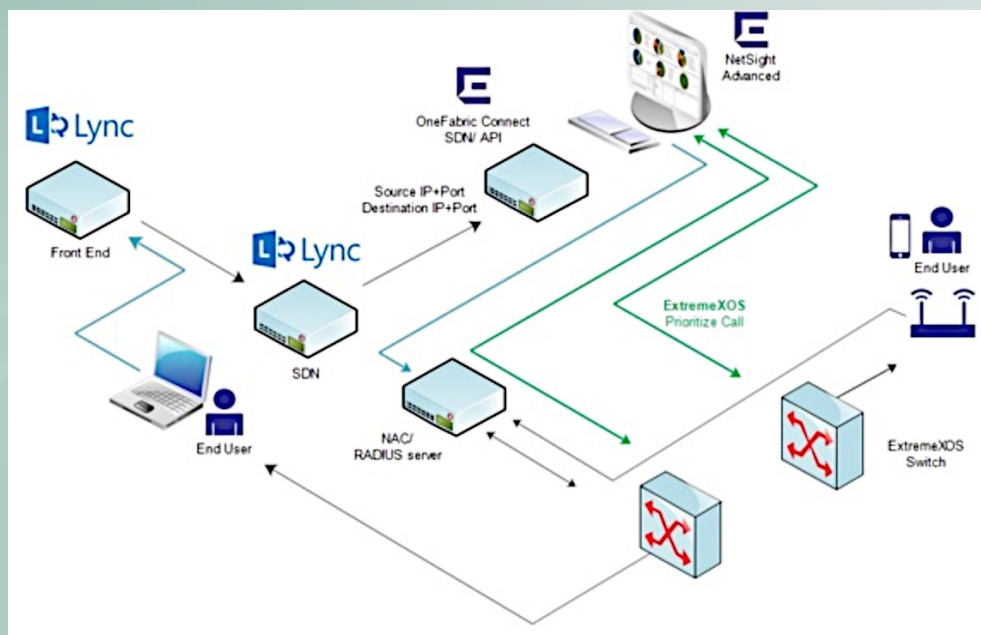
- EMS, NMS, CLI and APIs specific to switch and to each vendor
- Proprietary control plane per device
- Communication protocol standardized for interoperability

## Emerging SDN Architecture



- Centralized open control plane, non-vendor specific
- Normalized programming interface
- Standard control protocols and modeling language

# SDN with Microsoft Lync

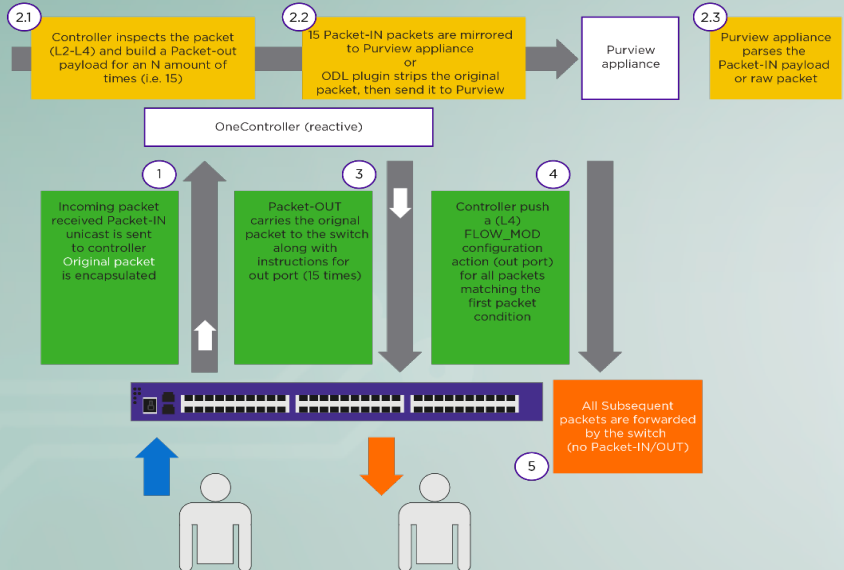
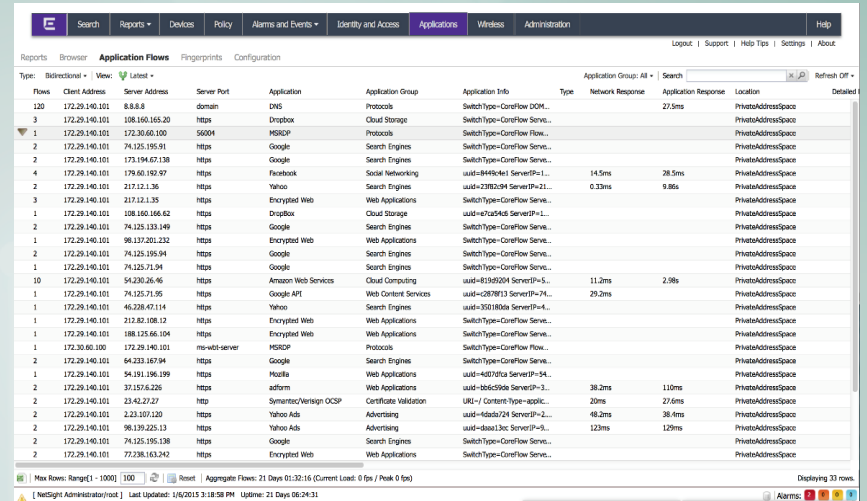


## Solution Benefits

- Improved Quality of User Experience
- Automated, dynamic and adaptive QoS provisioning
- Validated QoS capabilities and performance – wired and wireless
- In-depth, contextual visibility into performance, call quality
  - Simplified monitoring and troubleshooting of elements impacting user experiences and network performance.



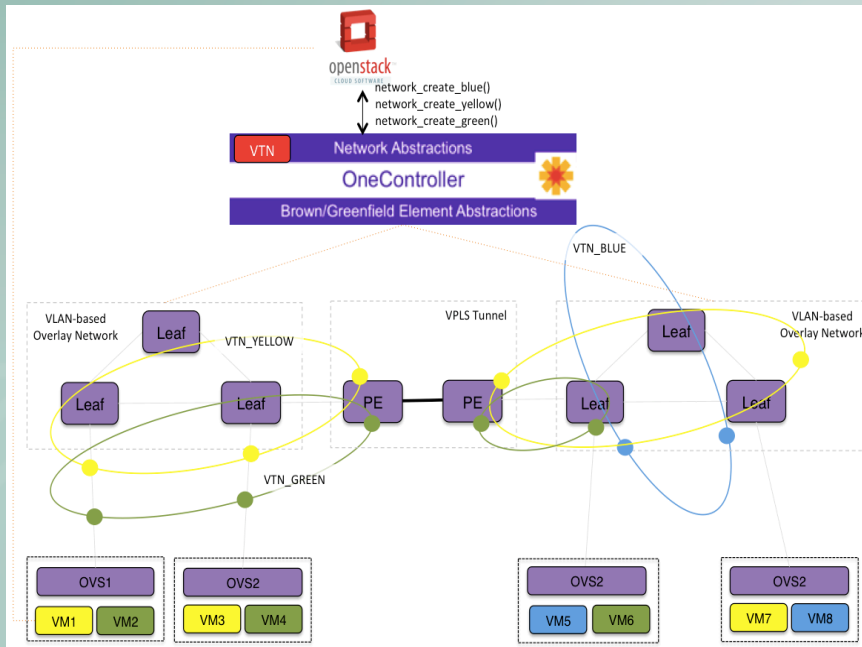
# SDN with Purview

Type	Client Address	Server Address	Server Port	Application	Application Group	Application Info	Type	Network Response	Application Response	Location
120	172.29.140.101	8.8.8.8	domain	DNS	Protocols	SwitchType=CoreFlow DOM...	SwitchType=CoreFlow DOM...	27.5ms		PrivateAddressSpace
3	172.29.140.101	108.160.165.20	https	Dropbox	Cloud Storage	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.29.140.101	172.30.60.100	50004	MSRP	Protocols	SwitchType=CoreFlow Flow...	SwitchType=CoreFlow Flow...			PrivateAddressSpace
2	172.29.140.101	74.125.195.91	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
2	172.29.140.101	173.194.62.138	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
4	172.29.140.101	179.60.192.97	https	Facebook	Social Networking	uid=84494e1 ServerIP=1...	uid=84494e1 ServerIP=1...	14.5ms	28.5ms	PrivateAddressSpace
2	172.29.140.101	217.12.1.35	https	Yahoo	Search Engines	uid=23823d4 ServerIP=21...	uid=23823d4 ServerIP=21...	0.33ms	9.86s	PrivateAddressSpace
3	172.29.140.101	217.12.1.35	https	Encrypted Web	Web Applications	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.29.140.101	108.160.166.62	https	Dropbox	Cloud Storage	uid=92af4d3 ServerIP=1...	uid=92af4d3 ServerIP=1...			PrivateAddressSpace
2	172.29.140.101	74.125.133.149	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
2	172.29.140.101	98.137.201.232	https	Encrypted Web	Web Applications	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.29.140.101	74.125.195.94	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
10	172.29.140.101	64.200.26.46	https	Amazon Web Services	Cloud Computing	uid=819d204 ServerIP=S...	uid=819d204 ServerIP=S...	11.2ms	2.98s	PrivateAddressSpace
1	172.29.140.101	74.125.71.95	https	Google API	Web Content Services	uid=287813 ServerIP=74...	uid=287813 ServerIP=74...	29.2ms		PrivateAddressSpace
1	172.29.140.101	66.236.62.114	https	Yahoo	Search Engines	uid=3331806 ServerIP=4...	uid=3331806 ServerIP=4...			PrivateAddressSpace
1	172.29.140.101	212.82.108.12	https	Encrypted Web	Web Applications	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.29.140.101	188.125.66.104	https	Encrypted Web	Web Applications	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.30.60.100	172.29.140.101	ms-wbt-server	MSRP	Protocols	SwitchType=CoreFlow Flow...	SwitchType=CoreFlow Flow...			PrivateAddressSpace
2	172.29.140.101	64.233.167.94	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
1	172.29.140.101	94.191.196.199	https	Piclist	Web Applications	uid=4d070ca ServerIP=94...	uid=4d070ca ServerIP=94...	38.2ms	110ms	PrivateAddressSpace
2	172.29.140.101	31.57.6.225	https	adform	Web Applications	uid=1665f96 ServerIP=31...	uid=1665f96 ServerIP=31...			PrivateAddressSpace
2	172.29.140.101	23.42.27.27	http	SymantecVerisign OCSP	Certificate Validation	URI= Constant Type=appli...	URI= Constant Type=appli...	20ms	27.6ms	PrivateAddressSpace
2	172.29.140.101	2.23.107.120	https	Yahoo Ads	Advertising	uid=4dada74 ServerIP=2...	uid=4dada74 ServerIP=2...	48.2ms	38.4ms	PrivateAddressSpace
2	172.29.140.101	98.139.225.13	https	Yahoo Ads	Advertising	uid=daa13cc ServerIP=9...	uid=daa13cc ServerIP=9...	123ms	129ms	PrivateAddressSpace
2	172.29.140.101	74.125.195.138	https	Google	Search Engines	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace
2	172.29.140.101	72.238.163.242	https	Encrypted Web	Web Applications	SwitchType=CoreFlow Serve...	SwitchType=CoreFlow Serve...			PrivateAddressSpace

- Leverage OpenFlow and OneController to forward the first N-packets of a new flow to the Purview (or other DPI) Engine
- Provides application visibility in any OpenFlow network (proved with EXOS & OVS)
- Results are presented in OneView
  - No full statistics, just the result of the application fingerprinting

# SDN with VTN for DC



- A simple and consistent single-pane-of-glass web UI for user access and admin access.
- **OpenStack** orchestrator that manages and orchestrates the DC compute, storage and networking infrastructure.
- **OpenStack** offloads all network configuration, management and orchestration to the Extreme Networks OneController.
- **OneController** specifically uses the Virtual Tenant Network (VTN) application to provide multi-tenancy and to stretch the tenant network across geographically dispersed DCs

# SDN Challenges

- Inter-domain
  - The Internet are managed by owners of different domains, which makes the centralized control doesn't work for inter-domain
- Scalability
  - Centralized control could not scale to a very large network (may work for a data center or a campus, but not Internet scale)
- Use cases
  - To improve the feasibility in real world
- Security
  - Mgmt, Data...