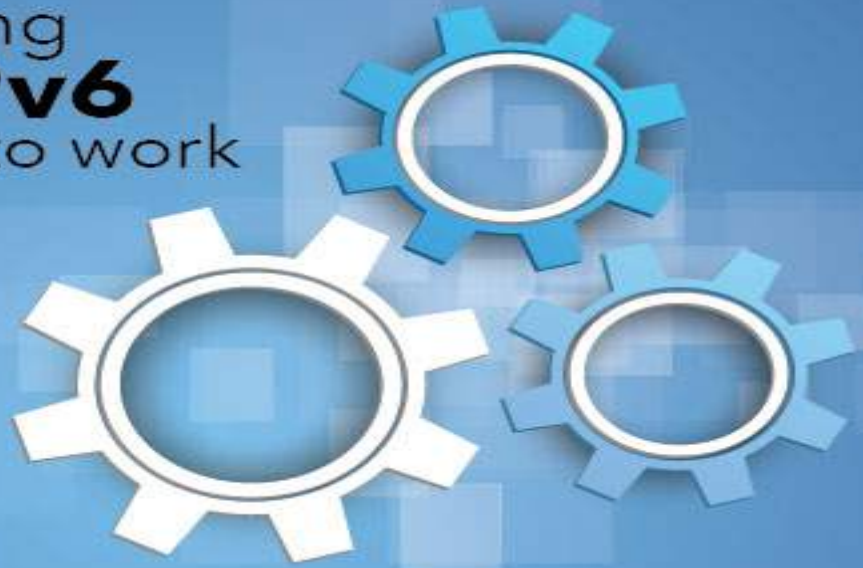
Putting
**IPv6**
to work



# North American IPv6 Summit

Grand Hyatt, Denver, Colorado
September 23-25, 2014

Rocky Mountain IPv6 Task Force
RMv6TF

# SDN and IPv6 innovation

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# Agenda

- Why is SDN so interesting
- What is it really
- How does a new platform look like
- When is SDN IPv6 capable, potential use cases
- Some uses case and solutions today
- What is next?


# Agenda

- Why is SDN so interesting


# Networks must support a changing IT Landscape

Legacy

- Distributed
- Static
- Physical
- Inefficient
- Manual Processes
- Inflexible
- Time consuming
- Silos of Technology

Enablers

- Centralized
- Dynamic
- Virtual
- Efficient
- Automated
- Agile
- Rapid response
- Pools of resources

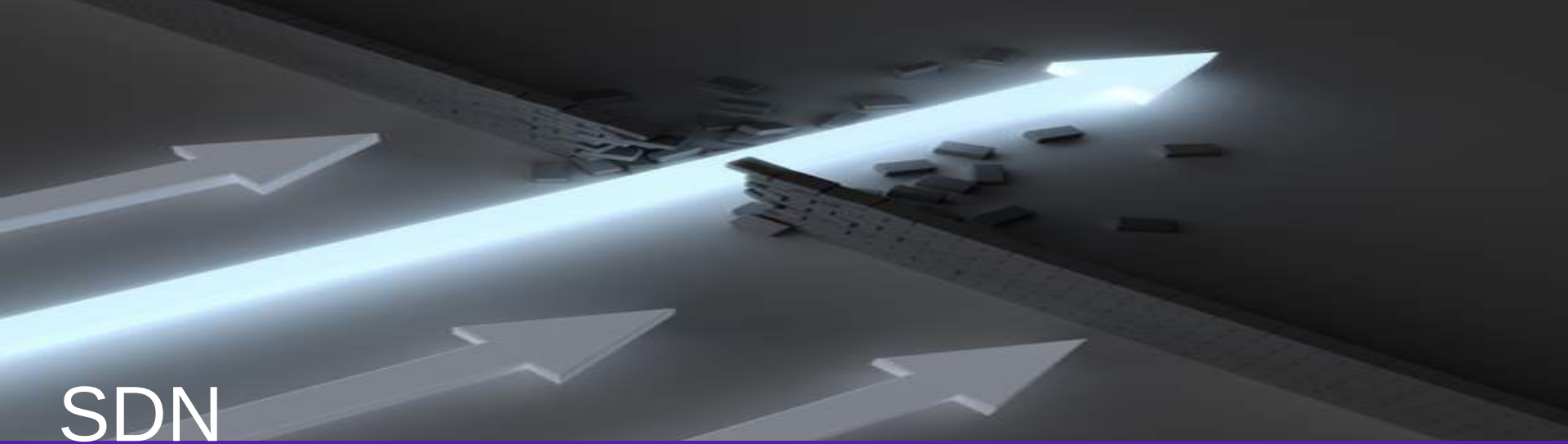
Modern

**New technologies are required**




# Imagine a world where

- Networks adapt automatically to any new user need and application
- New network applications, services and innovation became available daily
- Mix and match different vendors seamlessly to achieve best of breed
- Network services s are consumed like cloud services today



SDN

# A Disruptive Technology

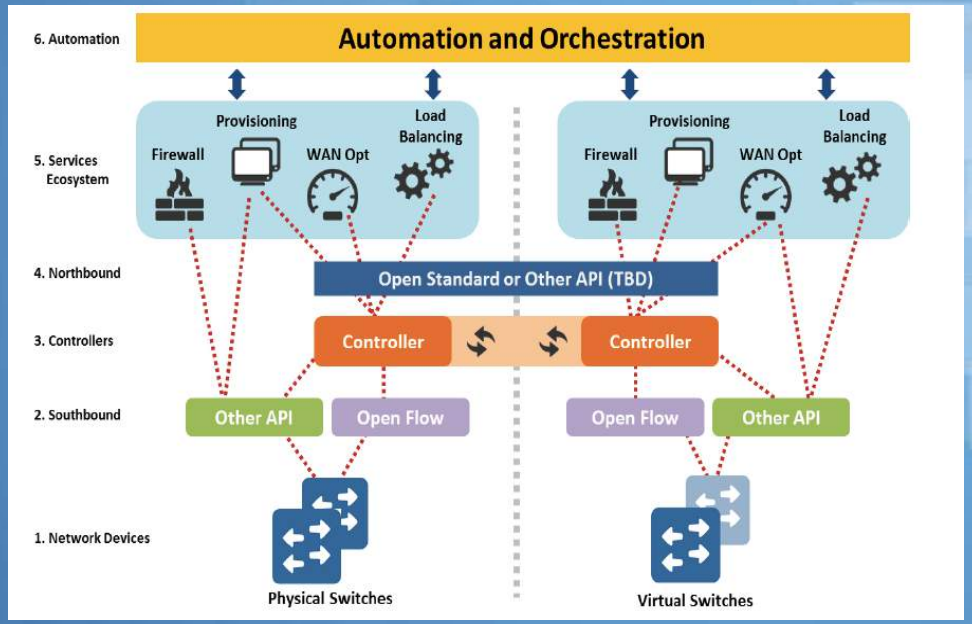
- Crossing the chasm: by 2017 10% of all networks will use SDN in production, a $3B + market
- New players and platforms will emerge
- The large incumbent(s) have the most to loose
- The power of a multi vendor led community

# Agenda

- What is it really


# What is SDN

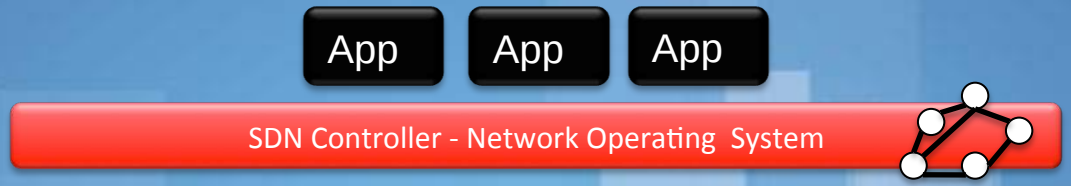
An **architectural approach** that delivers **network-wide objectives and capabilities**



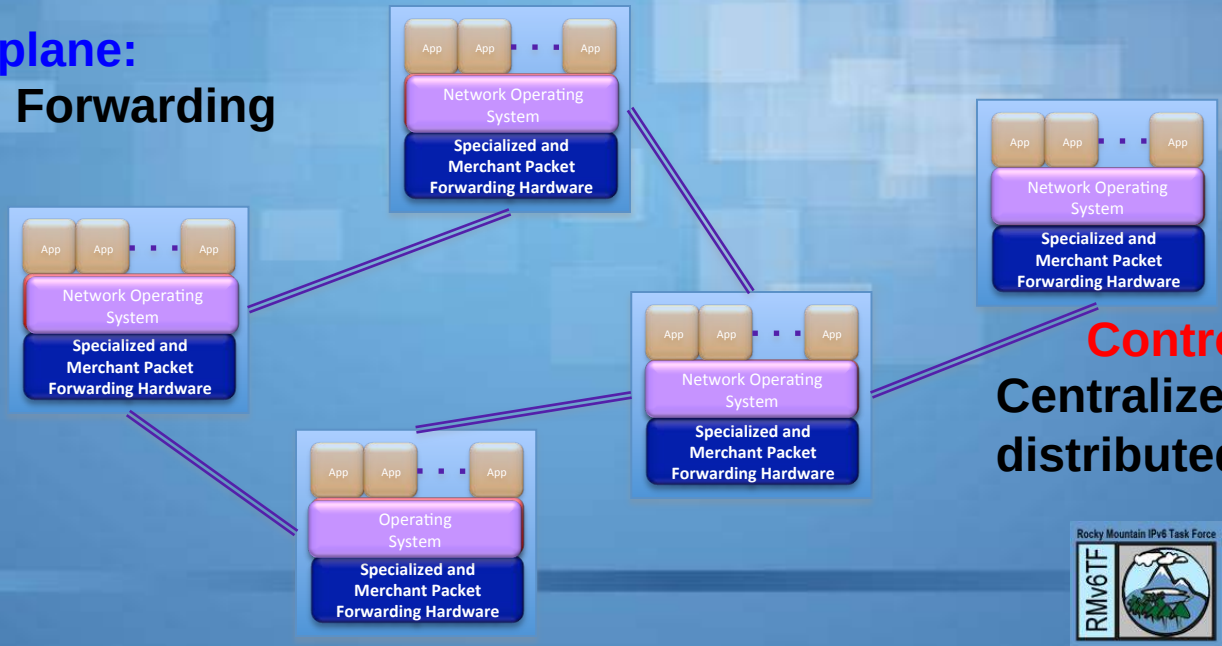

## Key features of SDN

- Network Abstraction - Separation of Control and Data Planes
- Programmable Data plane
- Virtualization of the network
- Automation and Orchestration
- Innovation of new services

# SDN Network Architecture




**Data plane:**
**Flow based Forwarding**

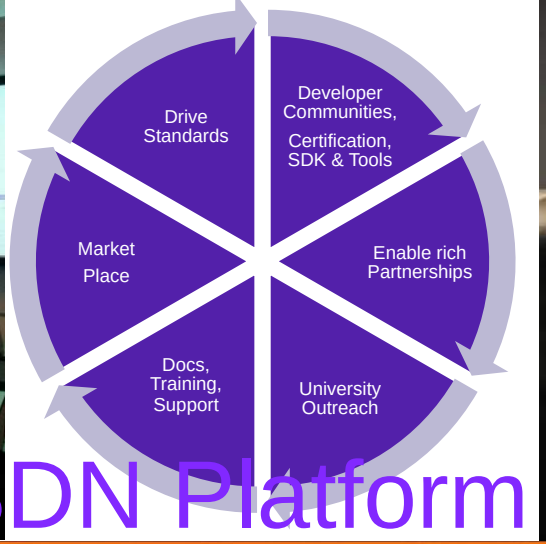



**Control plane:**
**Centralized with some distributed algorithms**




# Agenda

- How does a new platform look like



# Evolutionary SDN Platform

# Fueling Innovation

- Open, evolutionary approach fuels innovation and differentiation
- The platforms that succeed will be those that capture mindshare and developers
- The standards-based, open and comprehensive SDN platform
- Validated for brownfield & greenfield multi-vendor networks

# US Ignite Innovation Challenge – started 9/10

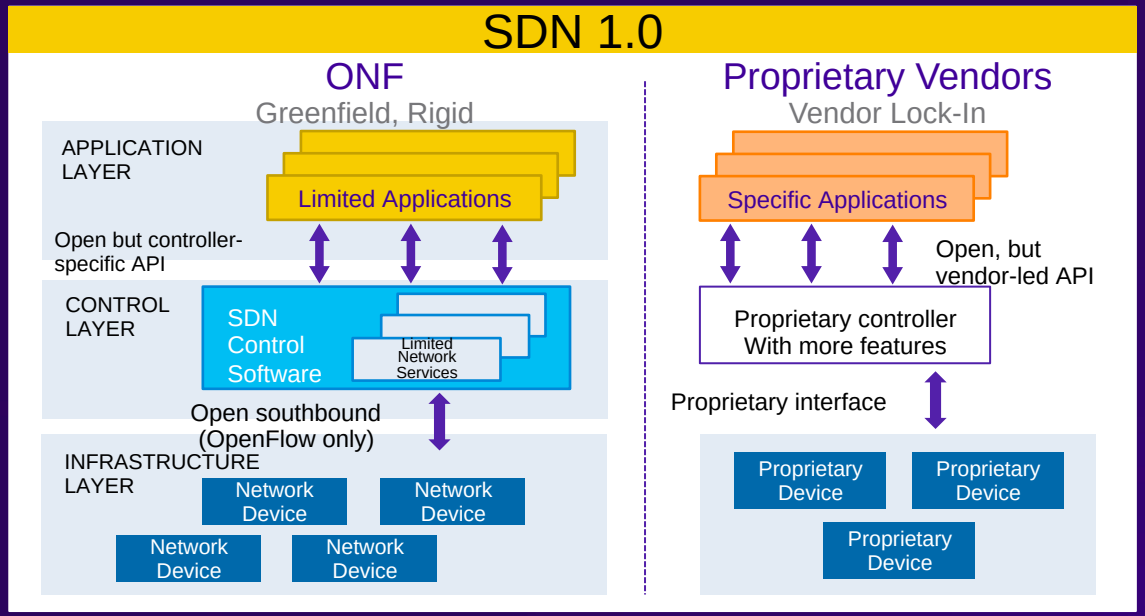
http://www.extremenetworks.com/solutions/sdn/sdn-innovation-challenge/

EXTREME NETWORKS SDN INNOVATION CHALLENGE

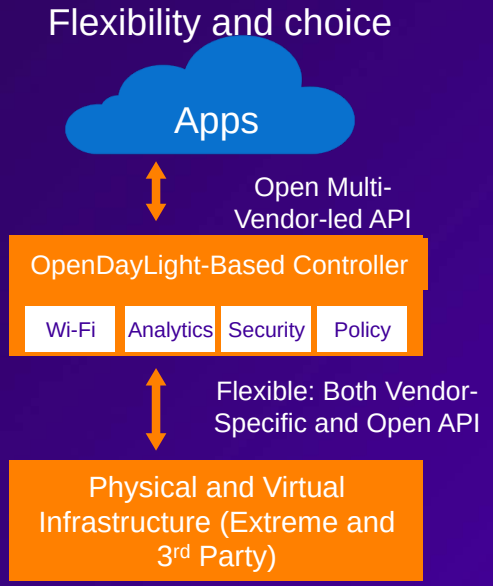
- Participants will sign-up for the Challenge by submitting an abstract and a 1-minute video pitch of the idea they propose to develop. This initial Submission deadline i**s October 10, 2014**.
- **Awards:** Based on scoring by an expert panel of judges, Extreme Networks will award the prize money to the top three winners
- Extreme is making available, in limited release, the Extreme Networks' SDN Platform targeting technology partners, developers, business partners and customers. The release includes
  - OneFabric Connect, NAC and Netsight
  - IdentiFi Wireless
  - EXOS with Python Script and JSON support
  - OpenDaylight Helium Release with the following validated solutions
    - VTN
    - Openstack (with VTN)
    - Hyperglance
    - Affinity
- **Looking for IPv6 solution proposals NOW!**


# The evolution of SDN architectures

## SDN 1.0




## SDN 2.0



# Agenda

- When is SDN IPv6 capable, potential use cases

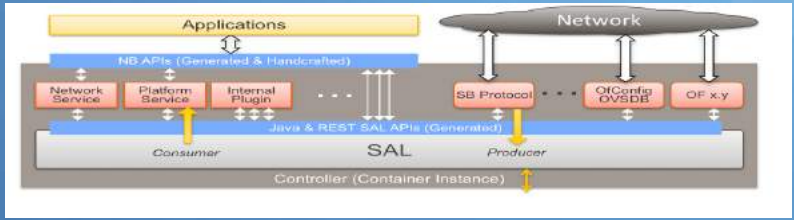

# SDN and IPv6 - The incredients are there today

- OpenDaylight Helium and OpenFlow 1.3
  - But commodity hardware is lacking a little behind
  - Scale and capability concerns

- OpenFlow 1.3 supports IPv6
  - OpenFlow 1.2 already allowed to match on IP protocol number (Ethernet type 0x86dd = IPv6), IPv6 source/ destination address, traffic class, flow label, and ICMPv6 types/codes
  - **1.3 added the ability to rewrite packet headers via flexible match support – OXM**
    - Added three new OpenFlow Extensible Match (oxm) fields: MPLS BoS, PBB I-SID, TunnelID, and IPv6ExtHdr. IPv6ExtHdr indicates whether certain IPv6 header extensions are present: No Next Header, Encrypted ESP, Authentication header, 1 or 2 dest headers, fragment, router, hop-by-hop, unexpected repeats, and unexpected sequencing.
  - 1.3 allows to match on IPv6 header fields such as source/destination address, protocol number (next header, extension header), hop-limit, traffic class, flow label, and ICMPv6 type/code (e.g. Neighbor Discovery Protocol (NDP))
  - 1.3 adoption increases daily

# SDN and IPv6 – cont'd

- OpenDaylight (Helium) supports OpenFlow 1.3 and IPv6 flow matching
- OpenDaylight supports MD-SAL (Model Driven Service Abstraction Layer) enables also non-flow based southbound protocols with additional IPv6 support




Editing OpenDaylight OpenFlow Plugin:End to End Flows:Example Flows

**Contents** [hide]

# IPv6 specific use case

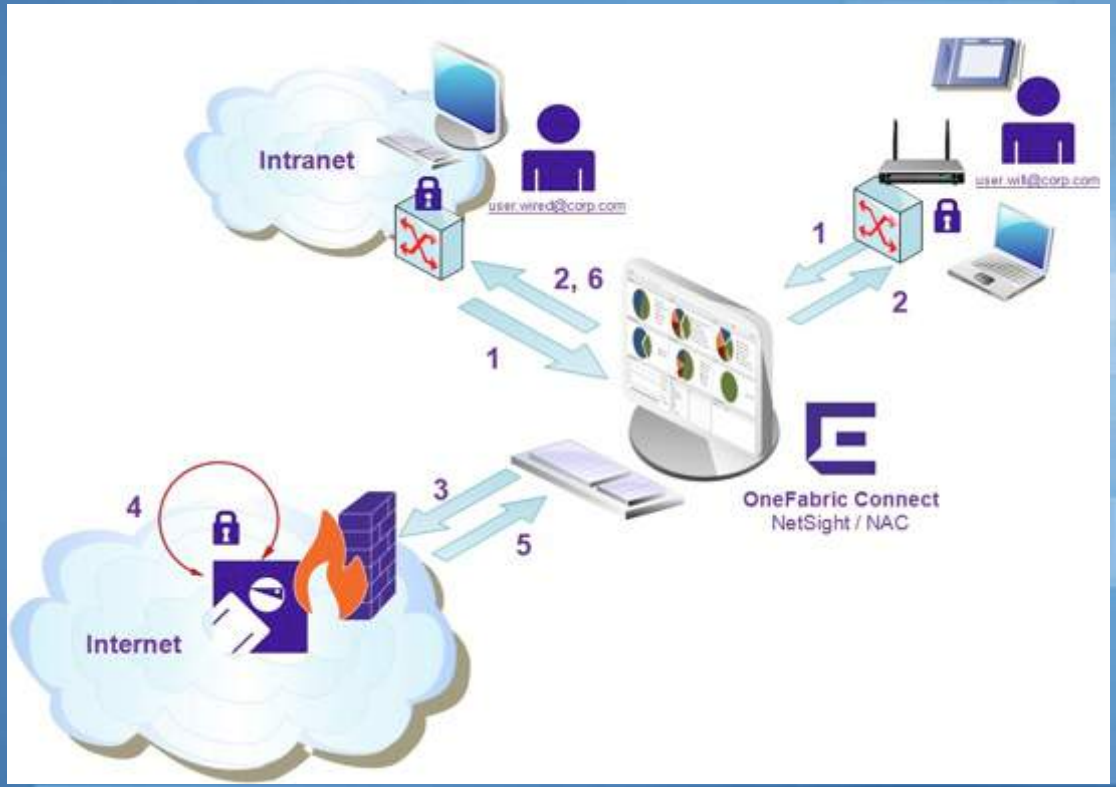
- First Hop Security for IPv6
  - see also http://blog.ipspace.net/2012/10/ipv6-first-hop-security-ideal-openflow.html
  - And http://www.apan.net/meetings/ChiangMai2012/Session/FIT/APAN33-junbi.pdf
- IPv6 over v4 tunneling for migration
  - https://www.youtube.com/watch?v=4vI-tBjJj6w

# Agenda

- Some uses case and solutions today


# Solution with Palo Alto Networks

*Identity Mapping NG-Firewall and NAC, Distributed Threat Response system*




- Accurate User ID to IP mapping to eliminates potential attacks and provides reliable, out of the box User Information to Palo Alto
- Improved security that blocks/ limits user access at the point of entry without impacting other users.
- More accurate network mapping for dynamic policy enforcement and reporting

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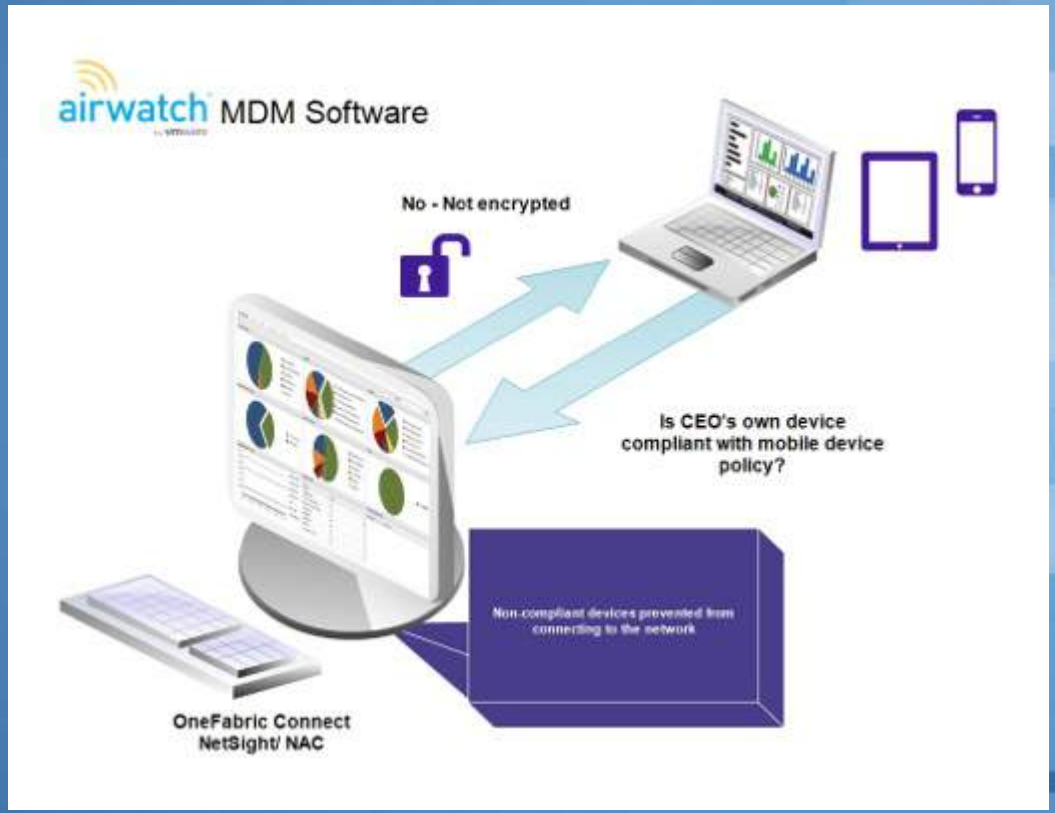
# Solution with AirWatch from VMware

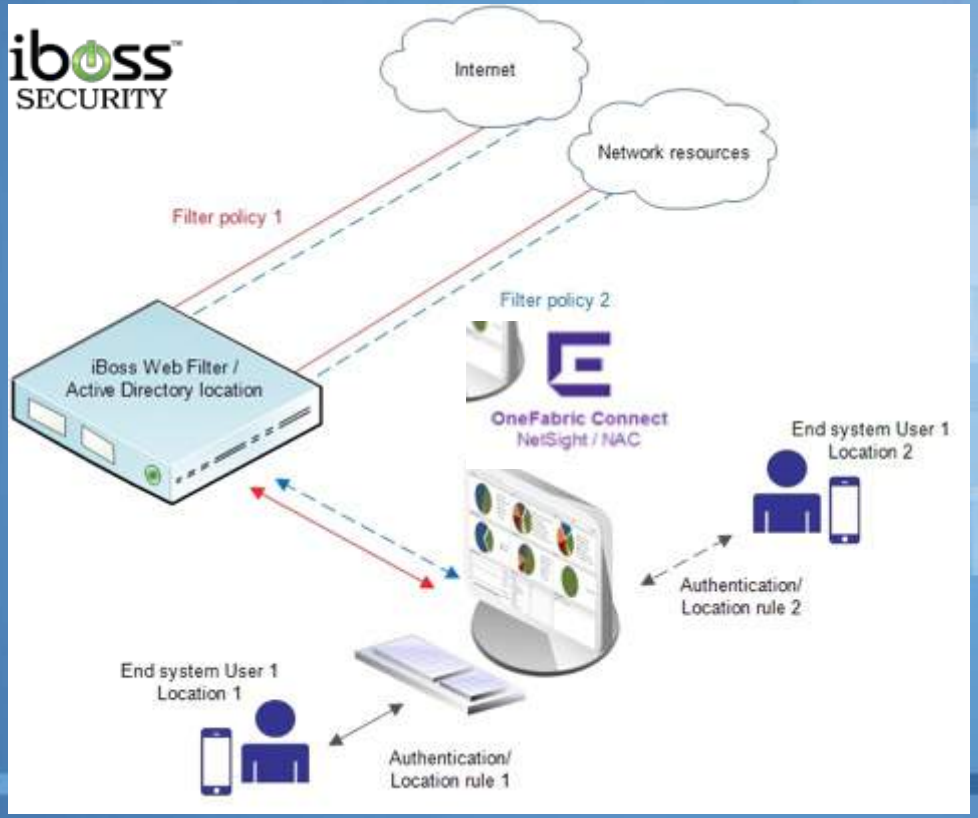
*MDM Integration for BYOD, Automated Onboarding, Policy Enforcement*




- Forced onboarding and MDM enrollment, user must register the device with MDM or with NAC before providing access to data
- Malicious Device Restriction, a jail-broken device can be detected and network access is restricted
- Enriched Asset monitoring for NAC through MDM (IMSI, IMEI etc)
- Provides the option also the option to manage access for all non-enrolled and managed BYOD devices

# Solution Integration with iBoss

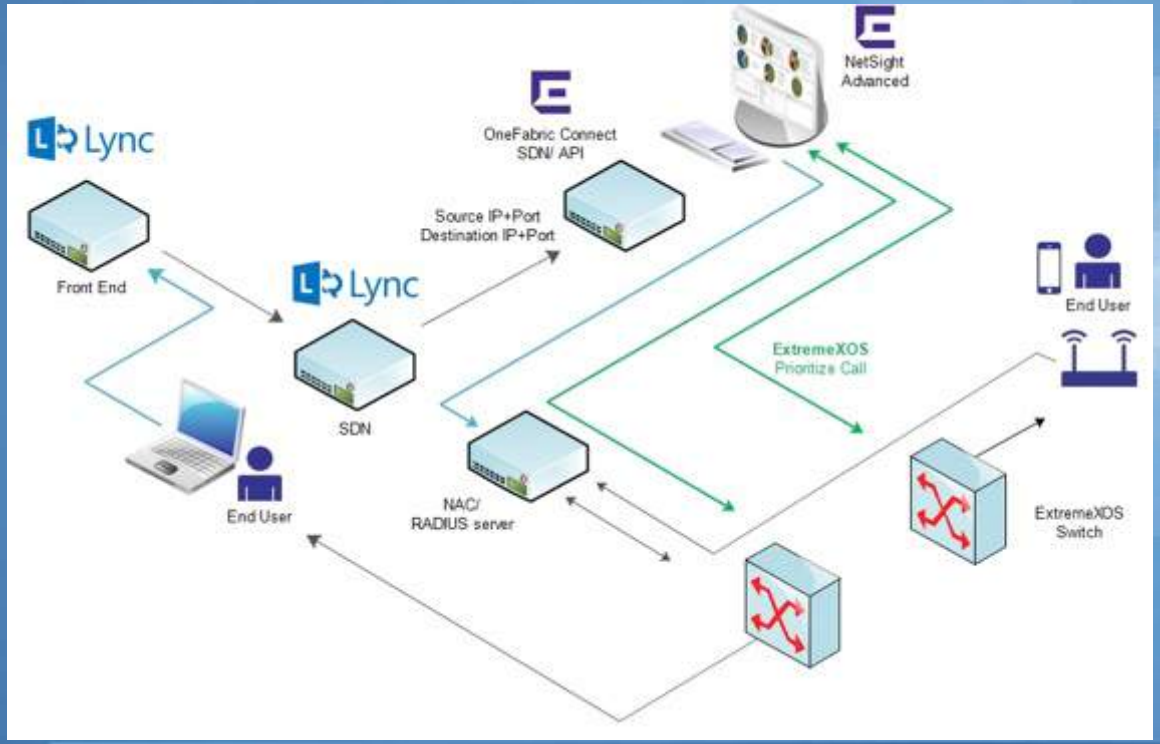
*Mobile Identity Access Management and Web Filtering*




- Seamless authentication and User ID mapping between
- Dynamic Assignment of iBoss group and user policies, location and time based
- Real-time, campus-based network-based intelligence of user, device type, connection type and location
- Comprehensive OneView reporting with detailed activity information including user, device, location, web and bandwidth activities

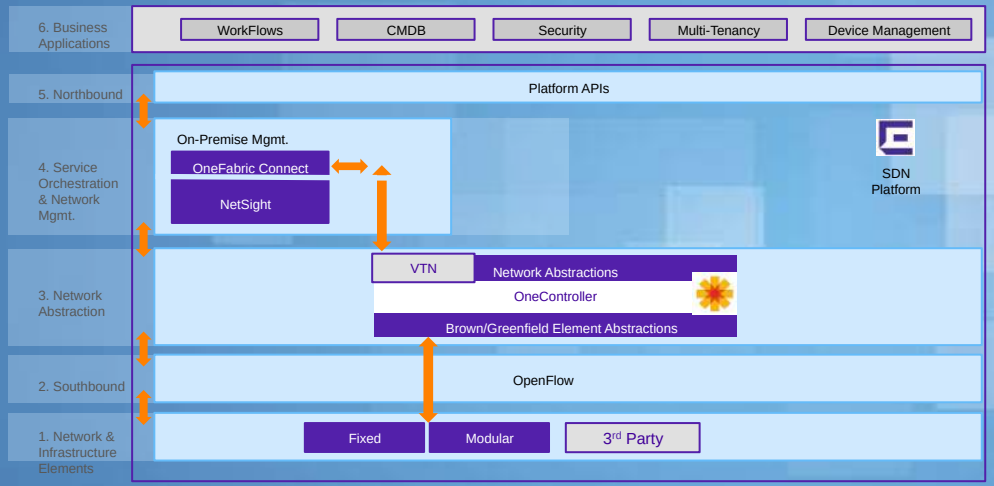
# Solution with Microsoft

*SDN Integration for a better MS Lync Experience*



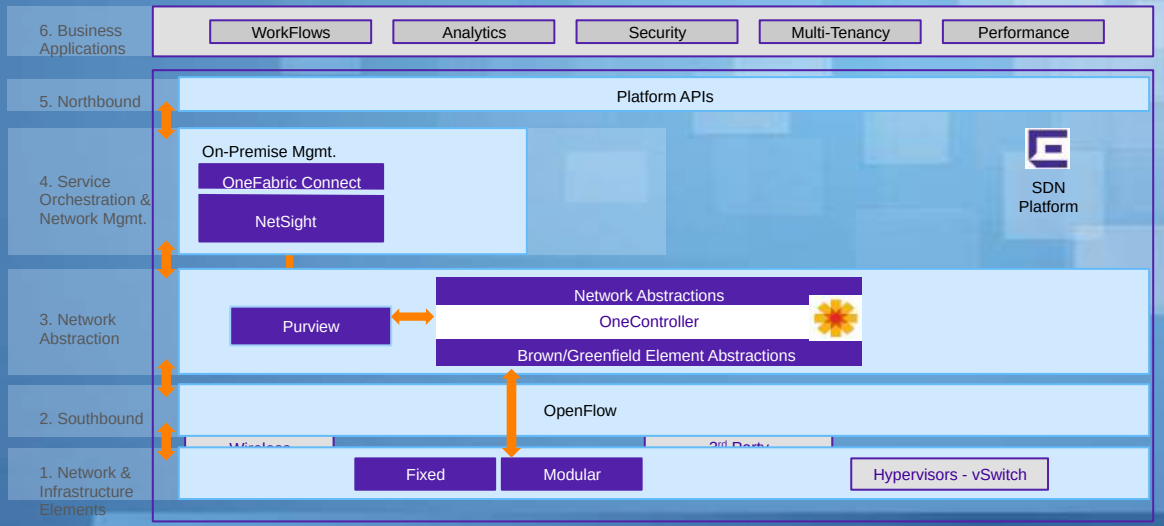

- Improved Quality of User Experience
- Automated QoS provisioning
- Validated QoS capabilities and performance – wired and wireless
- In-depth, contextual visibility into performance, call quality
  - Simplified monitoring and troubleshooting of elements impacting user experiences and network performance.

# Solution Integration Multi Tenant Networks - NAC




- Single physical infrastructure that supports multiple tentants
  - Lower capex
- Network Access Control per tenant
  - Additional security
  - Automated NAC, lower operational cost
- Agility, Flexibility
  - Users can create tenants on the fly
    - Ad hoc workgroups, projects
  - Users can self provision devices that belong to the tenant
    - Self provisioning portal

# Purview Analytics


- More visibility
  - Provide application detection and DPI in an OpenFlow environment
  - Streamlined troubleshooting
  - Business Analytics – what applications are being used
  - Application Performance

# Agenda

- What is next?


# SDN evolves into the Mobile World

- Going beyond Data Center and Core
- Network centric platforms will emerge in the next years that also address mobility
- Extreme will become a center of gravity
- It is about the entire solution, not a single protocol
- Mobility adds new challenges and opportunities to SDN