NFV and SDN - A Comcast Perspective

Nagesh Nandiraju, Ph.D.
Director, Next Gen Network Architecture
Comcast
Current Transitions – Beyond the Pipe

Customer trends
- Increasing number of Devices in home
- Service mobility
- Internet of Things

Service Provider trends
- Service Definition is changing
- Enable growth Applications

Access Technologies and Architecture
- Growing pipe sizes
- Multiple Access Technologies

Technology advancements
- NFV, SDN, Web Services
- Open source maturity
# Software Defined Networking

## BREAKING IT DOWN

### Overlay Networks
- Bus Srvcs - L3VPN, L2VPN
- Resi – fw, storage, v4-over-v6
- Various Encaps
- Service Chaining
- vCPE

### Network Automation
- Yang Models
- XML Based Configs
- Netconf
- Workflow
- Pre/Post Validation
- OSS Integration
- New Ops Models

### Merchant Silicon
- Disrupt 100G - cost, densities, latency, power
- Lean down the network
- IPv6
- Sunset MPLS, RSVP
- Segment Routing
- Lift the Control Plane

### Telemetry & Analytics
- Big Data
- Machine Learning
- Proactive Fault Detection

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**COMCAST**

**TECHNOLOGY & PRODUCT**

Impact Through Innovation
Network Function Virtualization

THE SCIENCE OF MOVING NETWORK FUNCTIONS TO COMPUTE PLATFORMS

Technology
Service Provider Investment
Partnerships

Route Reflectors
CPE
CMTS
PE?
Core?

Bare Metal
Application Cloud
Purpose Built Network Cloud?
VM vs. Container
Software Defined L3VPN

IP-VPN (no MPLS) architecture enabled through dynamic SDN orchestration platform creates **BIG-BANDWIDTH** private networking solution with **DISRUPTIVE ECONOMICS**

**Key Characteristics**
- IP-Based, no MPLS
- Private with Class of Service
- Breakthrough economics
- Cloud connected
- Simplified & Streamlined Branch office connectivity

**VxLAN, IPsec, SRv6**
Uniform Services over Multiple Access networks

- Typical access network is vertically integrated – CMTS for DOCSIS

- Investigating value in abstracting and virtualizing common functions
  - Common reusable hardware platforms
  - Scale out vs. Scale up
  - Agility, Flexibility of platform

Access Network HW

L2 media specific

ASIC based

Common functions virtualized

Access Network SW

Control plane, Routing, Device, Service and Subscriber management

NFV Infrastructure

(Elastic pool of resources . Compute, Switching, Storage)

Orchestration, Resource mgmt

Smart internet

Applications – Firewall, Virtual storage, Parental Control

WiFi GW

WiFi GW

WiFi GW
Common Concerns for adopting NFV, SDN

**Fragmentation?** “delays adoption” : “fosters innovation”

Monolithic applications vs. Micro Services
Continuous integration and deployment model in network

**Being Open feels different**

Paradigm shifts in operations

TCO? “New services, products” : “Operational gains”
The Journey Begins again!

- We’ve embraced Open source in the past and contributed back to the industry –
  - More than 1,500 Comcast engineers are working on several projects (including parts of X1) on our OpenStack platform

- Many contributions to Open source community – [https://github.com/Comcast](https://github.com/Comcast)

- Currently a sponsoring member of OpenDayLight, fd.io

- NFV and SDN present opportunity to embrace open source in the networking arena
  - We are engaged in several PoCs of NFV, SDN and Opensource options
  - Encouraged by many opportunities but potentially a long journey for transformation
Thank you!

Nagesh_Nandiraju@cable.comcast.com