Transport SDN: Carrier Requirements, Challenges, and Use Cases

Vishnu Shukla
OIF President
Verizon, USA

Light Reading Big Telecom Event
Chicago, June 16
Why Does Transport Need SDN?

- Optical and transport networks continue to be difficult and expensive to manage, with many manual processes and very long provisioning times.
- SDN and virtualization have the promise of simplifying optical transport network control, adding management flexibility, and allowing the rapid development of new service offerings by enabling programmatic control of optical transport networks and equipment.
- Can also reduce the cost of optical switches by moving control and management planes from embedded processors to general-purpose COTS hardware and virtualized software.
- Utilize centralized network-wide management and control to drive efficiency and speed.
What Do Carriers Need from SDN? (1/2)

- **COTS Hardware and Software for economic efficiency**
  - High performance, high volume, lower cost COTS HW
  - Software licensing models that are cost-effective for both vendors and providers
  - Large competitive development community and open systems
- **Resource (processing, storage and network) virtualization for elasticity and aggregation**
  - SDN must operate in concert with IP/MPLS/GMPLS network-based L1/L2/L3 VPNs
  - SDN must also operate in alternative networking environments (e.g., overlays)
  - Orchestration for applications, services & networks
  - Tools to make all this operational - addressing all aspects of the lifecycle

© Verizon 2014. All Rights Reserved
What Do Carriers Need from SDN? (2/2)

- **Standardization for all aspects of a software defined network**
  - For example, OpenFlow™ in ONF; OpenDayLight, OpenStack initiative, IETF SDN efforts
  - Coordination with ETSI NFV
- **Decoupling of topology, traffic and inter-layer dependencies**
  - Switching needs to be implemented dynamically at lowest possible network layer and/or as close to the edge to achieve scaling and cost targets

© Verizon 2014. All Rights Reserved
Challenges

• Operational simplicity
  • On-board new clients rapidly

• Differentiated service delivery
  • Automate resource allocation on the fly

• Scalability
  • Support X transactions per hour

• Security
  • Service isolation and authentication per client

• Continuous Availability
  • Disaster avoidance / recovery

• Current transport business model

Programmability and Application Awareness

© Verizon 2014. All Rights Reserved
OIF Role and Expectations

- Carrier SDN requirements
- Meaningful demo and testing in carrier environment showing
  - Status of technology
  - Interfaces and interoperability
  - Operation tools needed
  - Pertinent use cases

OpenFlow

Orchestration

Service

Service

Hypervisor

Controller

Compute & Storage

OpenFlow Switches

OIF

OPTICAL INTERNETWORKING FORUM
Carrier Requirements on Transport Networks in SDN Architectures

• Document is based on contributions of major carriers worldwide
• Comprises requirements on Transport SDN
  • Orchestrator (transport network relevant part)
  • Control and management planes
  • Data plane
• Being used as guidance within OIF but also communicated to other SDO and forums
Joint OIF/ONF Prototype Demonstration 2014

- **Application**: Cloud bursting over optical networks
  - Short lived, high-capacity between data centers
  - Implemented using OTN connections created via central interface
  - Ethernet service over OTN as the dataplane
- **Protocol Features**: Subset OTWG Extensions (ONF Lead)
  - CDPI and/or CVNI – level of interoperability tbd
  - Experimental encoding of extensions
- **Potential additional features**: Controller NBIs (OIF Lead)
  - Multi-domain (E/W or Controller hierarchy)
  - Network application interfaces (PCE, Topology)
Putting the Pieces Together

OIF Implementation Agreements

- UNI 1.0 signaling
- UNI 1.0r2/ E-NNI 1.0 signaling
- E-NNI 1.0 routing
- UNI 2.0 signaling
- ASON/GMPLS Interworking
- E-NNI 2.0 signaling
- E-NNI 2.0 routing
- E-NNI ML AM UNI2.0 Ext.


OIF Networking Interoperability Demonstrations

- SUPERCOMM Draft UNI 1.0 signaling
- OFC Draft E-NNI 1.0 signaling + routing
- SUPERCOMM UNI/E-NNI 1.0 SONET/SDH + EoS data plane
- SUPERCOMM Draft EPL over SONET/SDH + EVPL data plane
- ECOC EPL over SONET/SDH + BW mod
- Worldwide EVPL over transport + restoration
- OFC-NFOEC Ethernet services over OTNv3
- Joint OIF-ONF Cloud bursting over optical networks

OIF OPTICAL INTERNETWORKING FORUM
Summary

- **SDN has great promise to improve transport control**
  - Programmability
    - Ability to deliver new behaviors not (yet) considered by standards, vendors, ...
  - Simplified multi-layer control
  - Common behaviors in heterogeneous NE deployments
  - Application awareness
- **OIF is providing guidance to accelerate deployment**
  - Use cases and architecture
  - Carrier requirements
  - Framework document
  - Demonstrations
Thank You

OIForum.com