SDN Commercial Deployments: Emerging Business Cases
An IHS Markit Technology Webinar
Today’s Speakers
SDN Commercial Deployments: Emerging Business Cases

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1. Service Provider SDN Market Trends

2. Transport SDN Opportunities

3. Building the Transport SDN Business Case

4. Transport SDN Deployments & Lessons

5. Infinera SDN Approach

6. Conclusions

7. Audience Q&A
No Doubt: Operators Deploying SDN and NFV

We interviewed service providers that control 53% of global telecom capex

Source: IHS Infonetics Carrier SDN Strategies, 2016 and Carrier NFV Strategies, 2016; Respondents control 53% of global telecom capex
Two Primary Drivers

1. Service **agility** for quicker time to **revenue**

2. Global view of services and multi-domain, multi-vendor networks for **automation**

Two Primary Barriers

1. Software **not carrier-grade** yet

2. How to inter-operate physical and virtual in existing network

Source: IHS Infonetics Carrier SDN Strategies: Global Service Provider Survey, 2015; Respondents control 49% of global telecom capex
On the Road to 2020…and Beyond

PoCs (Proof-of-Concept testing)
Operators, vendors learn in the lab
Few field trials

Field trials
Vendors productize SDN and NFV software in operator lab trials
A few more field trials
~4 SDN/NFV commercial deployments (NTT, Telstra, Telefónica)

2013

2014

2015–2016

~10 more SDN/NFV commercial deployments (AT&T, CenturyLink, COLT, DT, Masergy, OBS, SKT, Verizon, Vodafone, Tiscali, soon DoCoMo)**
Many operators deploy 1 or 2 use cases
Mobile operators start with mobile core vEPC, vIMS

2016–2020

Wider-spread commercial deployments
Operators deploy several SDN and NFV use cases, then more each year

Source: IHS Infonetics Carrier SDN Market Size and Forecast, 2015; and NFV Market Size and Forecast, 2015

**Operators have used vendor professional services in every commercial deployment**
Network Automation Cycle ~2020

Applications

IoT, Intent, BoD

Centralized Control & Orchestration: Orchestrator of Orchestrators
- Services Control & Map
- Network Control & Map

Holistic, Global End-to-End View of Network

Cycle of Automation

OSS/BSS policy input

Logically centralized

Service models

Feedback to apps, control, policy for QoE, SLAs; Big Data

Real-time analytics (Small Data)

Instrumentation to gather network and subscriber behavior

Security required at multiple levels and multiple locations

Source: IHS Infonetics Carrier SDN Market Size and Forecast, 2015; and NFV Market Size and Forecast, 2015
Network Automation Cycle ~2020

Centralized Control & Orchestration: Orchestrator of Orchestrators

- Services Control & Map
- Network Control & Map

Holistic, Global End-to-End View of Network

Domain orchestrators and controllers (e.g., OpenFlow)

SDN-optimized network hardware servers for NFV, cloud, etc.

Security required at multiple levels and multiple locations

Applications

IoT  Intent  BoD

Applications

- Mobile Core vEPC/IMS
- SD-WAN vCPE
- Converged Access
- Optical Transport
- Packet Transport
- Cloud Services
- Data Center
- NFV
- Home Services
- Mobile Backhaul

Source: IHS Infonetics Carrier SDN Market Size and Forecast, 2015; and NFV Market Size and Forecast, 2015
Service Provider SDN Market Trends

Transport SDN Opportunities

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Transport SDN Opportunities

**SERVICE INNOVATION**
- Dynamic, customer-controlled services at L1–L3:
  - Dynamic bandwidth, NaaS
  - Network slicing, virtual transport networks
- Accelerated application and service development

**OPERATIONS AUTOMATION**
- Unified multi-layer service provisioning
- Multi-domain orchestration
- Intelligent SLA management

**NETWORK OPTIMIZATION**
- Multi-layer capacity optimization
- Traffic (re-)optimization
- Routing offload / optimization
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Building the Transport SDN Business Case

Transport SDN investment reality:
- Transport SDN opportunities are both near-term and long-term
- Full benefits are only realized once SDN deployment is mature and widespread

*How can service providers build the business case to get started?*

Three examples:

1. **Service innovation, dynamic services**
2. **Service delivery automation**
3. **Multi-layer network optimization**
Transport SDN Business Case: Dynamic Services

#1 purchase driver for dynamic services is faster service provisioning\(^1\)

89% of service provider survey participants say dynamic services will impact the Carrier Ethernet market\(^1\)

60% of service providers plan to offer dynamic services by 2018\(^1\)

The Bottom Line?

Carriers expect revenue increases correlated to faster service launch

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1 New Dynamic, Assured Third Network Services Powered by LSO, MEF Webinars, Moderator: Stan Hubbard, February 16, 2016
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Transport SDN Service Innovation: Telstra

Telstra’s PEN Platform

Self-Service Portal
- End points
- Bandwidth
- Duration
- Latency
- Etc.

Customer Console

OSS/BSS

PEN SDN

Abstraction

REST APIs

Customer App

APIs

Tokyo DC

Singapore DC

Hong Kong DC

Key Benefits
- End user pays only for bandwidth needed
- Service provider optimizes resources
- Both see operational savings

DC Replication Concept
- Understands daily data replication required
- Monitors spot pricing
- Determines optimal time to initiate connection
Transport SDN Multi-Layer Optimization

Transport SDN Goals

- Handle exponential traffic growth, large flows
- Reduce overprovisioning, increase efficiency and fault tolerance

Optimization

1. Increase meshing between core routers
2. Mux 100G trunks into 500G super-channels
3. Minimize router transit traffic

Benefits

- Maximize slot capacity at both IP and optical layers
- Expensive port cost reduction
Windstream At-a-Glance

**KEY FACTS**

- ~$5.6 billion in revenue
- ~$2 billion in adjusted OIBDAR
- >150 offices in 48 states
- ~>12k employees
- ~125k fiber route miles

**Leading Provider of:**

- Advanced network connectivity
- Voice and unified communications
- Managed services
- Network security

**ENTERPRISE**

- High-speed Internet
- Phone
- Digital TV

**CONSUMER & SMB**

- Ethernet
- Wave / transport
- IP services
- Infrastructure

**WHOLESALE**

*Notes: As of 3/31/16 Revenue and Adjusted OIBDAR presented on an LTM basis*
Windstream Network Footprint
Transport SDN Service Delivery Automation:

Windstream

“Windstream recognizes that our enterprise and wholesale customers demand streamlined service provisioning and more flexible, on-demand connectivity.”

SDN Service Orchestration

Multi-Layer SDN Control

SDN Control

Customer Site

Customer Site

“Wave in Minutes”
SDN-automated, multi-domain wavelength service
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Infinera Xceed Software Suite

Open APIs

XCEED APPLICATIONS

- XCEED INSTANT VIRTUAL NETWORKS
- XCEED DYNAMIC BANDWIDTH

Open APIs

XCEED MULTI-LAYER SDN PLATFORM

- XCEED SDN CONTROLLER
- XCEED MICROSERVICES

XCEED ABSTRACTION LAYER

- Revenue-Ready Applications: Making the SDN business case with commercially deployable, pre-integrated applications

- Purpose-Built Design: Platform built from the ground up to be open, extensible and optimized for multi-layer control

- Infinera Transport Networks: Flexible, agile, programmable packet-optical portfolio from metro to core
New Multi-Layer SDN Platform:
Purpose-built design

Proven open source base enables faster, more agile development

Infinera-developed Xceed Microservices add multi-layer WDM, OTN & packet intelligence to enable applications

XCEED MULTI-LAYER SDN PLATFORM

XCEED SDN CONTROLLER
Inventory, Security, Topology, Statistics, Logging, Policy

XCEED MICROSERVICES
Multi-layer PCE with Calendaring, Third Party Microservices

XCEED ABSTRACTION LAYER
Open Transport Switch

Rich, open APIs and YANG information models enable highly flexible abstraction

YANG, REST, NETCONF, OpenFlow, REST, XML, OVSDB
Xceed Dynamic Bandwidth

- Programmable, multi-domain connectivity and bandwidth on demand
  - Layer 1 OTN
  - Layer 2 MEF Ethernet services
- Multi-layer PCE
- Bandwidth calendaring
- Open to service provider innovation
Xceed Instant Virtual Networks (IVN)

- Virtual transport networks overlaid on shared physical network
- End customer view
  - Full multi-layer visibility and control of a network slice
  - Separate multi-layer PCE container instance
- Example customers
  - Cloud/content providers for data center interconnect
  - Large enterprises for private network backbone
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Operator Services Focus
- Service agility and velocity top goals
- Automation is critical to service agility
- Automation is not an end in itself

Open Systems
- Open, modular software spurs innovation
- Mix and match from multiple vendors
- Operators don’t want software vendor lock-in

Transport SDN
- T-SDN is real
- Early T-SDN at Pacnet early 2015
- More operators now, including Windstream
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