

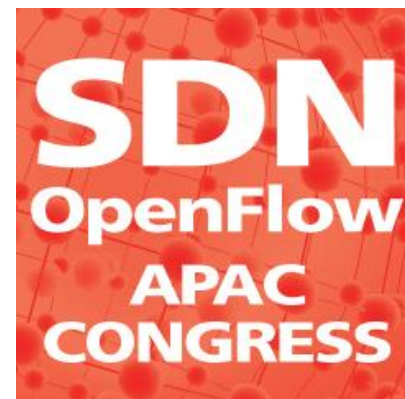
# Recent Developments in Transport SDN

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OIF Representative  
China Telecom

Layer 123 SDN & OpenFlow APAC Congress  
Singapore  
May 26-28, 2015



**OIF** OPTICAL  
INTERNETWORKING  
FORUM



# About the OIF

## The Optical Internetworking Forum:

- Represents an end-to-end ecosystem membership base...
- Focused on multi-layer and multi-domain transport interoperability...
- Positioned at the industry crossroads...
- Optimized for IA development and interop testing...
- Fills gaps, removes obstacles...
- Accelerates market adoption and ROI for new technologies...
- Improves network efficiency, lowers Opex/Capex for network operators...
- Unlike any other forum or SDO



<http://www.oiforum.com/>



# Why Does Transport Need SDN?

- **Optical and transport networks continue to be difficult and expensive to manage**
  - **Many manual processes**
  - **Very long provisioning times**
- **SDN and virtualization have the promise of:**
  - **Simplifying optical transport network control**
  - **Adding management flexibility**
  - **Allowing the rapid development of new service offerings by enabling programmable control of optical transport networks**
- **To improve optical networking operations cost and ROI by:**
  - **Automating services provisioning and deployment**
  - **Improving network resource utilization**



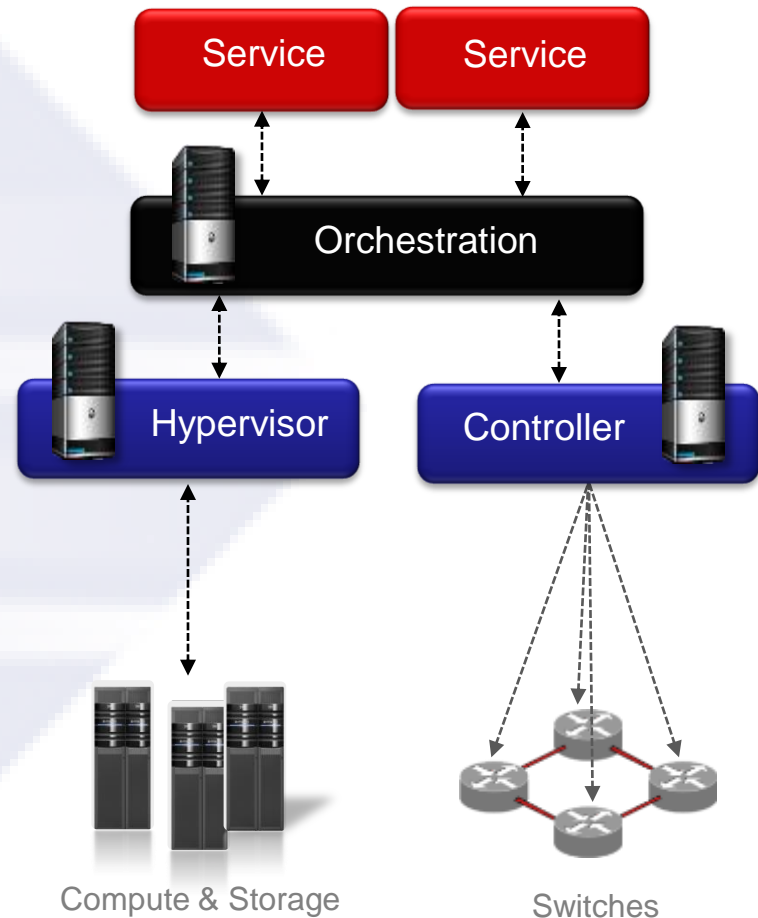
# Challenges

- **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**

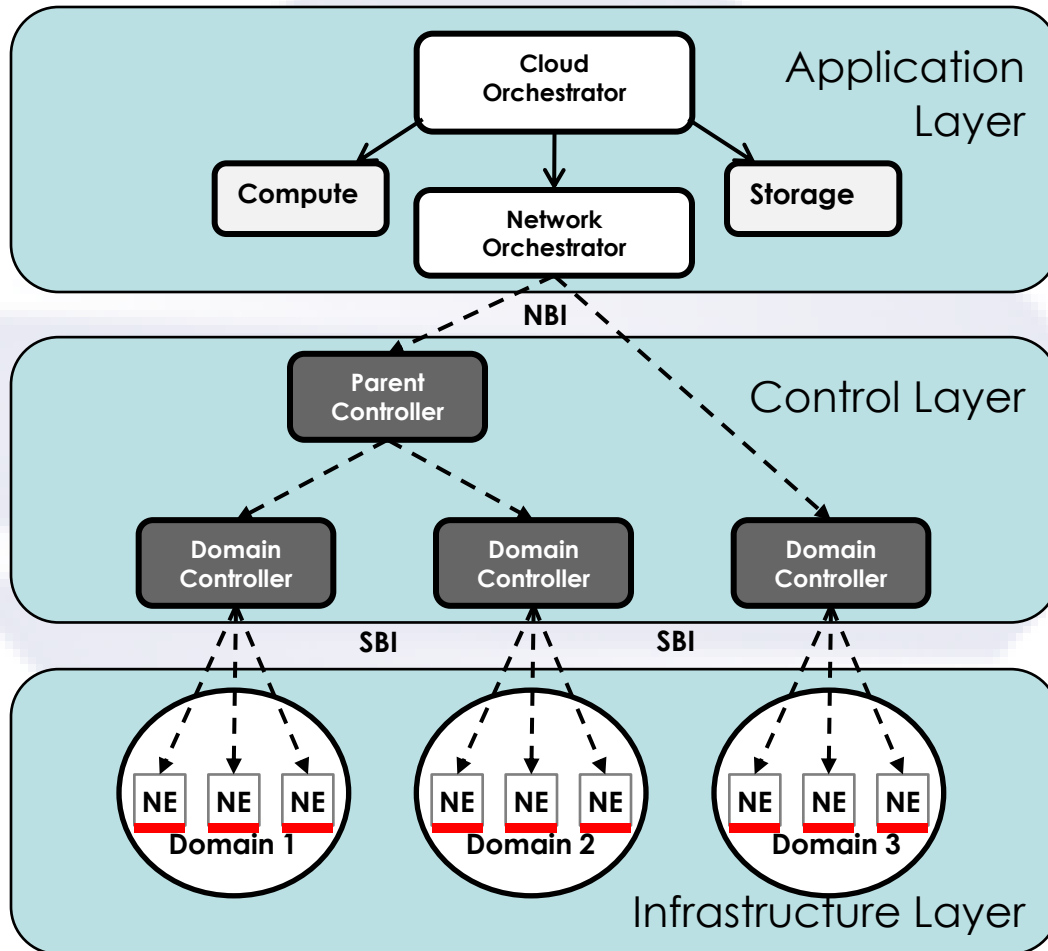
*Programmability and Application Awareness*

# OIF Role and Expectations

- **SDN Reference Architecture**
- **Carrier SDN Requirements**
- **Meaningful demo and testing in carrier environment showing**
  - **Status of technology**
  - **Interfaces and interoperability**
  - **Operation tools needed**
  - **Pertinent use cases**
- **Framework for Transport SDN**
  - **Define framework**
  - **Identify open interfaces**
  - **SDN and ASON**



# SDN Framework for Carriers



REST APIs

Service Request  
Topology

OpenFlow

Control to Dataplane  
Control to Virtual Network

\* See new OIF whitepaper on "Framework for Transport SDN"

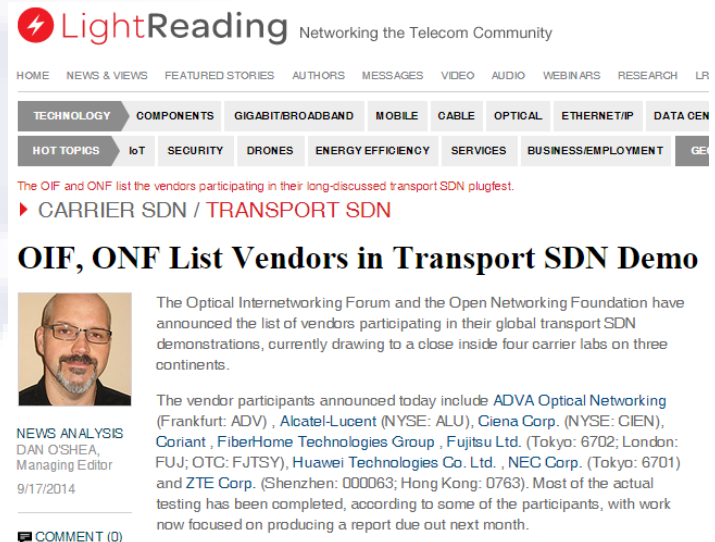
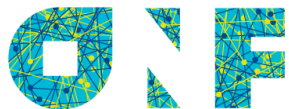
# OIF/ONF Global Transport SDN Demo

- **Goal - accelerate the deployment of practical, programmable transport networks that enable a new era of dynamic services**
- **Test prototype transport SDN technologies in real-world applications**
- **Application: Cloud bursting over optical networks**
- **Features:**
  - **Subset of OTWG OpenFlow Extensions (ONF lead)**
    - **CDPI and CVNI**
    - **OpenFlow optical extensions (recently approved by ONF)**
  - **Northbound Interface Protocols – Service Request and Topology network APIs (OIF lead)**
  - **Multi-domain orchestration hierarchy (OIF lead)**

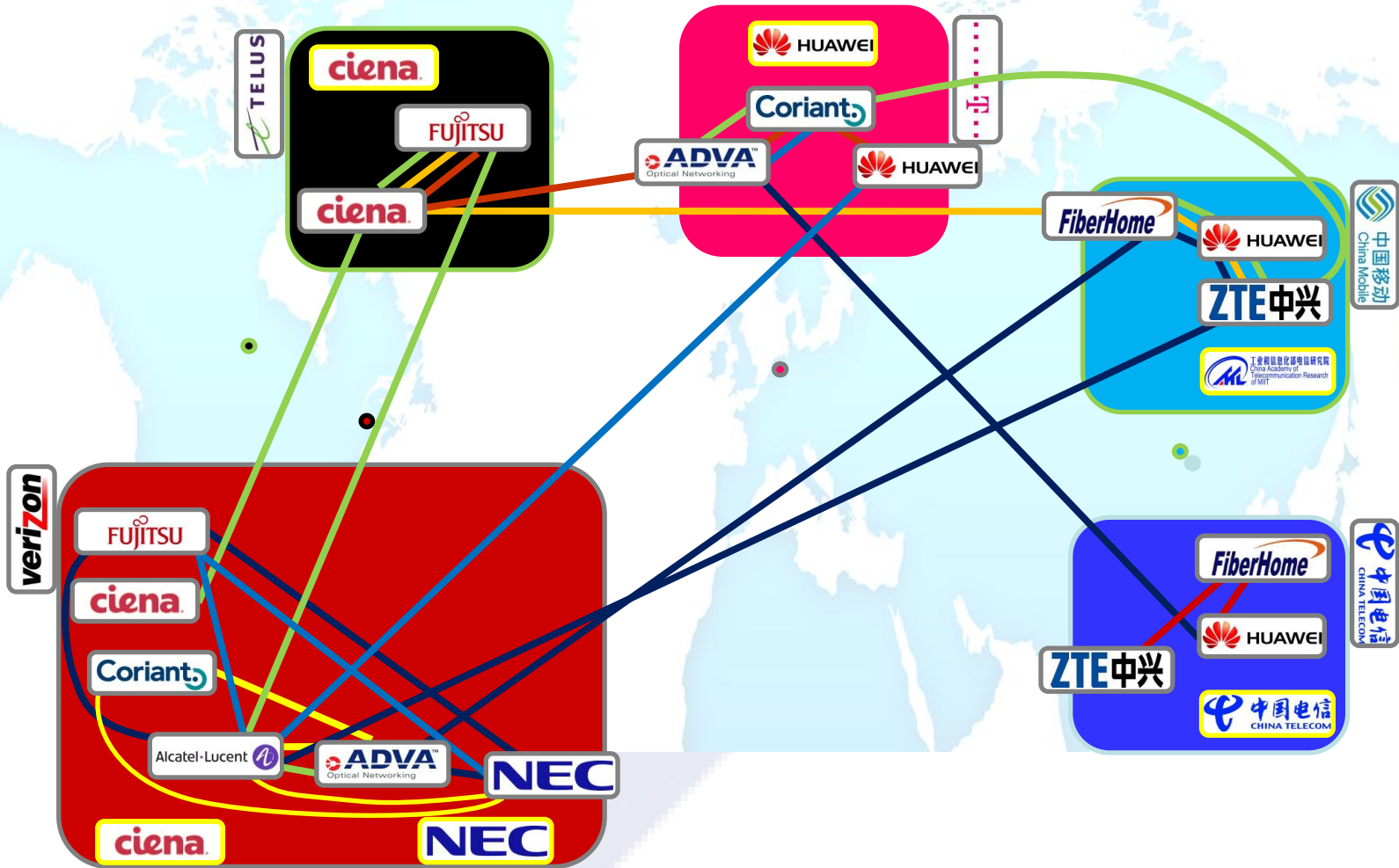


# OIF/ONF Global Transport SDN Demo

- Testing conducted in carrier labs over 7 week period August-September, 2014
  - China Mobile, China Telecom, Deutsche Telekom, TELUS, Verizon Labs
- Participating vendors
  - ADVA, ALU, Ciena, Coriant, FiberHome, Fujitsu, Huawei, NEC, ZTE
- Consulting members
  - China Academy of Telecommunications Research, KDDI R&D Laboratories, Orange



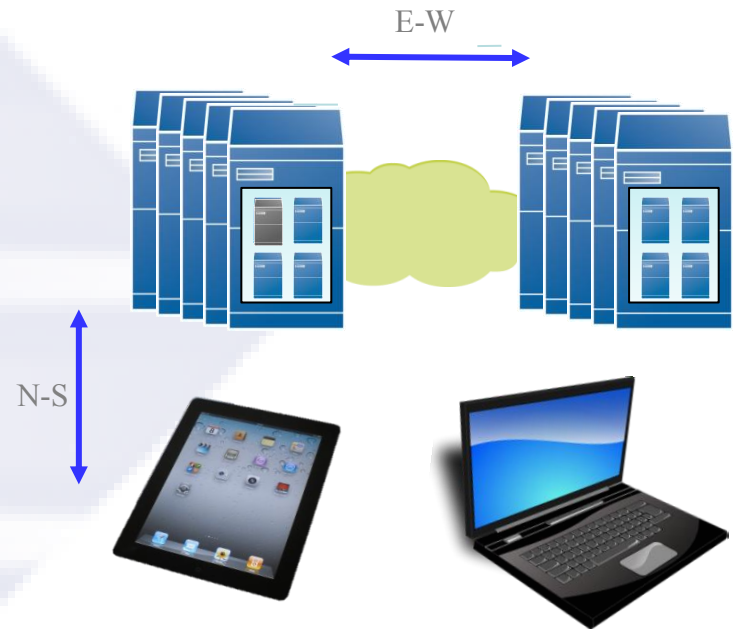
# 2014 Global Transport SDN Demonstration



# Cloud Bursting Example Application

Cloud computing has increased demand on “East-West” interfaces

- **Google: 4+ times more traffic than North-South**
- **Inter-cluster interface**
  - VM Migration, Dataset synch/relocation
- **Duration needs to be as short as possible**
  - High-bandwidth connectivity, short-lived connections



**Identified a lack of definition for how user applications interact with transport network applications and resource functions**

- **The programmability of Transport SDN requires some of the internal interfaces used by ASON to become open**

**Whitepaper jointly published by OIF and ONF (Oct. 2014)**

- **Title: Global Transport SDN Prototype Demonstration**
- **<http://www.oiforum.com/documents/2014-global-transport-sdn-demonstration-white-paper/>**

**OIF Transport SDN Framework Whitepaper (May 2015)**

- **Title: Framework for Transport SDN: Components and APIs**
- **<http://www.oiforum.com/documents/framework-for-transport-sdn-components-and-apis/>**

**OIF project started to develop API implementation agreements (IAs)**

- **Build on Service Request and Topology APIs prototyped in the demo**
- **Create IAs for Service Request, Path Computation, Topology and Link Resource Manager interfaces (identified as part of the OIF SDN Framework document)**

# Moving Transport SDN Forward

## OIF Activities

### Virtual Network Service definition

#### Transport API work

- **Joint work with ONF**
- **Specifying Service Request, Topology and other APIs**

### Planning for next interop demonstration

## OIF LAUNCHES NEW PROJECT TO IDENTIFY APIS FOR TRANSPORT SDN

📅 November 20, 2014February 7, 2015 👤 Deborah Porchivina

*Global Transport SDN Demo Results Demand Immediate Project Start*

Close on the heels of the joint **Optical Internetworking Forum (OIF)** and **Open Networking Foundation (ONF)** Global Transport SDN demonstration that concluded in October, the OIF has launched a new project to develop implementation agreements (IAs) for the application programming interfaces (APIs) used between application and network controller during the event. The new initiative will build on the Service Request and Topology APIs prototyped in the demonstration, culminating in IAs for use by carriers and equipment vendors. The new initiative will also create IAs for Service Request, Path Computation, Topology and Link Resource Manager interfaces that have been identified as part of the OIF's upcoming SDN Framework document. The APIs to be delivered by the new project are based on REST and JSON principles enabling rapid and flexible application development.

# Summary

- **SDN has great promise to improve transport control**
  - **Programmability**
  - **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**
  - **Implementation Agreements**

**Thank You!**

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