Agenda

- Overview of Tests
- Deep Dive into Three Connections
  - APIs
  - OpenFlow CDPI
  - OpenFlow CVNI
- Summary
2014 Global Transport SDN Demonstration

- Joint activity of OIF and ONF
  - Demonstrate current state of SDN in Transport industry
    - REST APIs
    - OpenFlow
  - Participants from both OIF and ONF
    - **OIF:** ADVA, Alcatel-Lucent, China Telecom, Ciena, Coriant, DT, FiberHome, Fujitsu, Huawei, KDDI, NEC, Orange, Telus, Verizon, ZTE
    - **ONF:** ADVA, Alcatel-Lucent, CATR, China Mobile, China Telecom, Ciena, Coriant, DT, FiberHome, Fujitsu, Huawei, KDDI, NEC, Verizon, ZTE
2014 Global Transport SDN Demonstration

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  - *Demonstrate current state of SDN in Transport industry*
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Timeline

ONF OTWG Face-to-face
ONF Workday

2013 2014

Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep

Soft Commit
Start Tech Work

ONF 1Q Mtg
OFC 2014

Hard Commit
Contracts, NDAs

Tech Spec Complete
Start Testing

Stop Testing, Presentation Recording

Analyst Pre-event

OIF 2Q Mtg
BTE

OIF 3Q Mtg

L123 SDN

OFC 2014

Tech Spec Complete
Start Testing
Stop Testing, Presentation Recording
2014 Global Transport SDN Demonstration
2014 Global Transport SDN Demonstration
Cloud Bursting

- Cloud computing has increased demand on “East-West” interfaces
  - Google: 4+ times more traffic than North-South
  - Inter-cluster interface
    - VM Migration, dataset sync, relocation
    - Duration needs to be as short as possible
      - High-bandwidth connectivity, short-lived connections
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Cloud Bursting

- Cloud computing has increased demand on “East-West” interfaces
  - Google: 4+ times more traffic than North-South

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  - VM Migration, Dataset synch/relocation
  - Duration needs to be as short as possible
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Overview of Control Systems

Application Layer
- Cloud Orchestrator
  - Compute
  - Network Orchestrator
    - Storage

Control Layer
- Parent Controller
  - Domain Controller
    - Domain 1
    - Domain 2
    - Domain 3

Infrastructure Layer
- REST APIs
  - Service Request Topology
- OpenFlow
  - Control to Dataplane
  - Control to Virtual Network

Cloud
- Compute
- Storage

Network Orchestrator
- Domain Controller
- Domain 1
- Domain 2
- Domain 3

NE

SBI

Compute
Storage
API & OPENFLOW-C DPI TESTS
2014 Global Transport SDN Demonstration
NEC Network Orchestrator
Service Invocation Flow

NEC

FUJITSU

HUAWEI

Coriant

ADVA

Service Request API

OF 1.3

L2+L3

OF 1.3+

OTWG

L1

L0

OIF

INTERNET WORKING FORUM
HTTP/1.1 201 Created
Server: Apache-Coyote/1.1
Content-Type: application/json
Date: Tue, 23 Sep 2014 14:41:37 GMT
Connection: close
Host: 10.131.22.2:8081
Content-Length: 183

{"@": "http://oiforum.com/ns/base-attributes",
"id": "http://10.131.22.2:8081/rest/json/SERVICE_REQ_API/146154ff-0a0f-4f7d-bdfa-f729c46f9e55",
"name": "146154ff-0a0f-4f7d-bdfa-f729c46f9e55",
"aEnd": "http://10.131.22.2:8081/rest/json/ENDPOINT_API/DT_COR_31-15-03.4",
"zEnd": "http://10.131.22.2:8081/rest/json/ENDPOINT_API/DT_COR_11-15-03.4",
"layer": "odu",
"Bandwidth": 10000
}
OpenFlow Capture

FlowMod:
- Match #1:
  - Input port: 5423121
- Match #2:
  - Signal Type: 2 (ODU2)
- Action #1:
  - Output port: 1228817
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CATR Network Orchestrator
Service Invocation Flow

OF 1.3+ OTWG

L1
Topology API Capture

GET/rest/json/TOPOLOGY_API/edge/10.138.35.1-1.222.8.1,10.138.35.2-0.218.8.1 HTTP/1.1
Host: 10.138.35.20:8090
Connection: keep-alive

HTTP/1.1 200 OK
Content-Length: 1067
Content-Type: application/json

{"id": "http://10.138.35.20:8090/rest/json/TOPOLOGY_API/edge/10.138.35.1-1.222.8.1,10.138.35.2-0.218.8.1",
  "aEnd": {
    "end": "http://10.138.35.20:8090/rest/json/TOPOLOGY_API/vertex/10.138.35.1/end/1.222.8.1"},
  "zEnd": {
    "end": "http://10.138.35.20:8090/rest/json/TOPOLOGY_API/vertex/10.138.35.2/end/0.218.8.1"},
  "ietfTE.TEMetric": 100,
  "ietfTE.linkType": "p2p",
  "ietfGMPLS.ifSwitchCapable": [110],
  "ietfGMPLS.ifSwitchCapability": [12],
  "ietfASON.capacityLC": [{10, "ietfASON.maxLC": 8}],
  "ietfGMPLS.switchingType": 110,
  "ietfGMPLS.encoding": 12,
  "ietfASON.capacityLC": [{1, "ietfASON.maxLC": 4}],
  "ietfGMPLS.switchingType": 110,
  "ietfGMPLS.encoding": 12,
  "ietfASON.capacityLC": [{2, "ietfASON.maxLC": 1}]
},
"operStatus": "up"}
POST/VWAN_NSM-REST/rest/json/SERVICE_REQ_API HTTP/1.1
Content-Type: application/json
Content-Length: 97
Host: 10.139.6.60:8083
Connection: keep-alive

{"layer":"odu","bandwidth":"10000","aEnd":"EDTNLAB-12_EndPoint11","zEnd":"EDTNLAB-31_EndPoint11"}

HTTP/1.1 201 Created
Date: Wed, 10 Sep 2014 03:07:07 GMT
Content-Type: application/json
Transfer-Encoding: chunked
Server: Jetty(8.1.5.v20120716)

{"id":"SERV-1410318427801-8D9C6A","aEnd":"EDTNLAB-12_EndPoint11","zEnd":"EDTNLAB-31_EndPoint11","layer":"odu","bandwidth":"10000","operStatus":"up"}
OpenFlow Capture

FlowMod:
- **Match #1:** Input port: 2
- **Match #2:** Signal Type: 2 (ODU2)
- **Action #1:** Output port: 6
CVNI Tests

- **Abstract Node Representation**

  - Parent Controller
  - Domain Controller
  - NE

- **Abstract Link Representation**

  - Parent Controller
  - Domain Controller
  - NE
  - NE
Service Invocation Flow
OpenFlow Capture

FlowMod:

Match #1:
Input port: 131135

Match #2:
Signal Type: 10 (ODU0)

Match #3:
TPN/Trib Slot: 1/ #4

Action #1:
Output port: 196693
Summary

- **Demonstration shows:**
  - Cooperation between 17 companies
    - 7 Carriers (5 Host, 2 Consulting)
    - 9 Vendors
    - 1 Research Institution
  - Transport SDN is becoming real
    - APIs: Service Request, Topology
    - Equipment control interfaces

- **Next step:**
  - Review Issues List
  - Solidify Prototypes -> Standards
    - Network APIs
    - OTWG extensions to OpenFlow
2014 Global Transport SDN Demonstration
Accelerating Momentum on the Road to Next-Generation Architectures