Global SDN deployment powered by ONOS

Internet2 TechExchange 2015

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ON.Lab

“The Open Networking Lab was founded as a 501 (c) (3) non-profit to pursue our vision of what Software Defined Networking could be for the public good.”

Nick McKeown
KP, Mayfield, Sequoia
Professor, Stanford

Scott Shenker
Professor, UC Berkeley
Chief Scientist, ICSI

Guru Parulkar
Executive Director, ON.Lab,
Executive Director ONRC
Consulting Professor, Stanford

Larry Peterson
Robert Kahn Professor
Princeton (Emeritus)
What are known for?

- Mininet - network simulator
- OpenVirtex (OVX) – network virtualization
- Open Networking Operating System (ONOS)
- XOS – Orchestrating platform
ONOS mission

To produce the Open Source SDN Network Operating System that enables Service Providers to build real Software Defined Networks.
ONOS Community

ON.LAB

SERVICE PROVIDER PARTNERS
at&t
China unicom
NTT Communications
SK telecom

VENDOR PARTNERS
ciena
ERICsson
FUJITSU
intel
NEC

COLLABORATORS
BLACKDuck
cnic
CREA
ETRI
GARR
HANBIT
KISTI
ONF
SK international

COMMUNITY

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VENDOR PARTNERS
CISCO
IBM

COLLABORATORS

COMMUNITY

VENDOR PARTNERS

COMMUNITY
Goals and motivations

Goals
- Create a global SDN network
- Let entities communicate at L3 without legacy routers in the network core

Demonstrate that ONOS can work
- in real network scenarios
- providing high performance, HA and scalability

Agile deployment model
- Improve partners network, improve ONOS
- Fundamental feedback from production translated into requirements
SDN-IP as a global SDN deployment
SDN-IP deployment on Internet2

Network slice

+ SDN-IP

Flow Space Firewall
Network slicing tool

AL2S network
Physical network

BROCADE
Juniper

40 OpenFlow switches, 5 universities connected, 2 international peerings
SDN-IP deployment on AmLight

Network slice

Flow Space Firewall
Network slicing tool

AMLight/FIU OF network
Physical network

+ SDN-IP

6 OpenFlow switches
7 RENs connected
1 international peering
SDN-IP deployment on GEANT (GTS) / GARR

Network slice + ICONA

GEANT Testbed Service
Network slicing tool

GEANT OF network
Physical network

5 OpenFlow switches, 2 institutions connected,
5 ONOS clusters geographically distributed, 1 international peering
Global SDN deployment
Conclusions

Summary
• 50 OpenFlow switches, 14 institutions connected over 3 continents
• Cardinal (ONOS 1.3) deployment in progress
• Two ONOS applications have been validated: SDN-IP and ICONA

Insights
• ONOS needs more features for production use
• Network operators need to use an agile process for deployment
• Vendors need to improve (re-think) OF support and guarantee resources isolation

Future work
• Next deployment candidate is ONOS Drake
• WIP in KREONET-S and AARNET. More deployments coming
• Focus on stability, performances and scalability
Under the hood
SDN-IP peering, a brief summary

What is it?
• SDN-IP is an application running on top of ONOS

Features
• It allows your SDN to scale and connect to the rest of the Internet
• You can migrate your existing network to SDN incrementally
• You can scale your SDN control plane

Technology
• Exchanges routes peering with external routers (BGP - vendor independent)
• HA functionalities (both in data plane and control plane)
SDN-IP architecture

- BGP speaker 1
- BGP speaker 2
- SDN-IP 1
- SDN-IP 2
- ONOS 1
- ONOS 2

- BGP routes
- ONOS intents
- OpenFlow entries
SDN-IP deployment on Internet2

L3 network
BGP sessions

L2 network – AL2S slice
OF 1.0 enabled