Open Networking Operating System
The platform and its deployments

GTS Tech+Futures Workshop
Copenhagen - Oct, 20th 2015
Agenda

• What’s ON.Lab?
• What’s ONOS? (architecture, use cases)

• **ONOS deployments**

• During the workshop
  • Technical dive-ins
  • Open discussion
“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.”
What are known for?

- Mininet - network simulator
- OpenVirtex (OVX) – network virtualization
- Open Networking Operating System (ONOS)
- XOS – Orchestrating platform
ON.Lab joins the Linux Foundation
• Lead ONOS promotion and outreach to the global community
• Help administer the open source project as a part of the overall portfolio
• Provide guidance and counseling to ONOS project on open source structure & processes
• Drive curriculum for community training

David Boswell as the new Community Manager
• Since forever helping big communities growing
• Experience: Mozilla, NASA, Obama Administration, …
ONOS mission

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

- Scalability, High Availability & Performance
- Northbound & Southbound Abstractions
- Modularity
ONOS Distributed Architecture

- **Apps**
- **NB Core API**
- **Distributed Core**
  - (state management, notifications, high-availability & scale-out)
- **SB Core API**
- **Providers**
  - **Protocols**
- Apps interact with Providers via Core APIs.
Use cases overview

- **SDN-IP** peering and **BGP router**
- Converged **packet-optical** network
- Central Offices Re-architected as Datacenter (**CORD**)
- **CORD Fabric** (Leaf-spine fabric supported by Segment routing)
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
39 OpenFlow switches, 5 universities connected, 2 international peerings
SDN-IP deployment on AmLight

Network slice + SDN-IP
Flow Space Firewall
Network slicing tool
AMLight/FIU OF network
Physical network
BROCADE

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

Network slice

GEANT Testbed Service
Network slicing tool

GEANT OF network
Physical network

4 OpenFlow switches, 2 institutions connected,
4 ONOS clusters geographically distributed, 1 international peering
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
Conclusions

ONOS is out!

• Significant community
• Focused on SP (Scalability, HA, performance)
• Compelling use-cases (CORD+)
• On-going Deployments

Right **time to discuss and get involved**

• Want to know more about ONOS and its use-cases?
• Deployment best practices
• How to collaborate/partnering together
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

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

BGP routes
ONOS intents
OpenFlow entries

External Network

SDN Network