OPEN NETWORKING FOUNDATION

ATRIUM

Open SDN Distribution

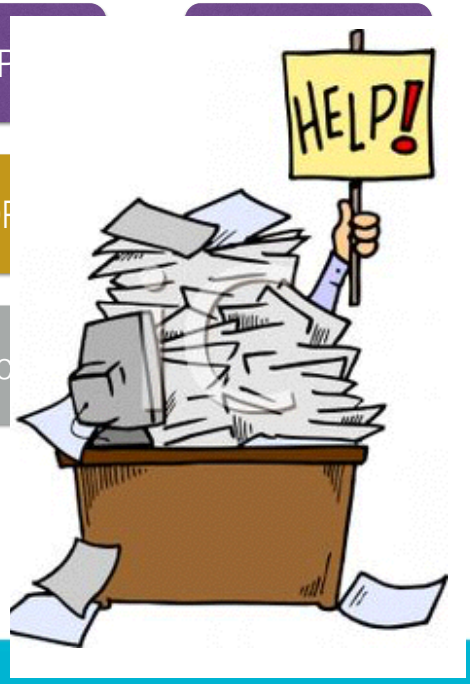
Saurav Das

Principal System Architect, ONF

With contributions from ONF Atrium Management team and many others …

SDN Provides a Lot of Choices

Orchestration	SNMP	Netconf	Cloudstack	Openstack	CLI
Application	Load Bal	Virtualization	L3 CLOS	L7 apps	Peering Router
Controller	Proprietary	ONOS	Ryu	ODL	RouteFlow
Hardware	White Box	ToR	OCP		WAN
HAL	Proprietary	P4	OF-DPA		Open Flow
Silicon	Cavium	Barefoot	Broadcom		Corsa



Solution: Vertically Integrated Stack == SDN Distribution

SNMP	Netconf	Cloudstack	Openstack	CLI
L3 CLOS	Peering Router	Virtualization	L7 apps	Peering Router
Proprietary	ONOS	Ryu	ODL	RouteFlow
White Box	ToR	OCP	NIC	WAN
Proprietary	P4	OF-DPA	Open Flow	Open Flow
Cavium	Barefoot	Broadcom	Netronome	Corsa

Project Atrium Goals

1. Integration

- Create vertically-integrated open-source stacks
- From open-source components, OF1.3 & Hardware
- Enable network operators to download distribution from a single location

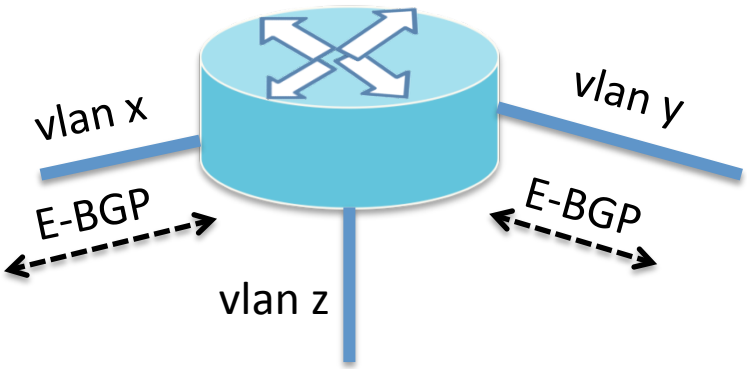
2. Interoperability

- Enable multiple hardware vendors to plugin to stack
- Allows end-users to select different hardware classes for common use-cases.

3. Deployments

- Work hand-in-hand with operators on deployable use cases leading to trials.
- Give operators confidence in pure SDN solutions

What is Atrium today?



Open Source Routing

onos

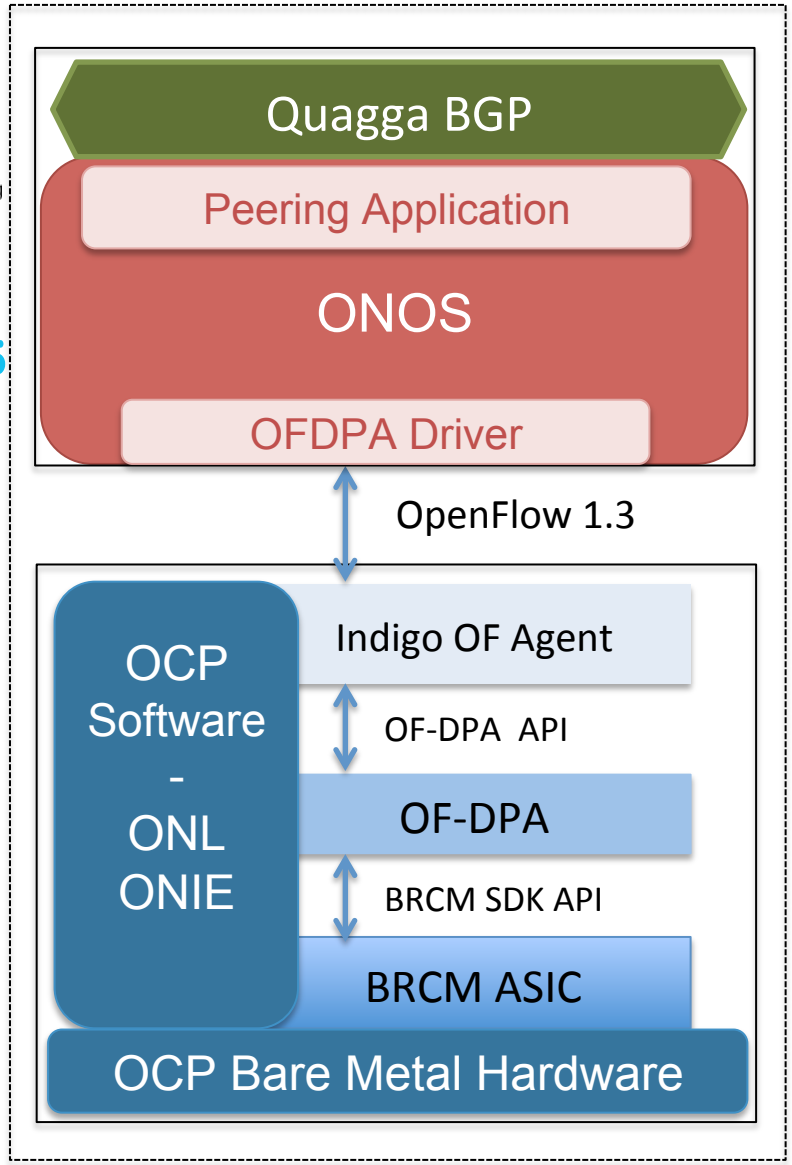
big switch networks

Accton
Making Partnership Work

BROADCOM

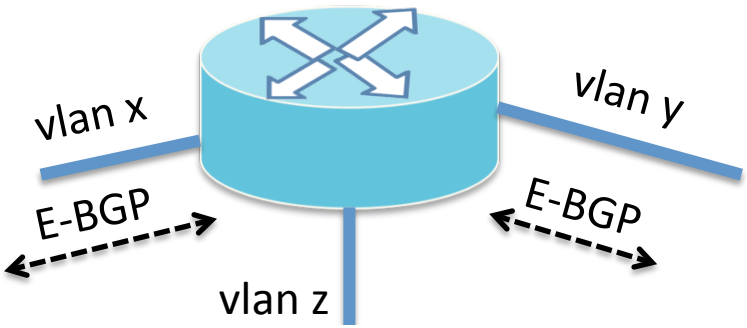
Quanta

OPEN Compute Project



OCP: Open Compute Project; ONL: Open Network Linux; **ONIE**: Open Network Install Env; **BRCM**: Broadcom Merchant Silicon ASICs; **OF-DPA**: OpenFlow Datapath Abstraction

What is Atrium today?



Open Source Routing

ONOS

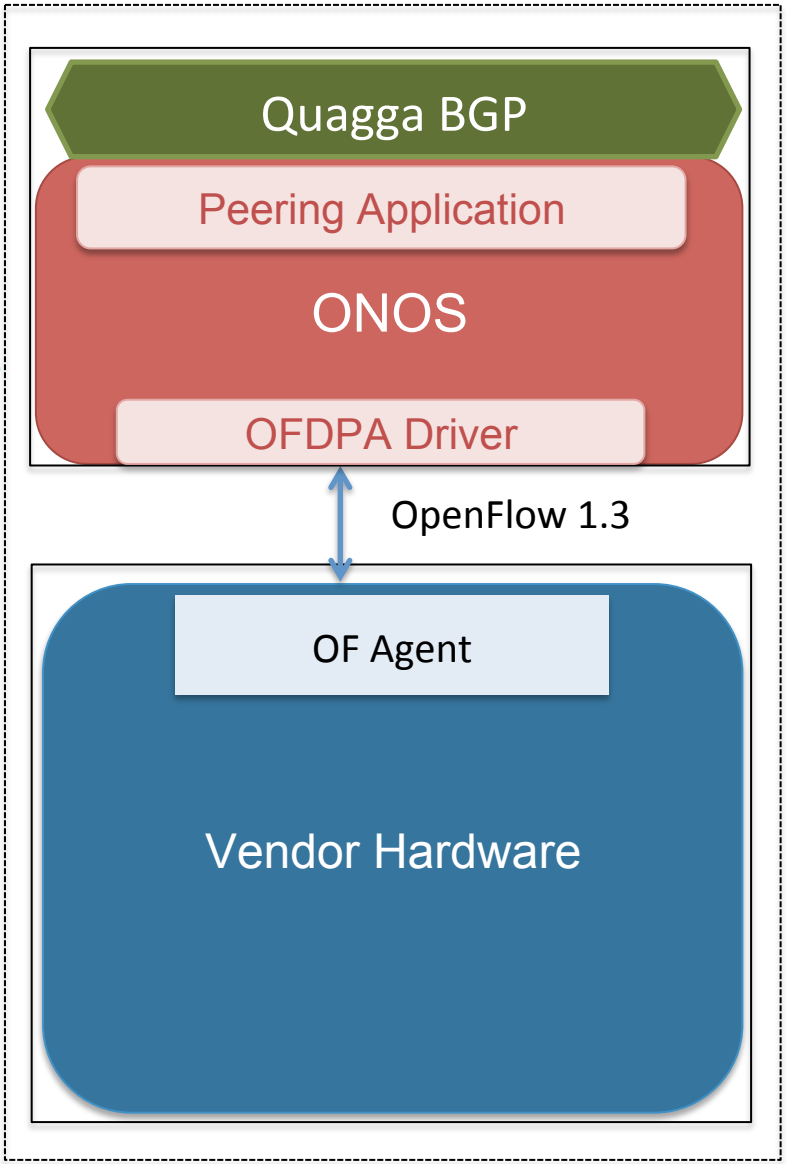
PICA8 OPEN NETWORKING

NoviFlow switching made smarter

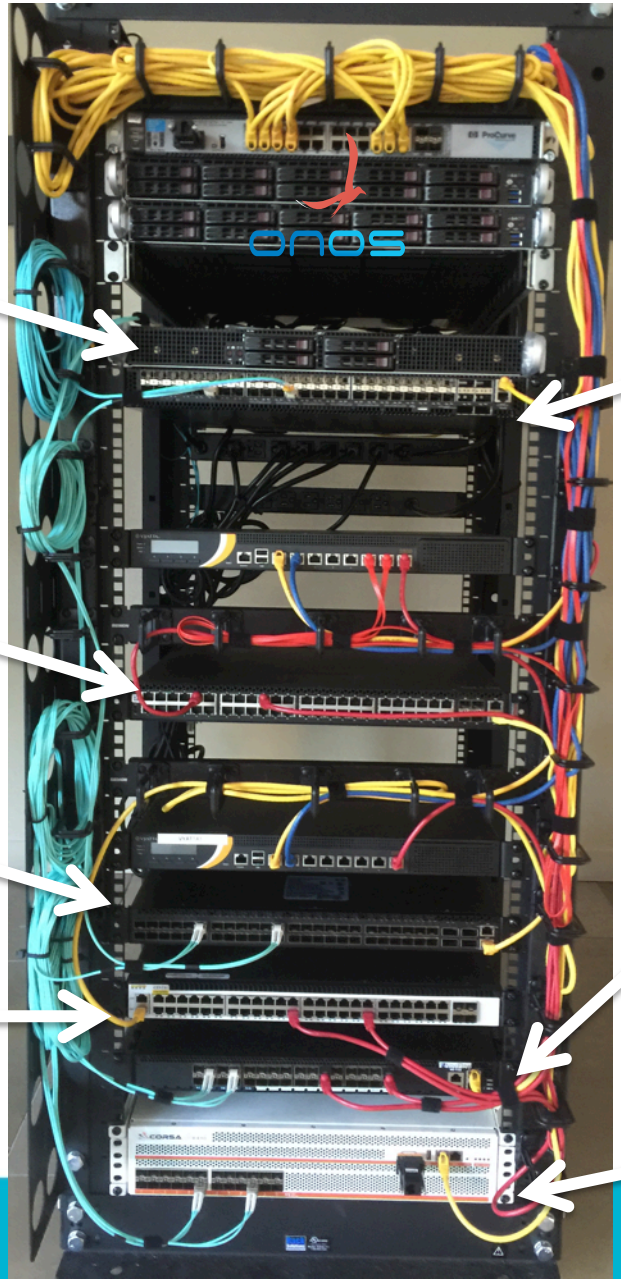
NETRONOME

CORSA

centec networks



ONF Builds 7 Routers



NETRONOME

Accton
Making Partnership Work

PICA8
OPEN NETWORKING

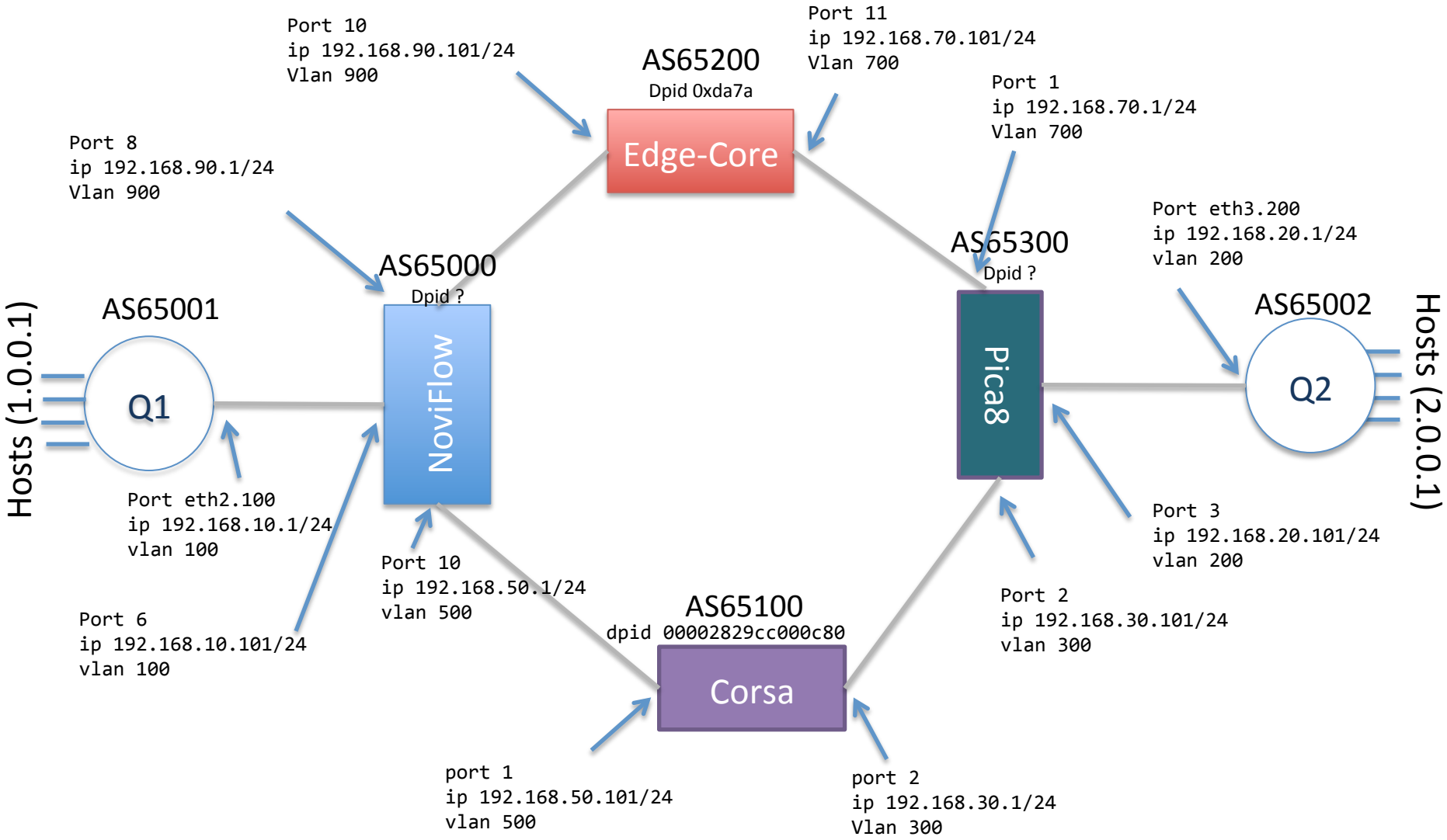
Quanta

NoviFlow
switching made smarter

centec
networks

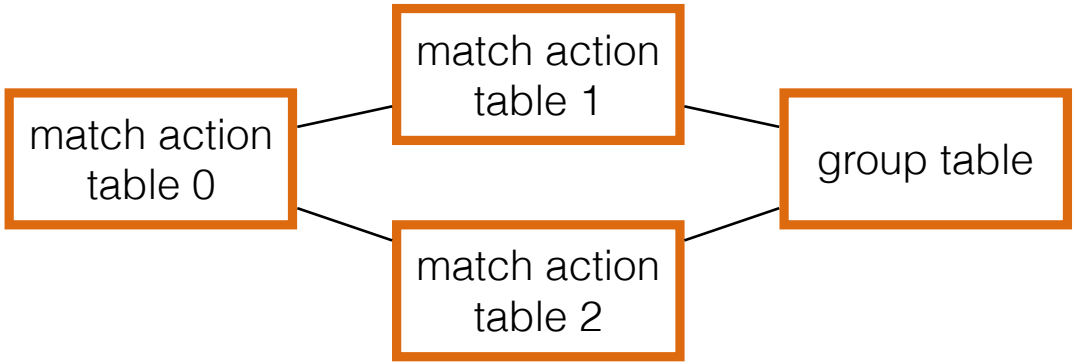
CORSA

Atrium Demo @ Layer123



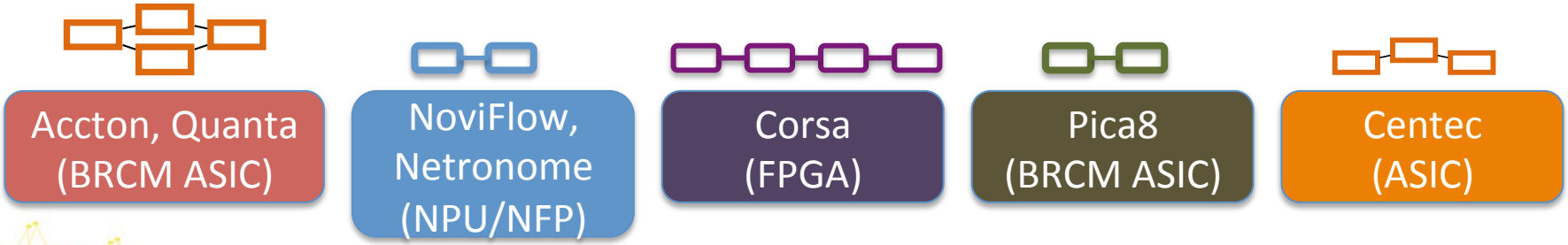
A Closer Look at Interoperability

Different combinations of Match-Action Tables form Different OF 1.3 pipelines

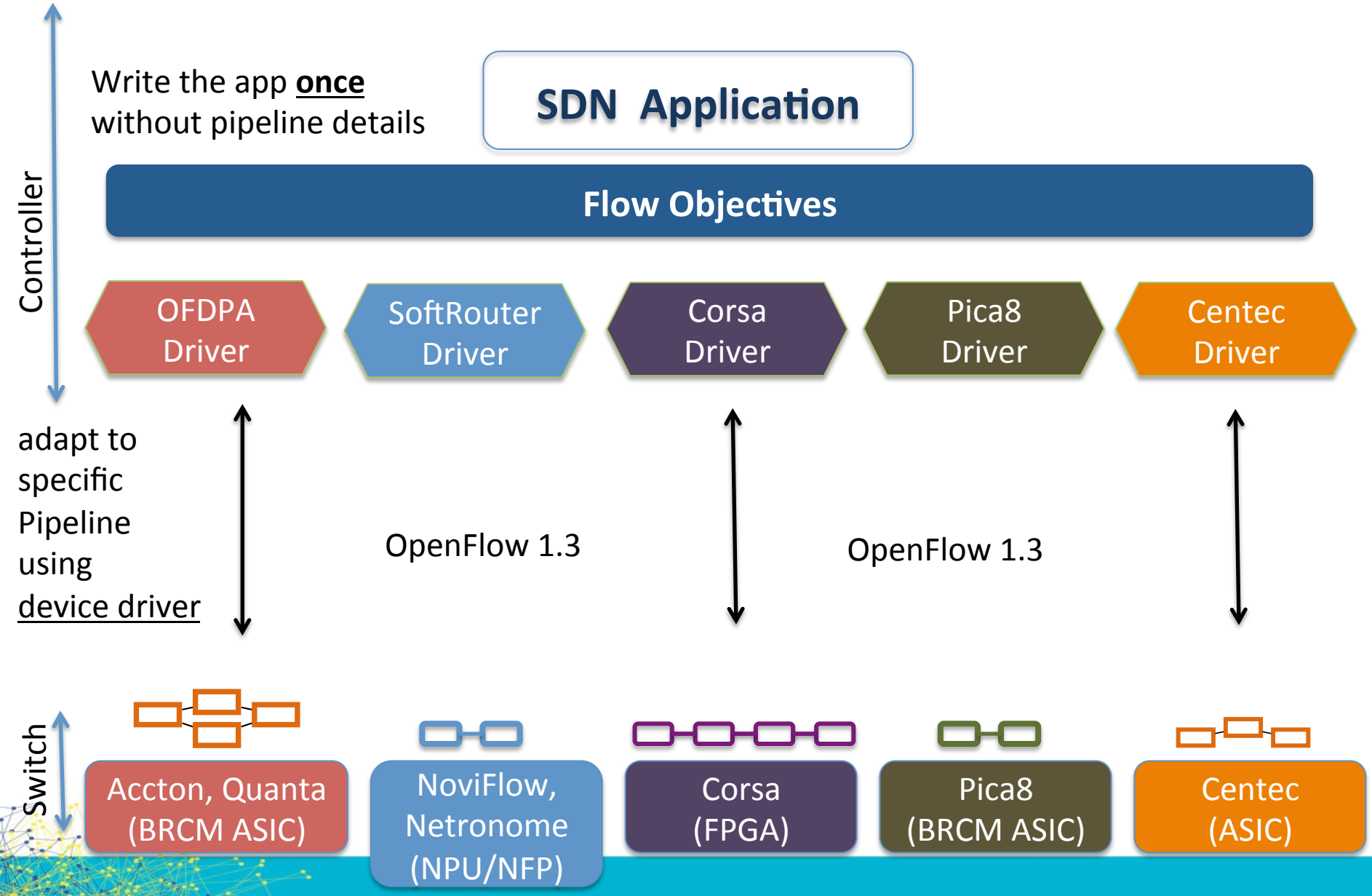


How can a controller manage these differences?

How can an application work across these differences?

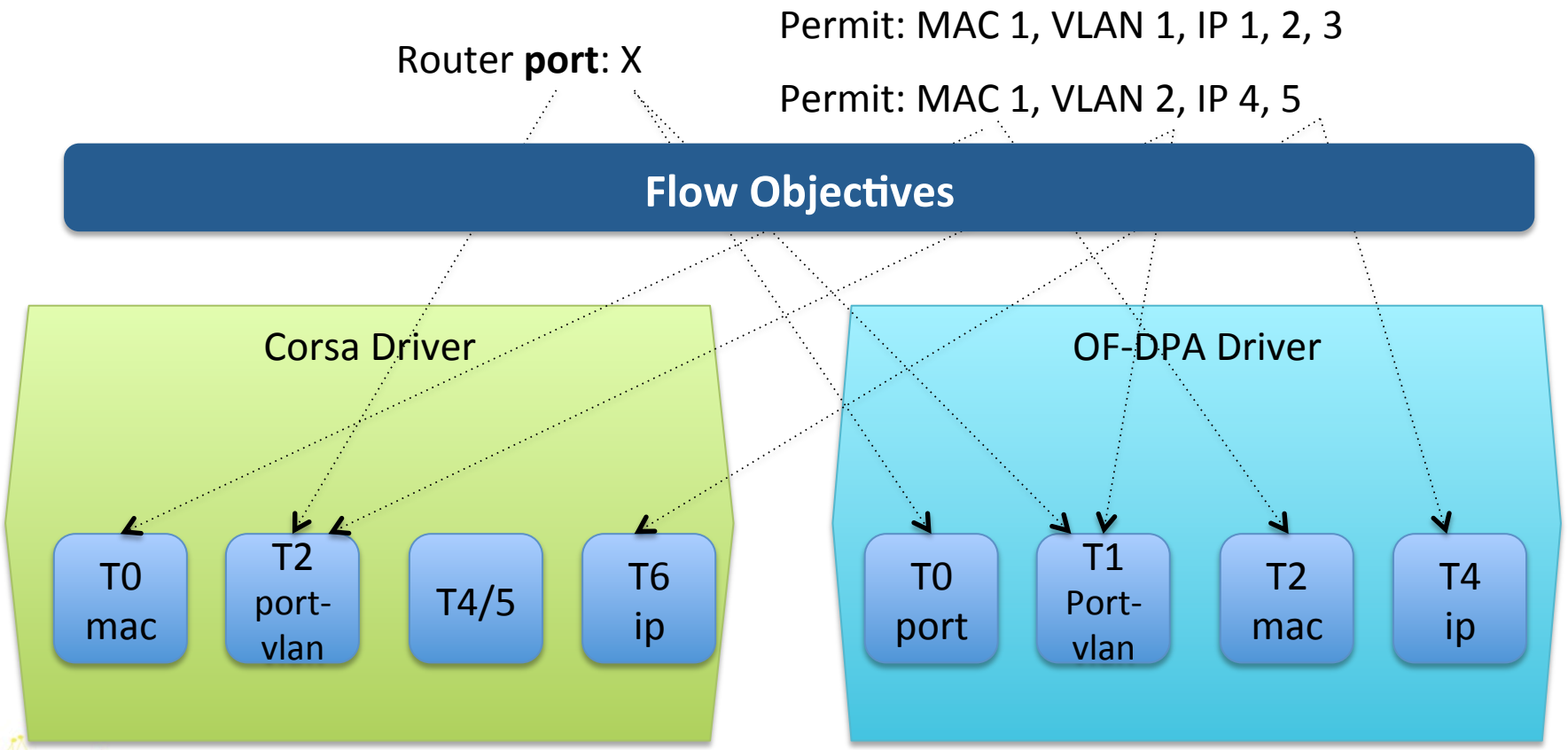


Solution: Flow Objectives API



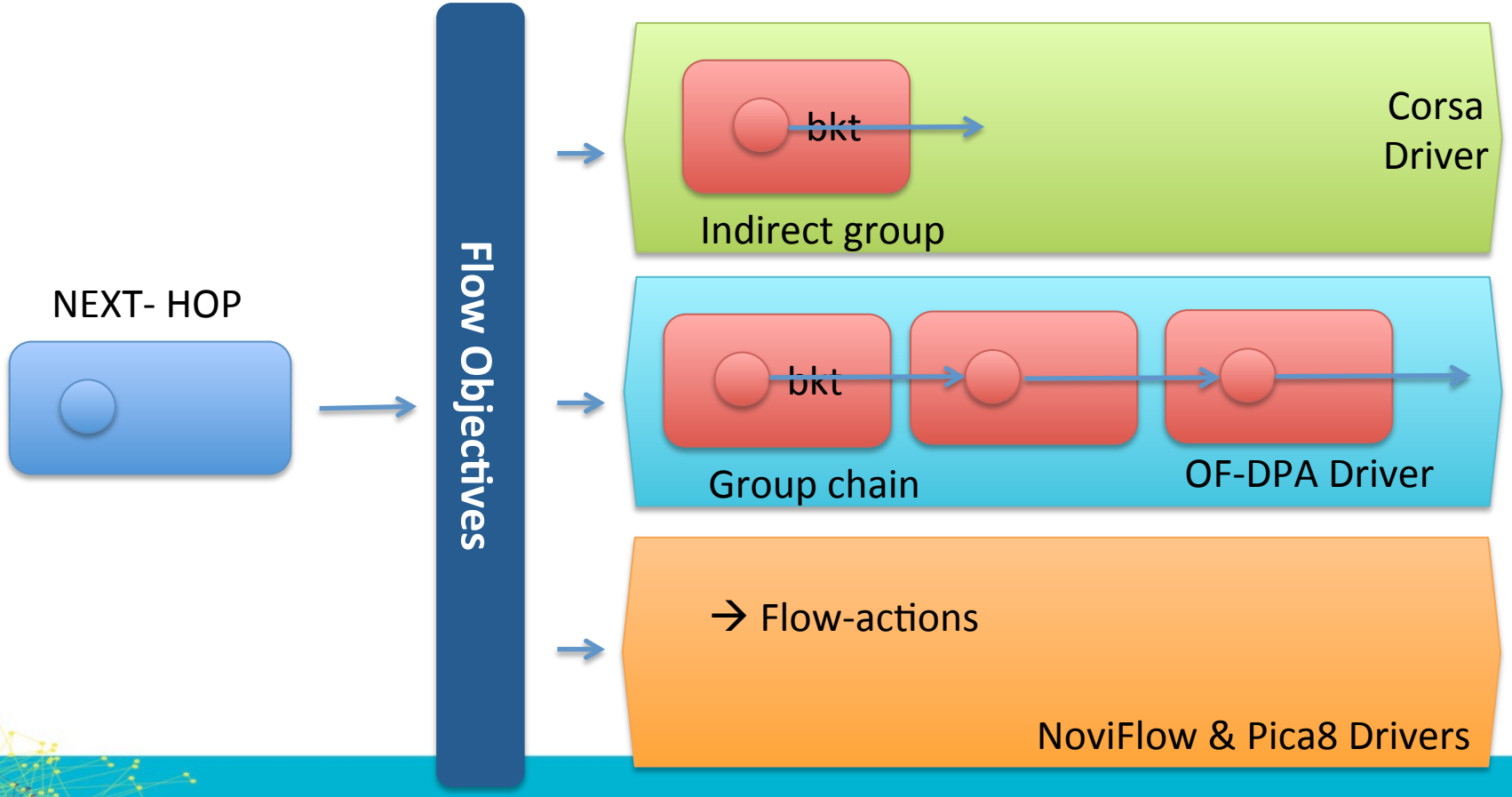
Example: Filtering Objective

- Filter ➔ only Permit or Deny options
- On match fields of packet header

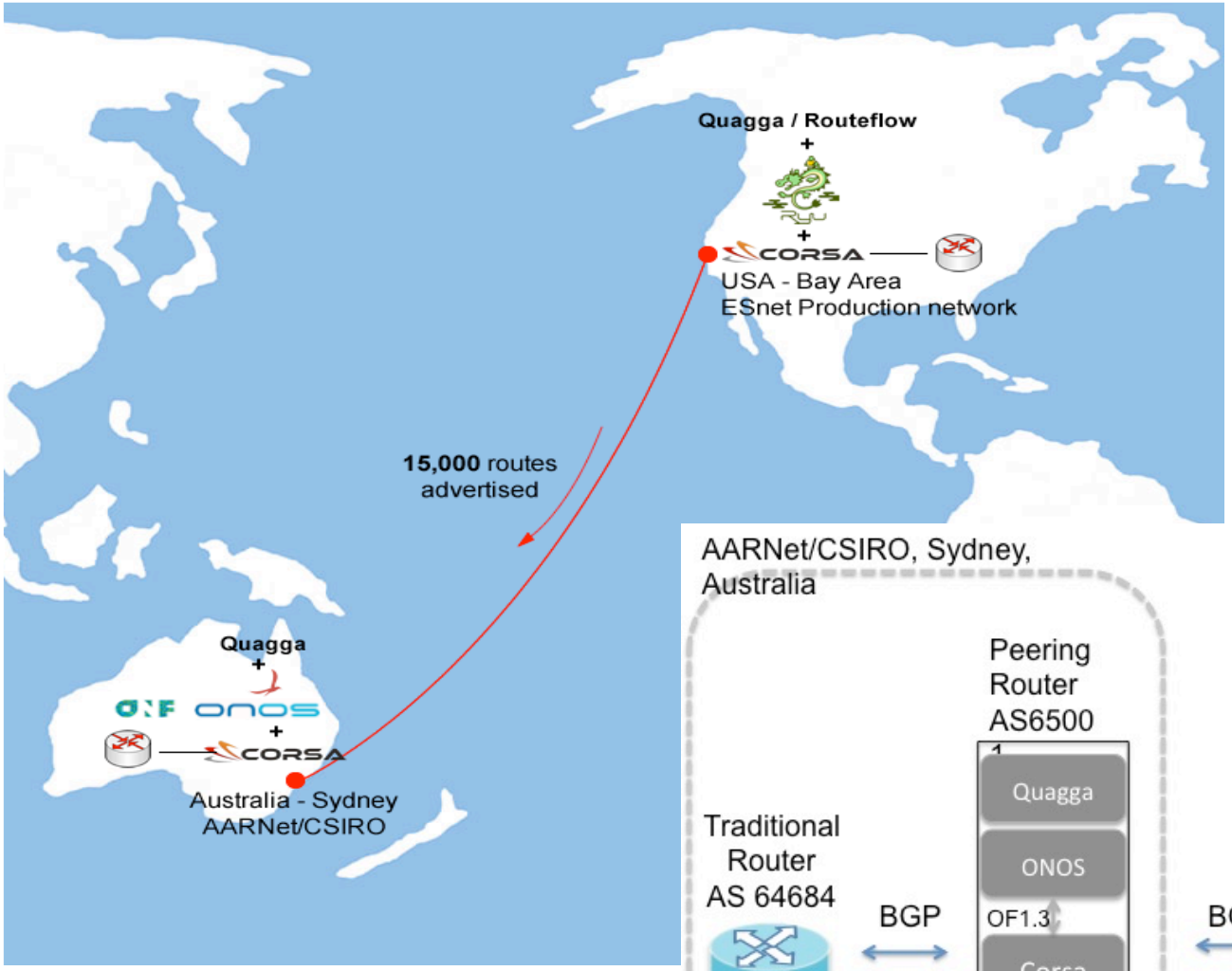


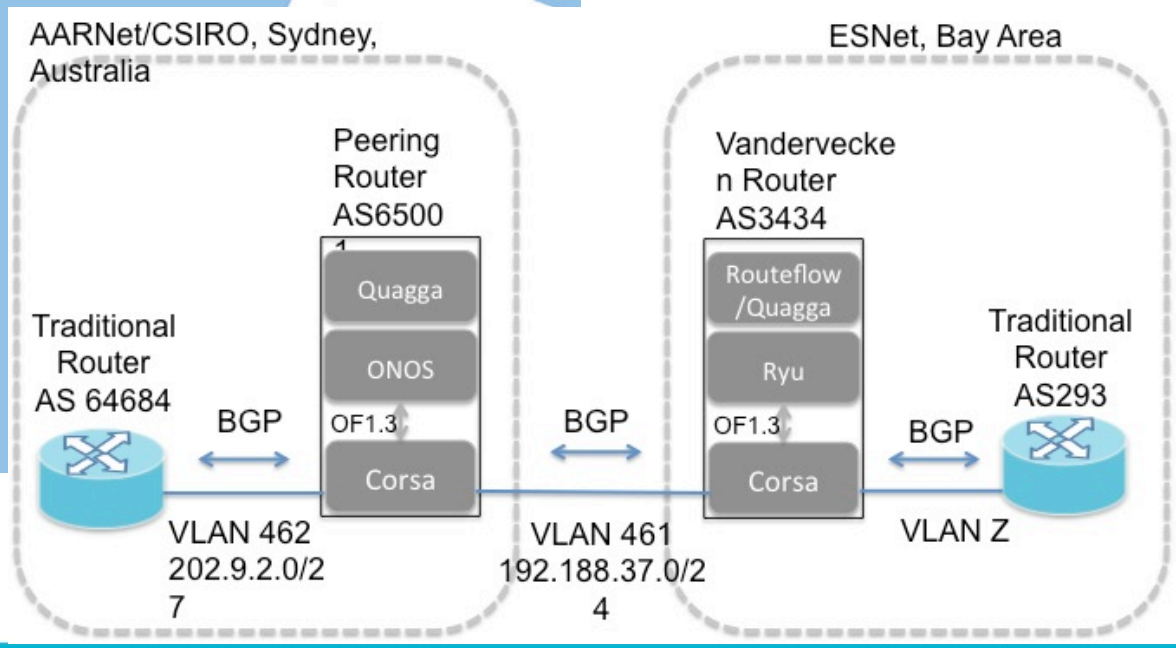
Example: Next Objective

- Next ➔ next hop for forwarding
- Similar to OF 1.3 group, but …



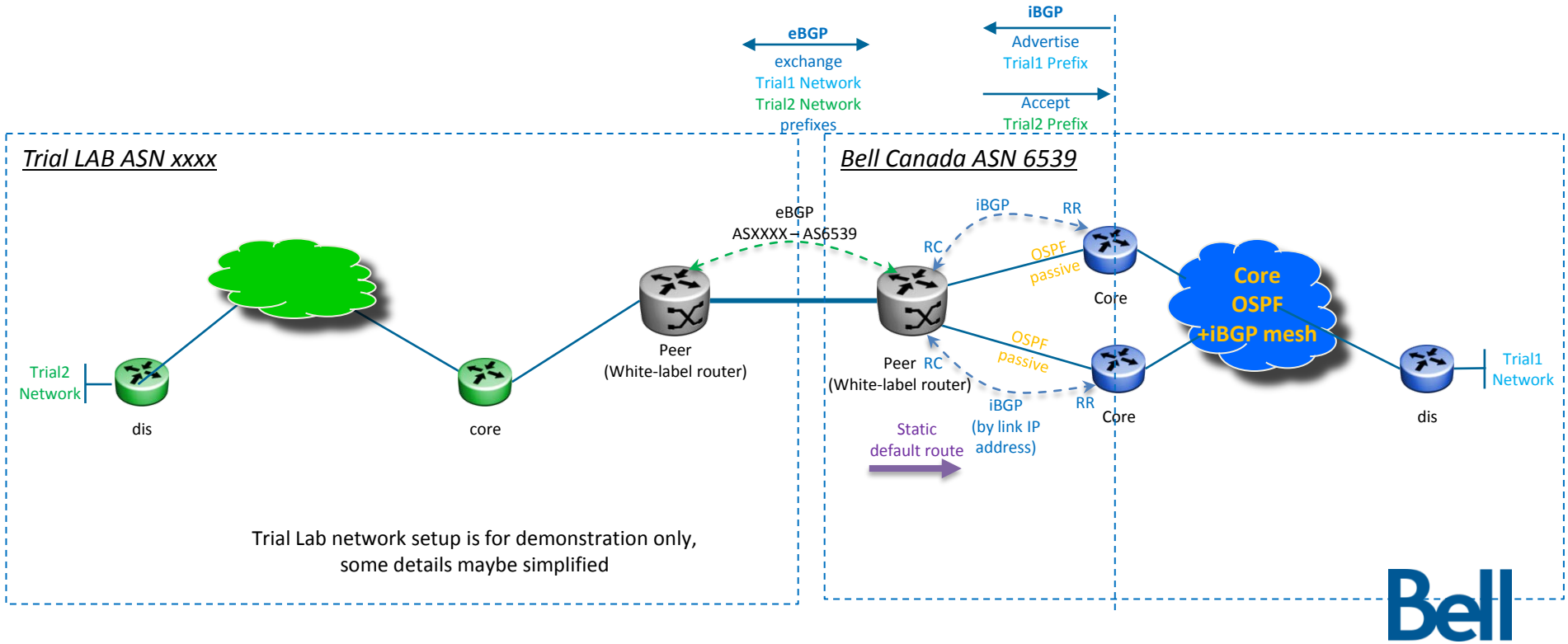
Atrium Pre-release Deployment



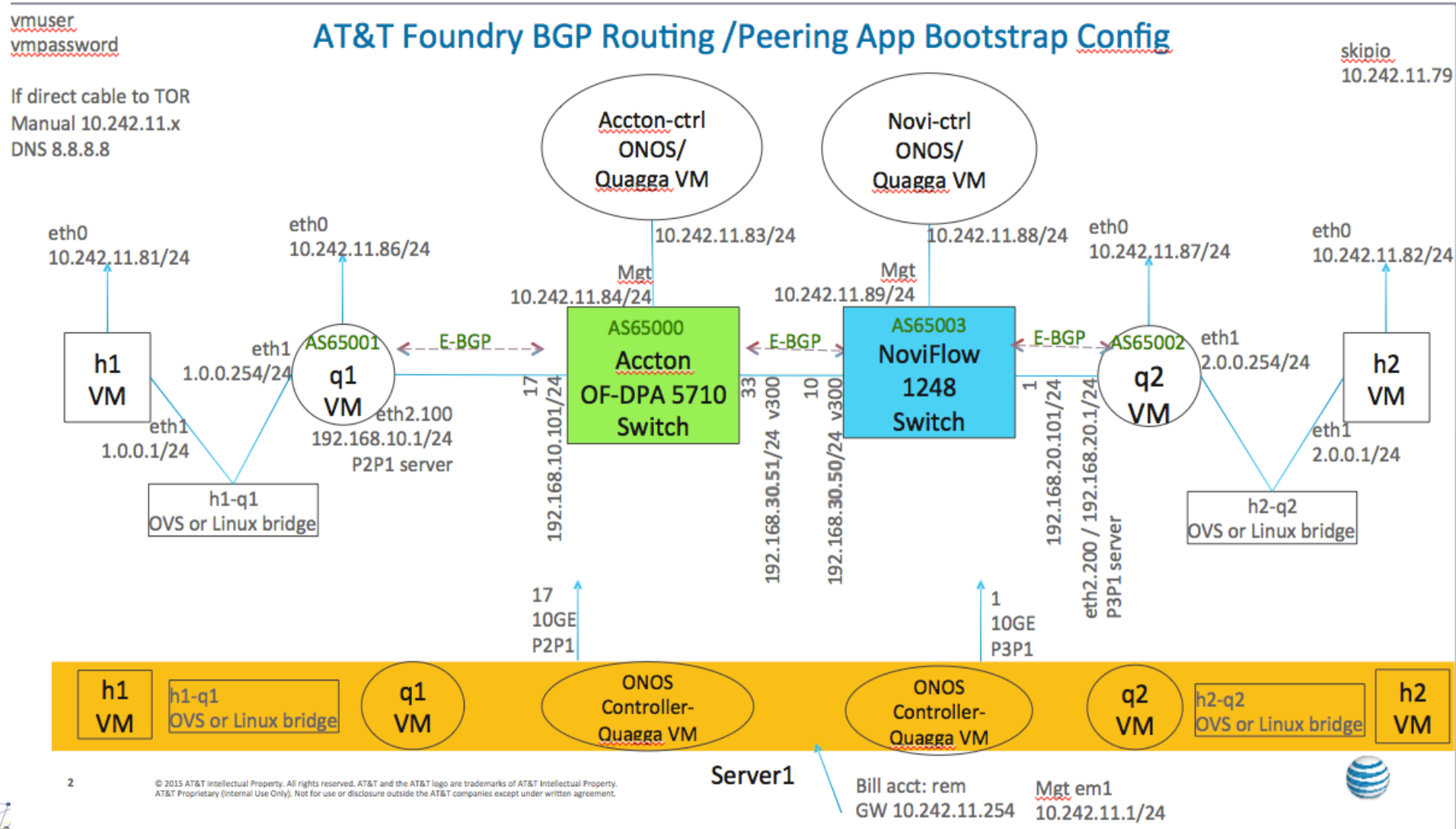


Atrium Post-release Operator Engagements

phase 1 – Trial Lab (white-label box) <--> Trial AS6539 (white-label box)



Atrium Post-release Operator Engagements



Outline

1. **Project Atrium today**
   - Motivation
   - Atrium release 15/A

2. **Project Atrium next**
   - What is coming in the next release 15/B?

3. **Project Atrium roadmap**
   - Tentative: projects under discussion

LEARN MORE & JOIN THE COMMUNITY:

https://groups.opensourcesdn.org/wg/Atrium/dashboard

What's Coming in the 15/B Release?

1. Continued Improvements on the 15/A release (ONOS based)
   - Hardening & Stability
   - Performance
   - Missing features: untagged, runtime-config, static-routes
   - Hardware Automated Test Infrastructure

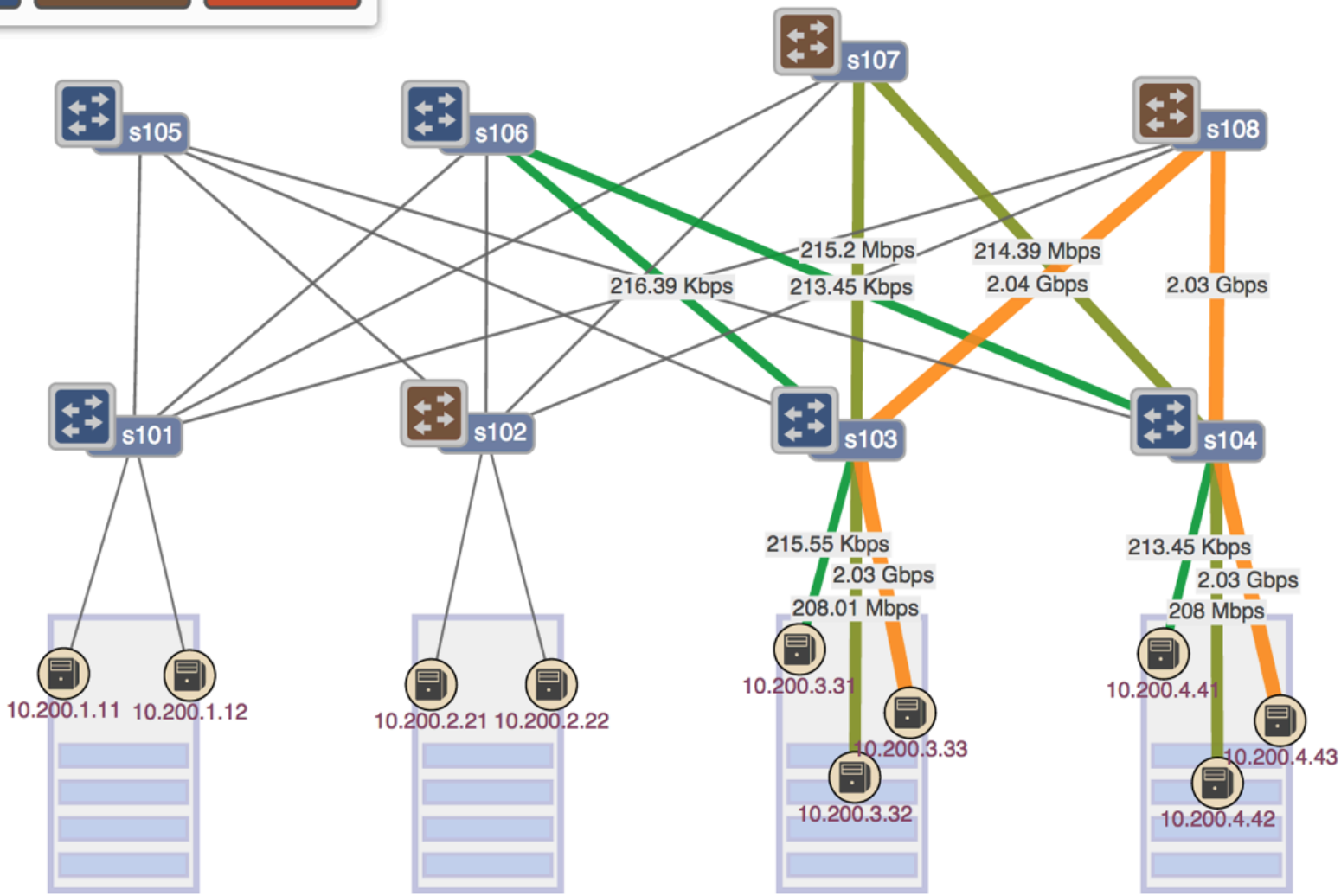
2. Atrium Router on OpenDaylight
   - Porting from ONOS to ODL
   - ODL will also use FlowObjectives and device drivers
   - Community contibutions: Wipro & Criterion

LEARN MORE & JOIN THE COMMUNITY:

https://groups.opensourcesdn.org/wg/Atrium/dashboard

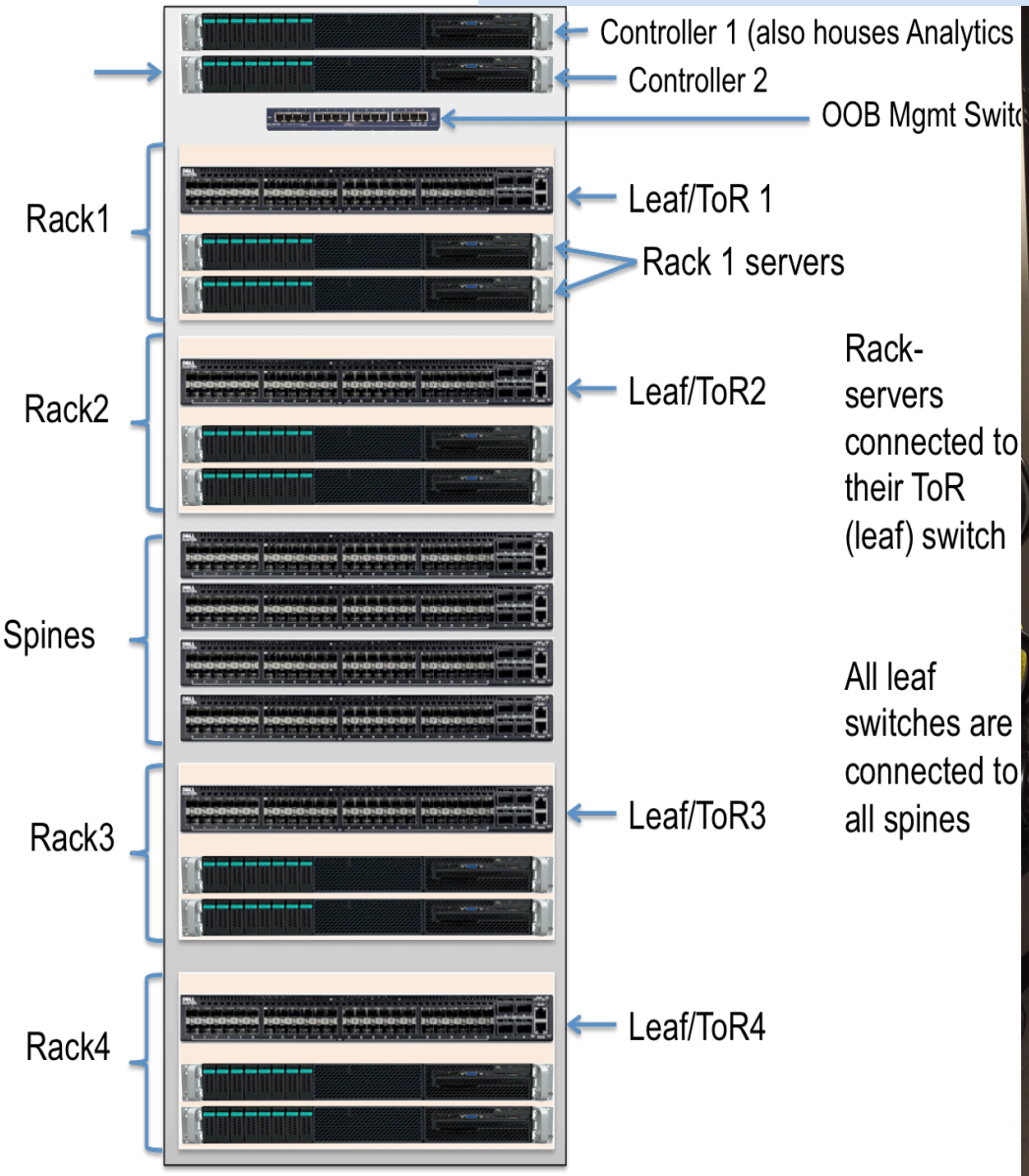
Open-Source Leaf-Spine Fabric (L3 Clos)

Internally the Fabric uses MPLS Segment Routing



Open-Source Leaf-Spine Fabric (L3 Clos)

Internally the Fabric uses MPLS Segment Routing



Rack-servers connected to their ToR (leaf) switch

All leaf switches are connected to all spines

Outline

1. **Project Atrium today**
   - Motivation
   - Atrium release 15/A

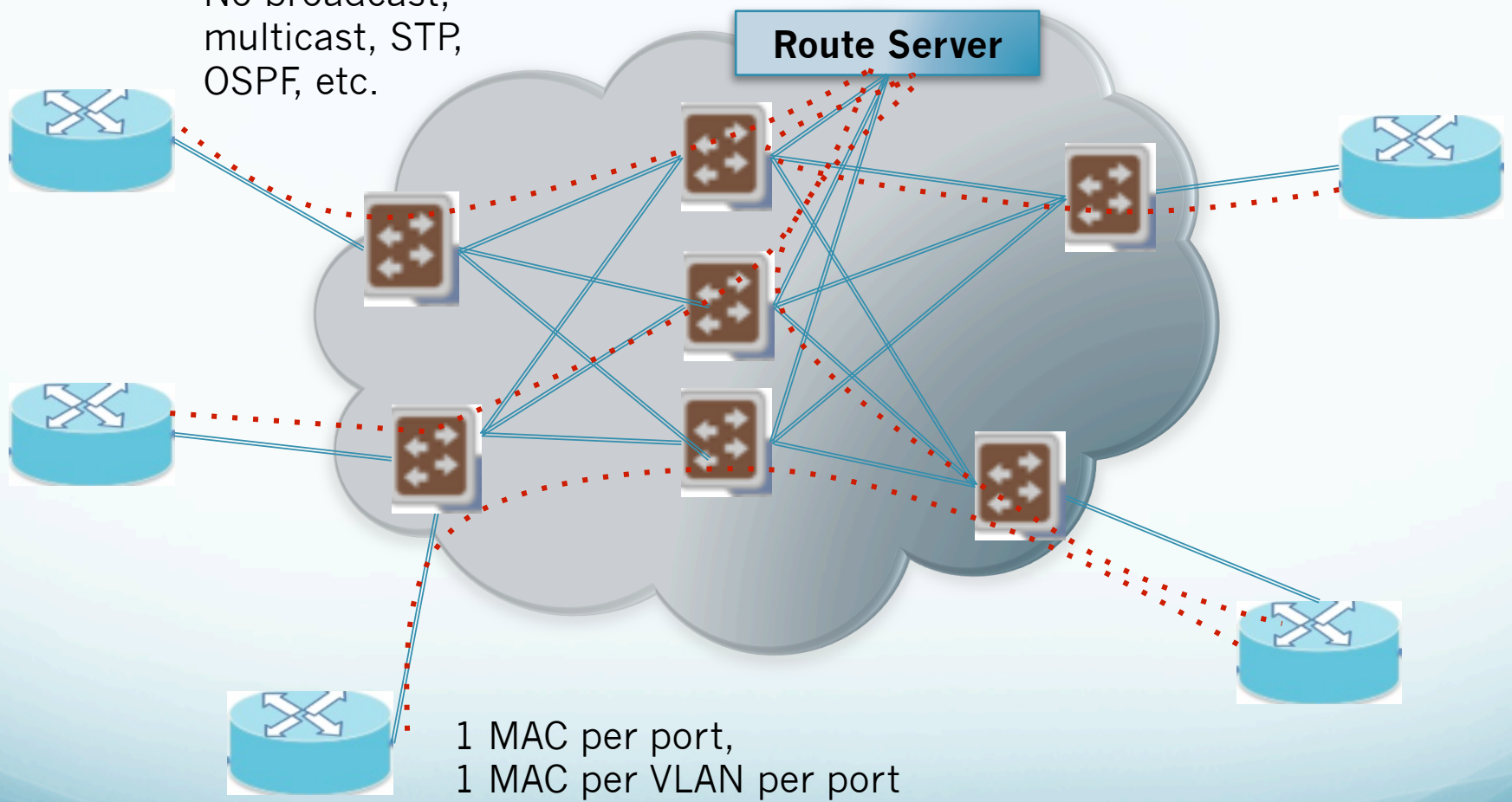
2. **Project Atrium next**
   - What is coming in the next release 15/B?

3. **Project Atrium roadmap**
   - Tentative: projects under discussion

LEARN MORE & JOIN THE COMMUNITY:

https://groups.opensourcesdn.org/wg/Atrium/dashboard

L2 IXP Fabric



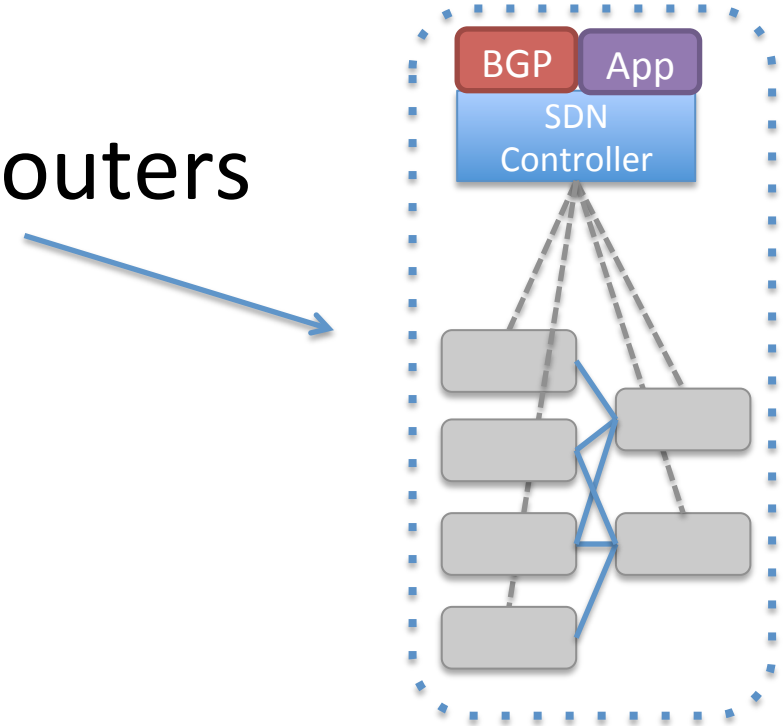
Atrium Router Stack

+

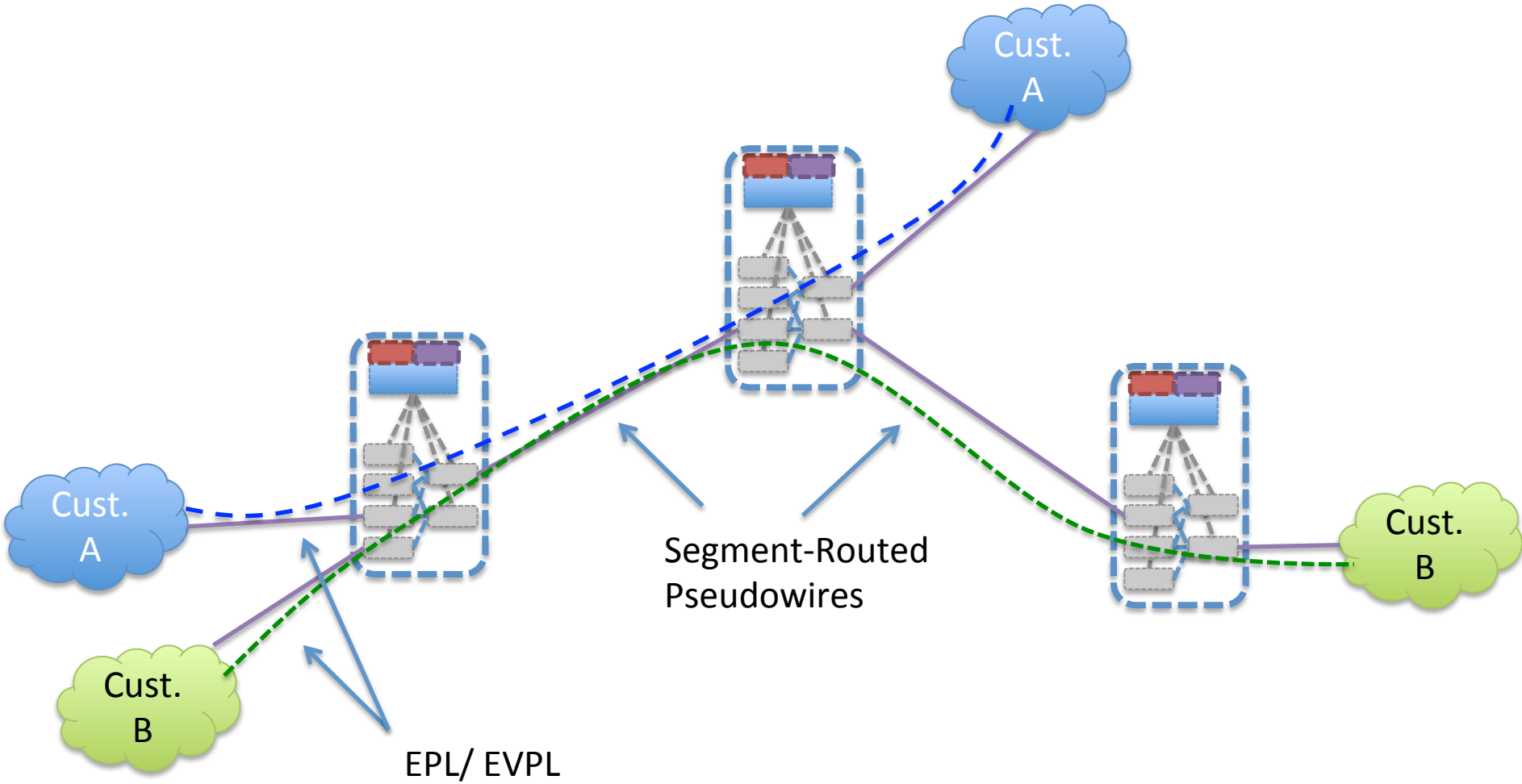
L3 Clos Fabric

=

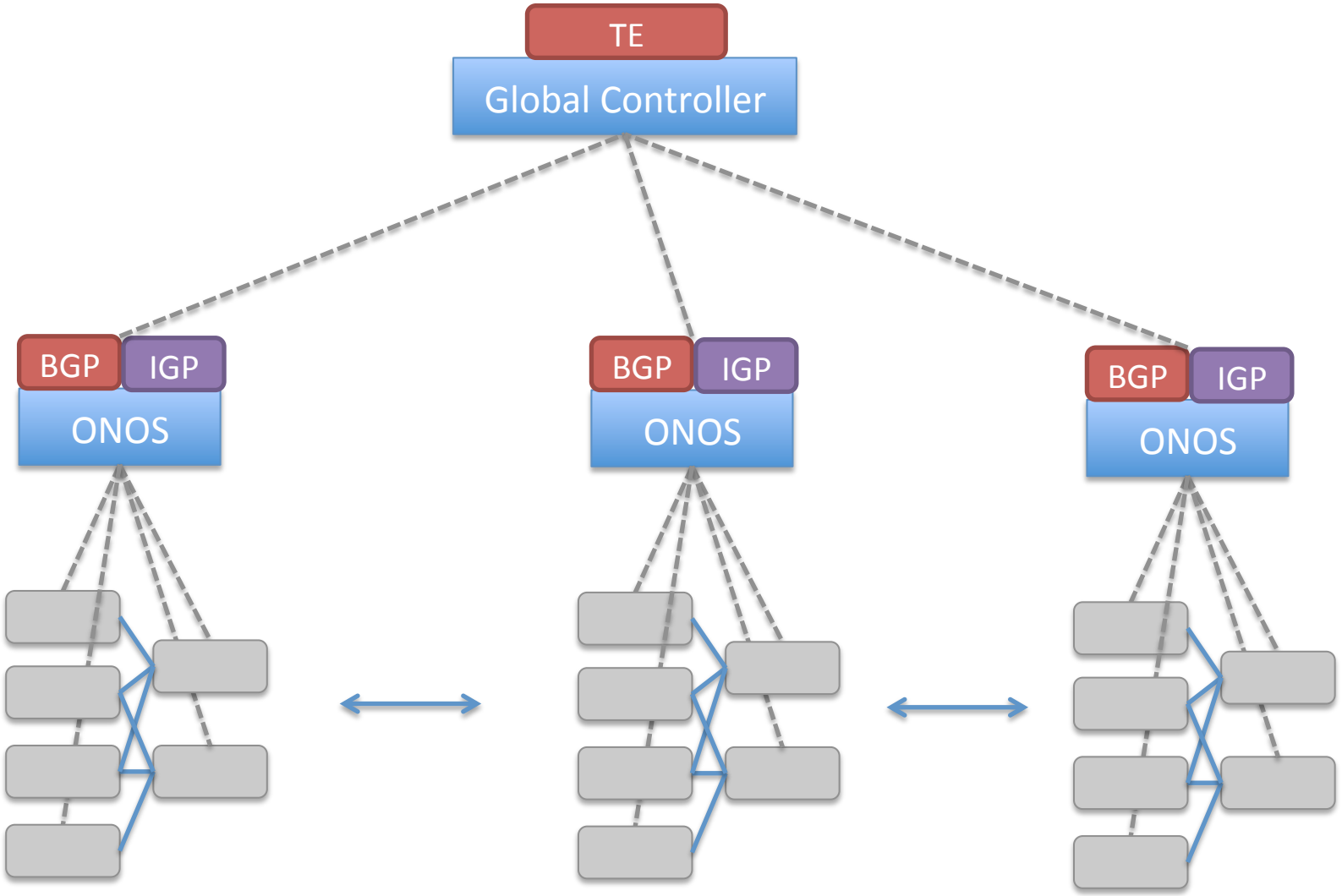
Chassis Routers



Support MEF E-Line Services



This is just the starting point!



And more …

- Generic L2 Enterprise Network
- Smart Cities/ IoT
- Packet-Optical

Summary

Integration, Interoperability & Deployments

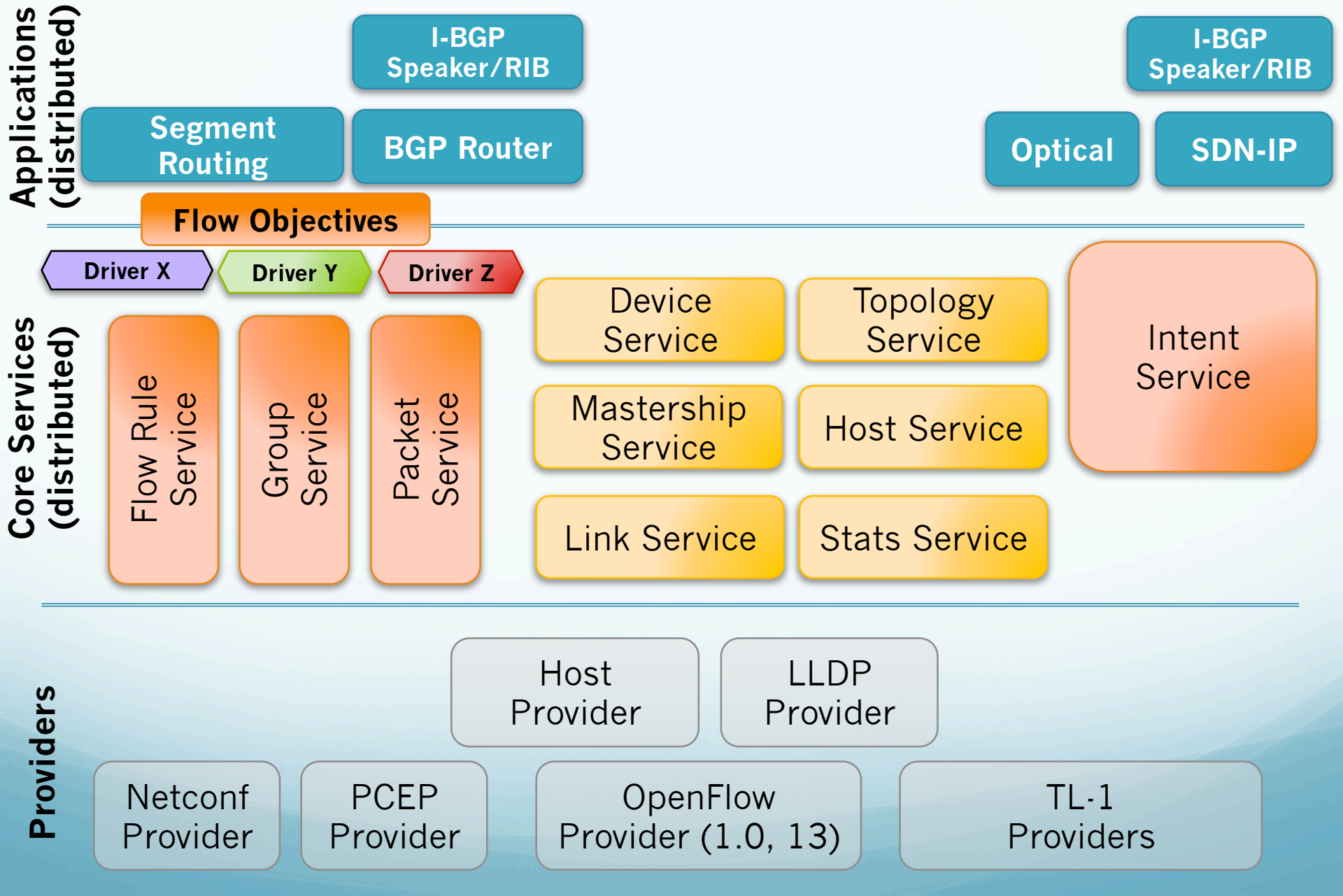
- Atrium 1st release brings together ONOS, Quagga, OCP components (ONL, ONIE) and OFDPA with white-boxes + vendor equipment
- Open SDN Distribution (2015/A release: June 30th)
- ONF builds 7 routers!
- Key architectural contribution: Flow Objectives & Device Drivers
- Pre release deployment in Sydney.
- More coming as we engage operators

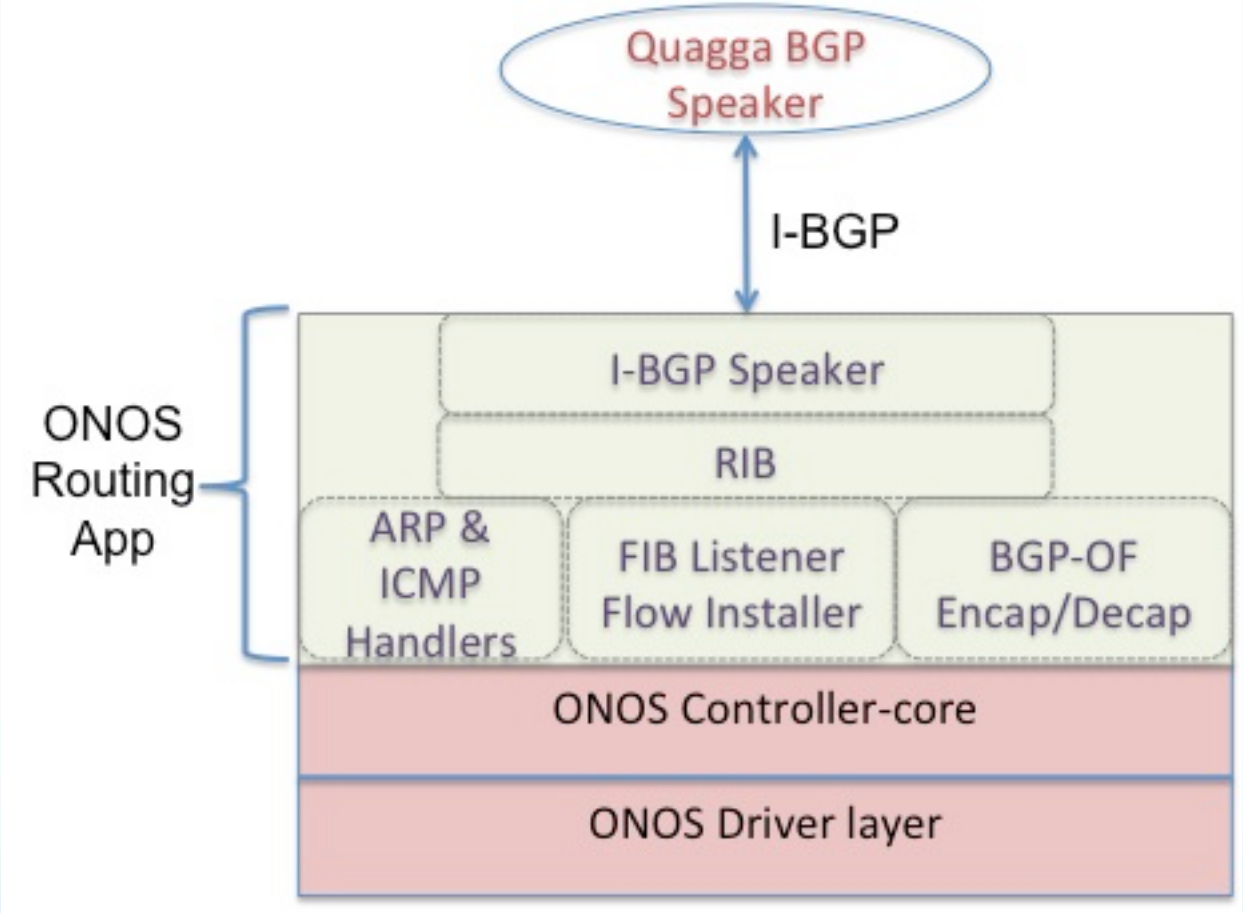
Atrium 15/B release

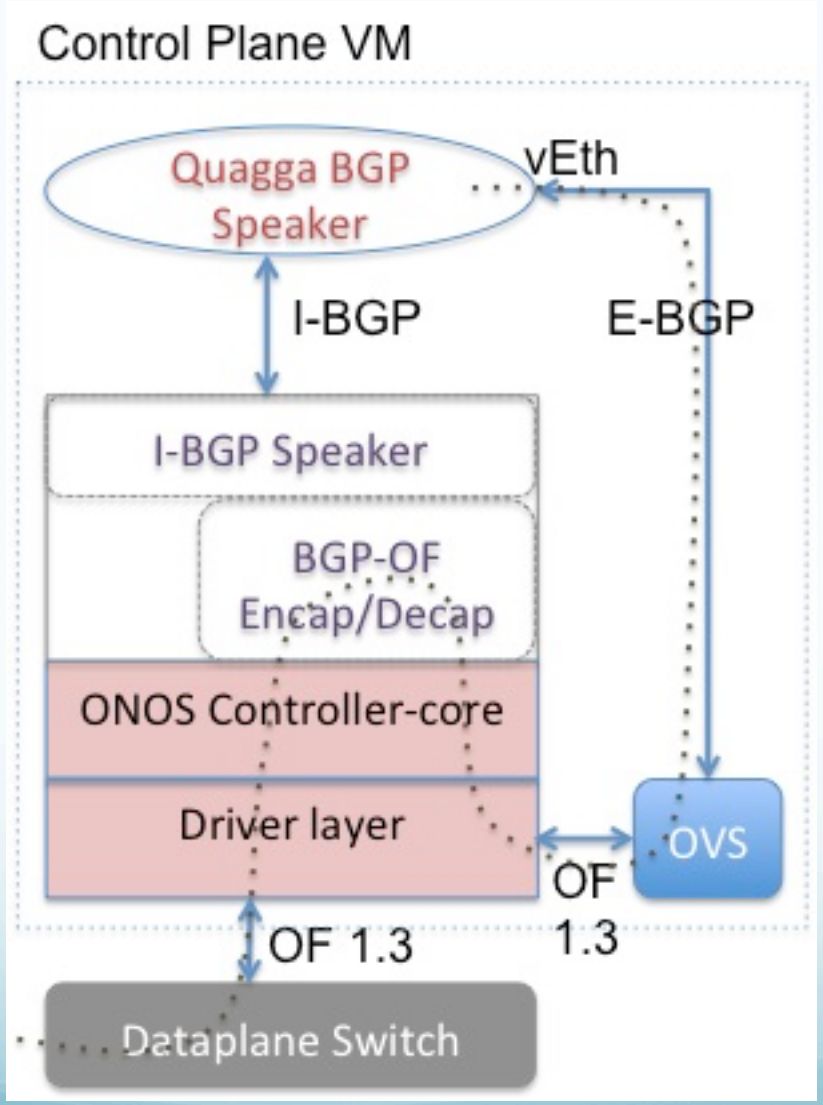
- Improved 15/A router built around ONOS
- ODL based Atrium router
- Atrium leaf-spine L3 Clos fabric

Many more projects in the horizon

ONOS Architecture




Quagga BGP Speaker
I-BGP
ONOS Routing App
I-BGP Speaker
RIB
ARP & ICMP Handlers
FIB Listener Flow Installer
BGP-OF Encap/Decap
ONOS Controller-core
ONOS Driver layer


Control Plane VM
Quagga BGP Speaker
vEth
I-BGP
E-BGP
I-BGP Speaker
BGP-OF Encap/Decap
ONOS Controller-core
Driver layer
OVS
OF 1.3
OF 1.3
Dataplane Switch

Outline

1. **Project Atrium today**
   - Motivation
   - Atrium release 15/A

2. **Project Atrium next**
   - What is coming in the next release 15/B?

3. **Project Atrium roadmap**
   - Tentative: projects under discussion

LEARN MORE & JOIN THE COMMUNITY:

https://groups.opensourcesdn.org/wg/Atrium/dashboard