ONOS

[Open Source SDN Network Operating System for Service Provider networks]

http://onosproject.org/

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ONOS Partnership

ON.LAB

at&t

NTT Communications

intel

FUJITSU

ERICSSON

ciena

NEC

HUAWEI

INTERNET2

CREATE-NET

cnit

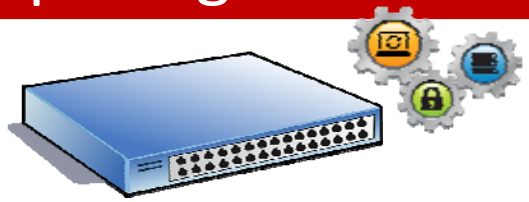
Consortium GARR

Infoblox

SRI International

A partnership comprising ON.LAB and

SERVICE PROVIDERS



VENDORS

RESEARCHERS

Outline

- Motivation
  - Why open source network OS for service providers?
- ONOS architecture and use cases
- Open source ONOS release
- Industry and SDN as a disruptive innovation

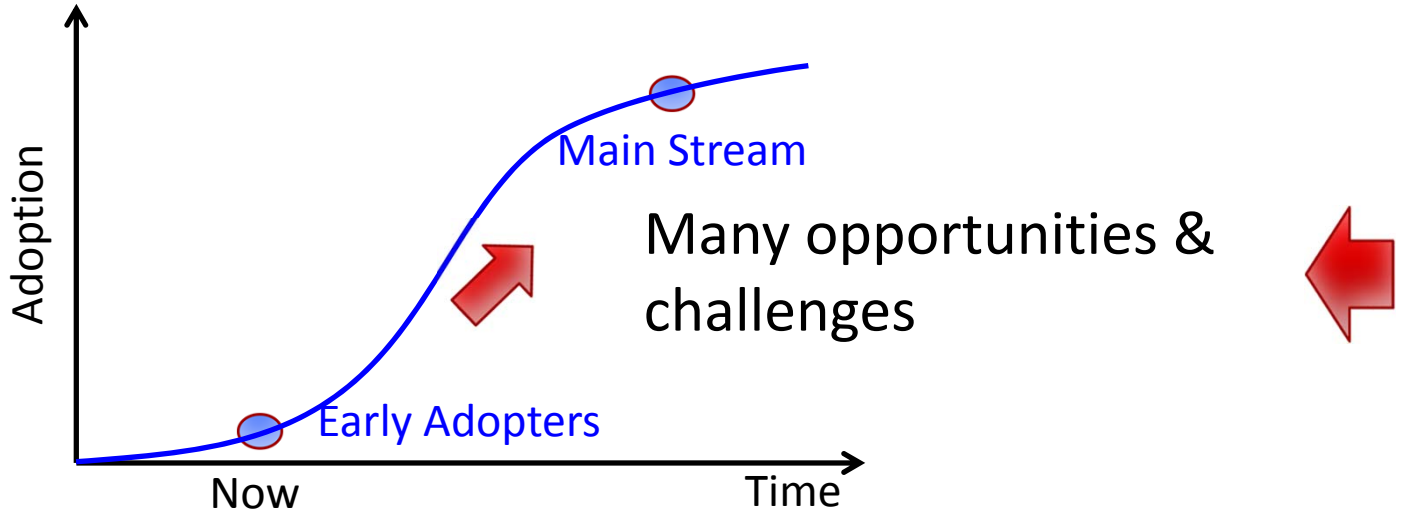
Being Transformed

Current Network Infrastructure

SDN as a Disruptive Innovation

Agile Network Infrastructure

$100B+(?) Industry



How would SDN Manifest?

Network of
Closed Proprietary
Boxes

Network Control
& Management
Applications

This is inevitable! Evidence abound.

Network OS

White boxes using
Merchant Silicon

Software in 2014

Smartphone: Open 75%, Closed 25%
Browser: Open 63%, Closed 37%
Websites: Open 67%, Closed 33%

DC servers: Open 70%, Closed 30%
Tablet: Open 62%, Closed 38%
Mainframes: Open 60%, Closed 40%
Supercomputers: Open 99%

Open-source still growing fast

Nick McKeown at ONOS Summit

Open Source Network OS

Network Control
& Management
Applications

open source™
Network OS

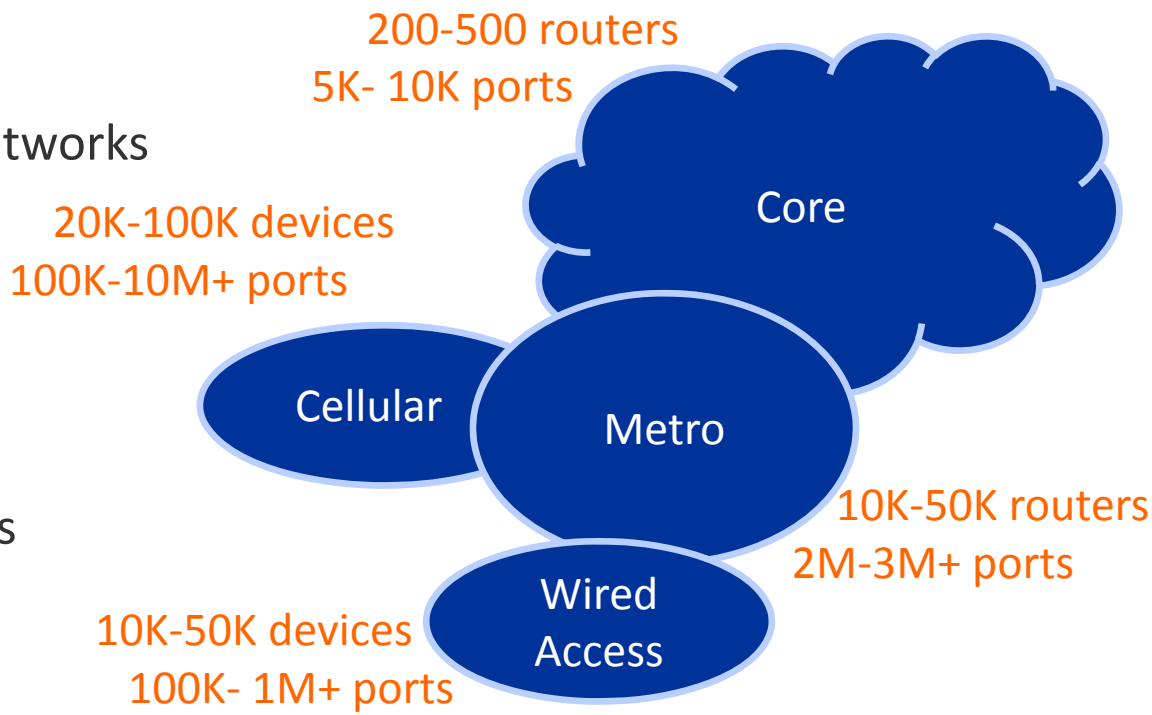
Difficult to build and
Difficult to monetize

White boxes using
Merchant Silicon

Why service provider networks?

Service Providers Operate Large Networks

- WAN core backbone
  - Multiprotocol Label Switching (MPLS) with Traffic Engineering (TE)
- Metro networks
  - Metro cores for access networks
- Cellular access network
  - LTE for a metro area
- Wired access/aggregation
  - Access network for homes
  - DSL/Cable



Why are Service Providers interested in SDN and ONOS?

Reduce CAPEX and OPEX

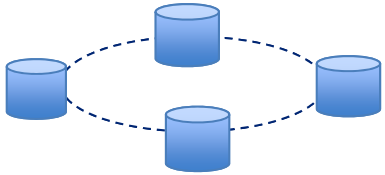
Bring Cloud-style agility, flexibility, scalability to their networks

Roll out services rapidly

Reduce operational complexity, increase visibility

But Service Provider networks place stringent requirements on SDN control plane:

Handle tens of millions of fixed and hundreds of millions of wireless end points



Provide five nines availability, high performance, low latency

Need ease of use, services creation and delivery

Allow seamless migration of existing networks while capitalizing on white boxes

ONOS is a SDN network operating system designed for these stringent Service Provider requirements.

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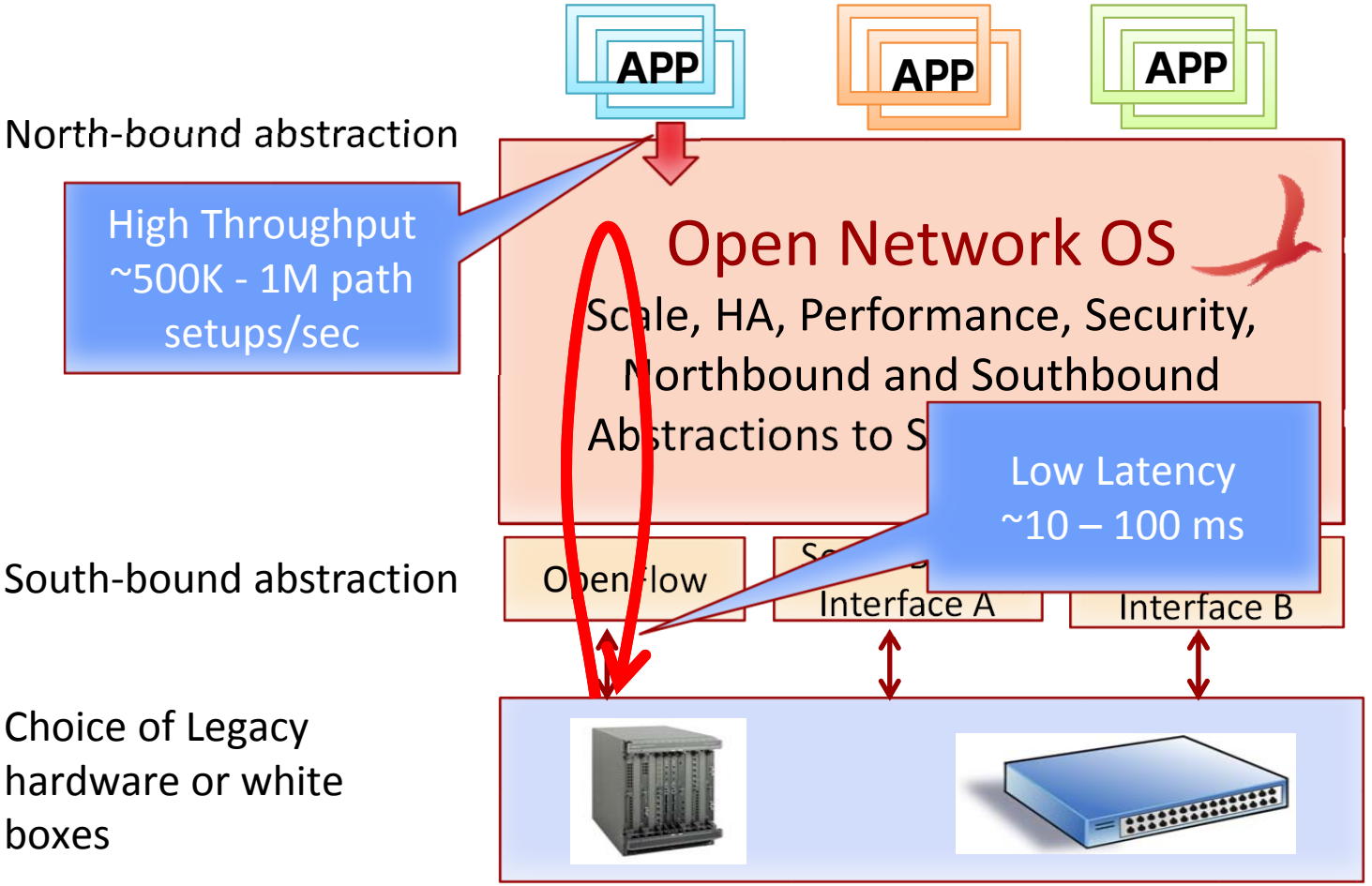
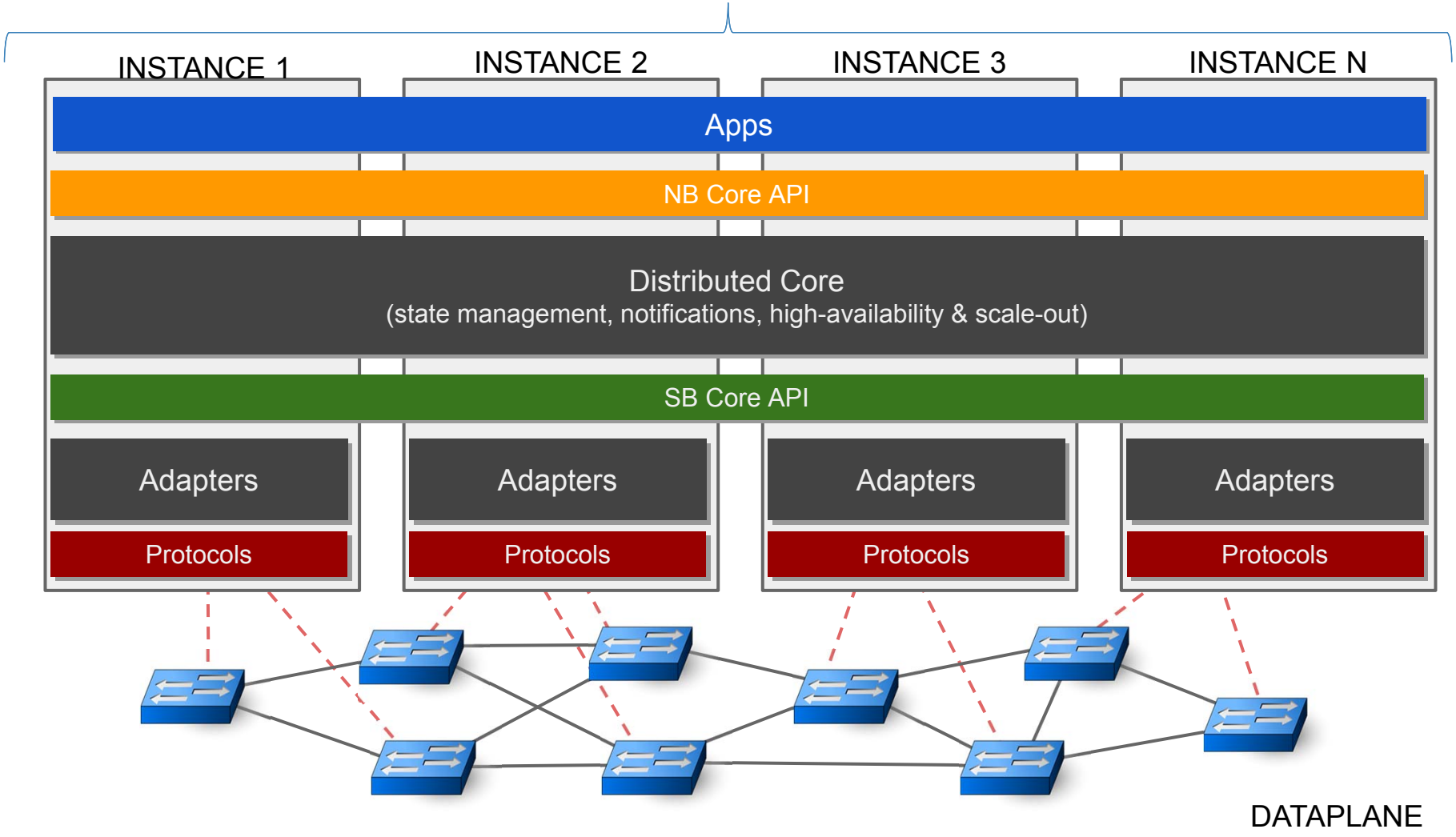
Key Elements of ONOS

Modular, Scalable, Resilient with Abstractions



ONOS Distributed Architecture

Scalable Distributed Core for Scalability, HA, Performance



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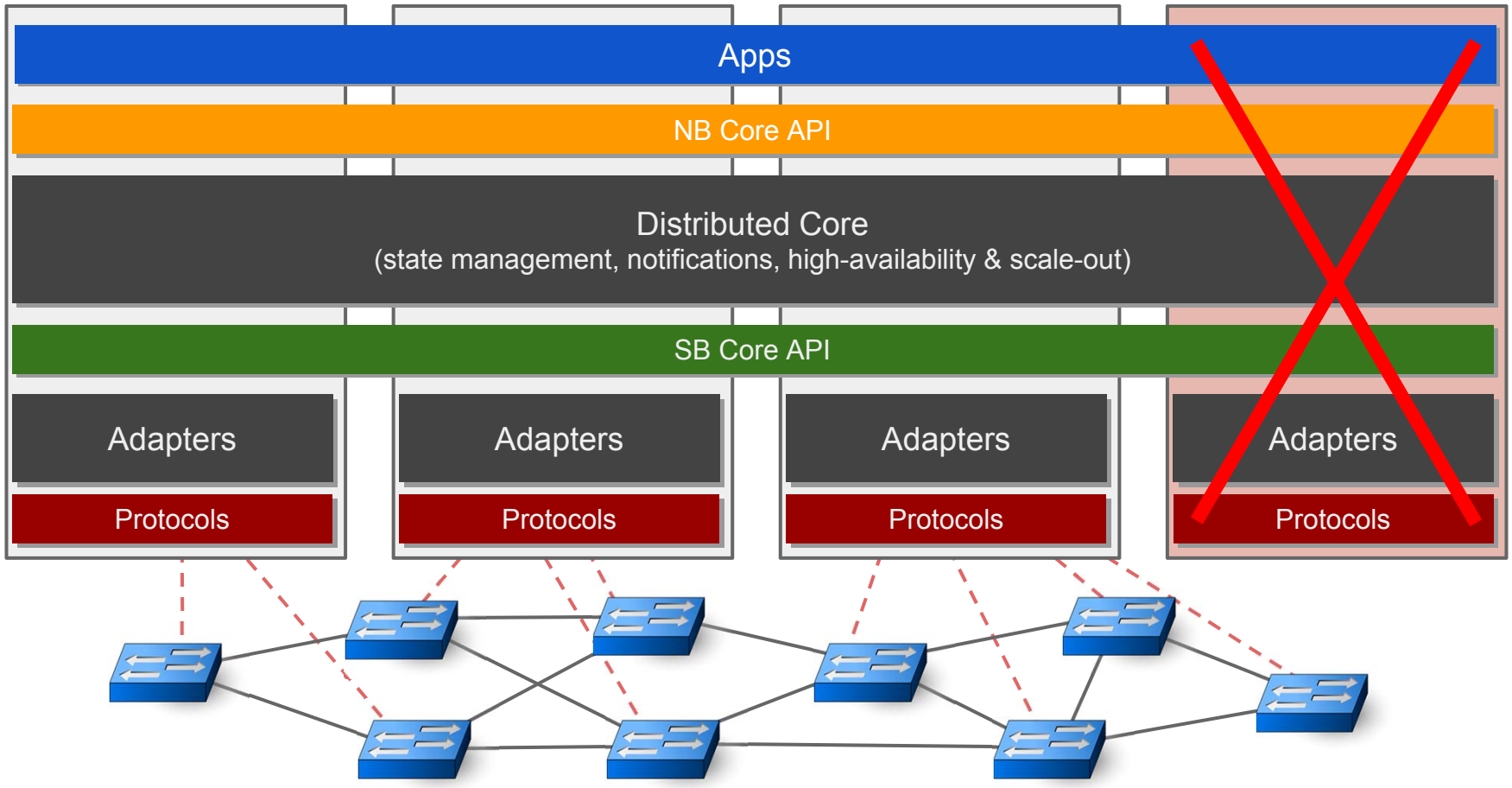
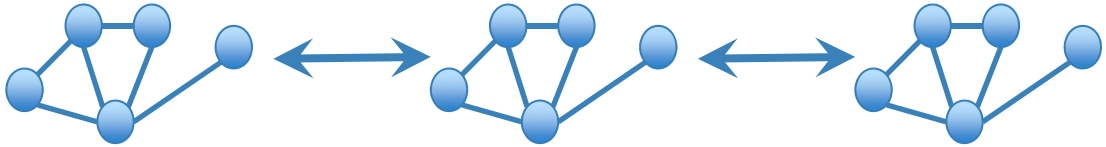


Distributed Core

Application Intents
- immutable
- durable & replicated

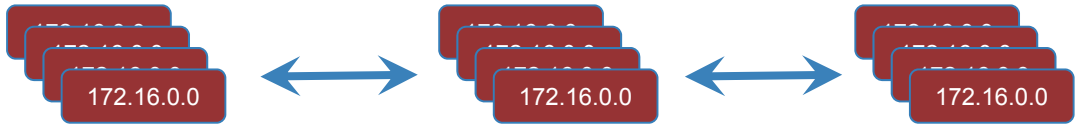
3-way replication
- H/A execution via distributed queues

Global Network View
- eventually consistent
- fully replicated



Optimistic Replication
- gossip based
- anti-entropy
- partial ordering

Flow Table Entries
- strongly consistent
- partitioned



Master/Backup Replication

- It is all about distributed state management: HA and scale-out
- Different types of state require different types of synchronization
- Distribution & replication methods optimized for the type of state
- Based on size and read/write access patterns

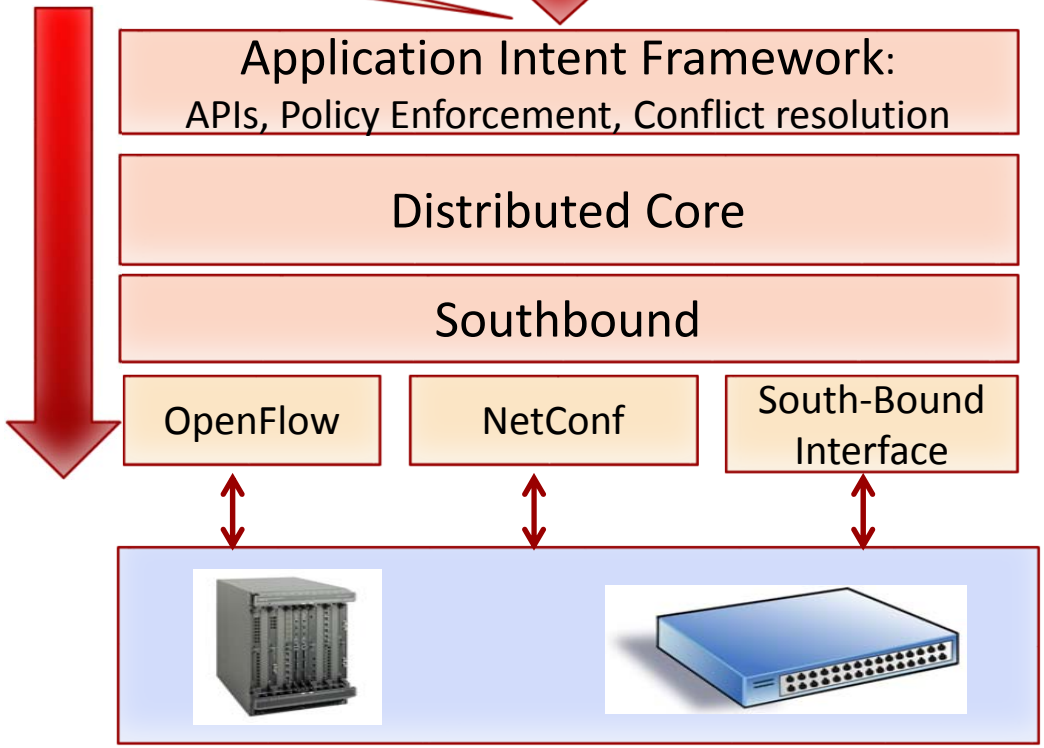
ONOS Application Intent Framework

Flexible and intuitive northbound abstraction and interface for DevOps person to define what they need without worrying about how.

"Provision 10G path from DC1 to DC2 optimized for cost"

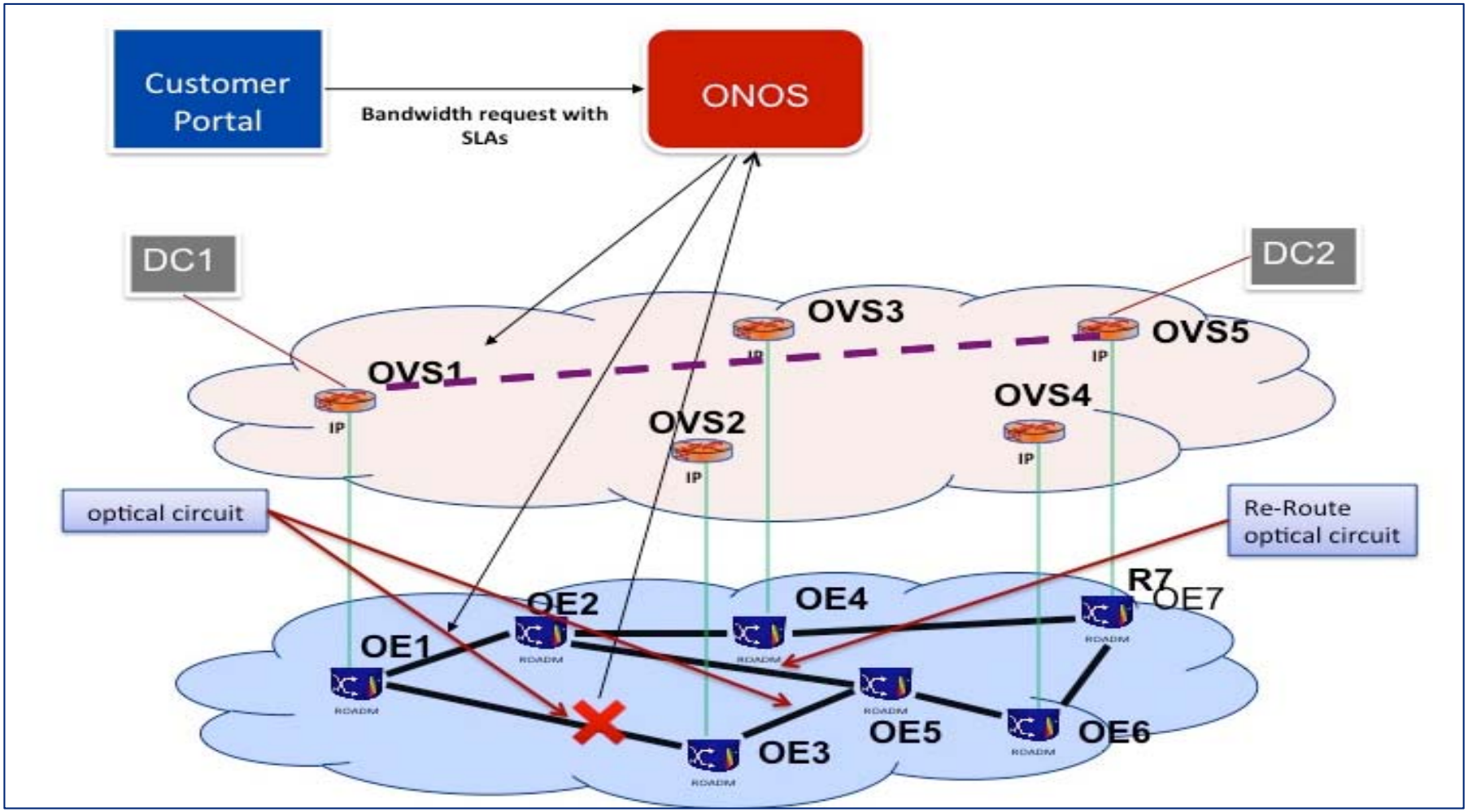
Network Agnostic,
Highly available, Scalable

Intents translated and Compiled into specific instructions for network Devices.



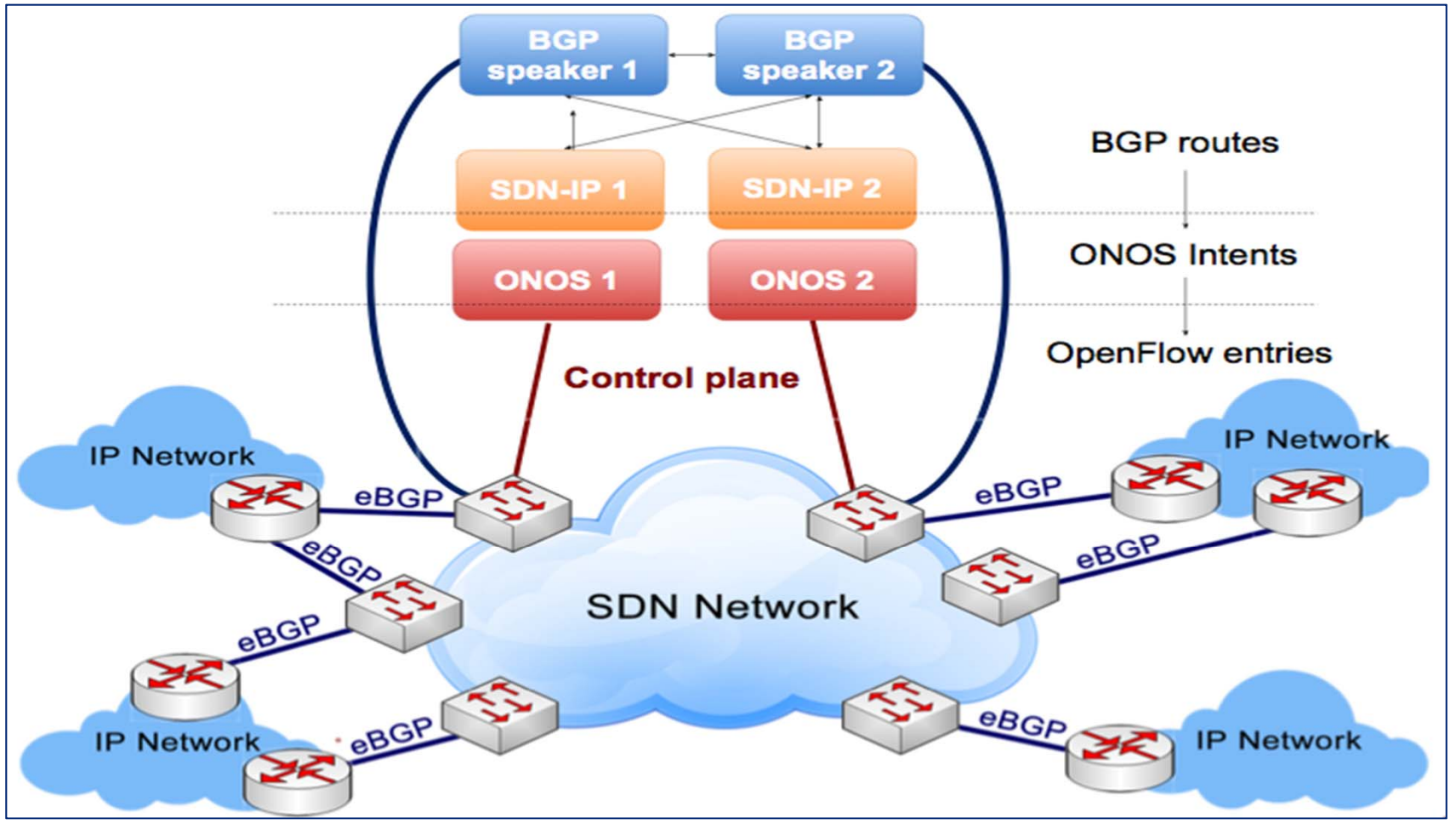
ONOS- Initial Service Provider Use Cases

1. SDN control of Multi-Layer Networks



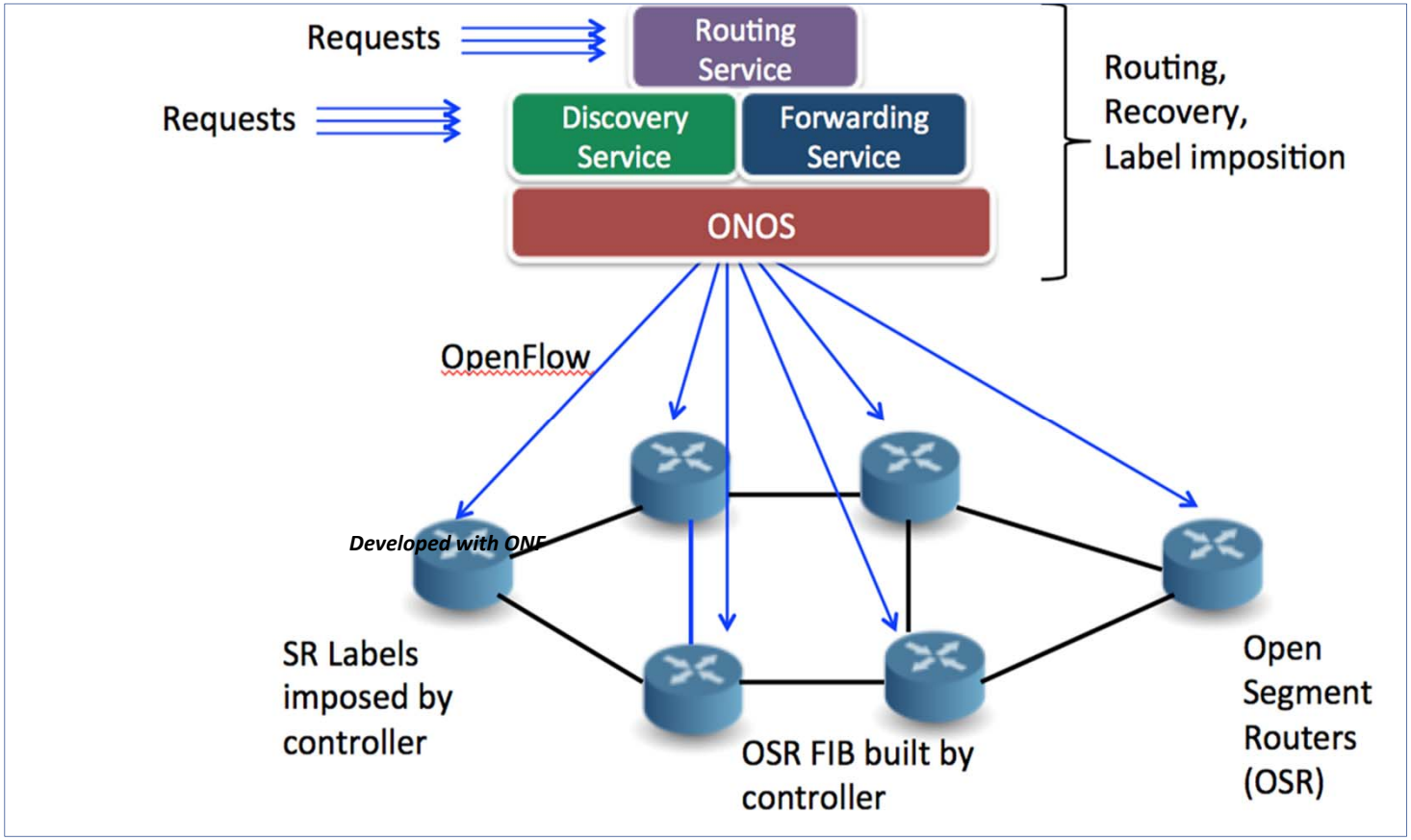
ONOS- Initial Service Provider Use Cases

2. SDN-IP Peering

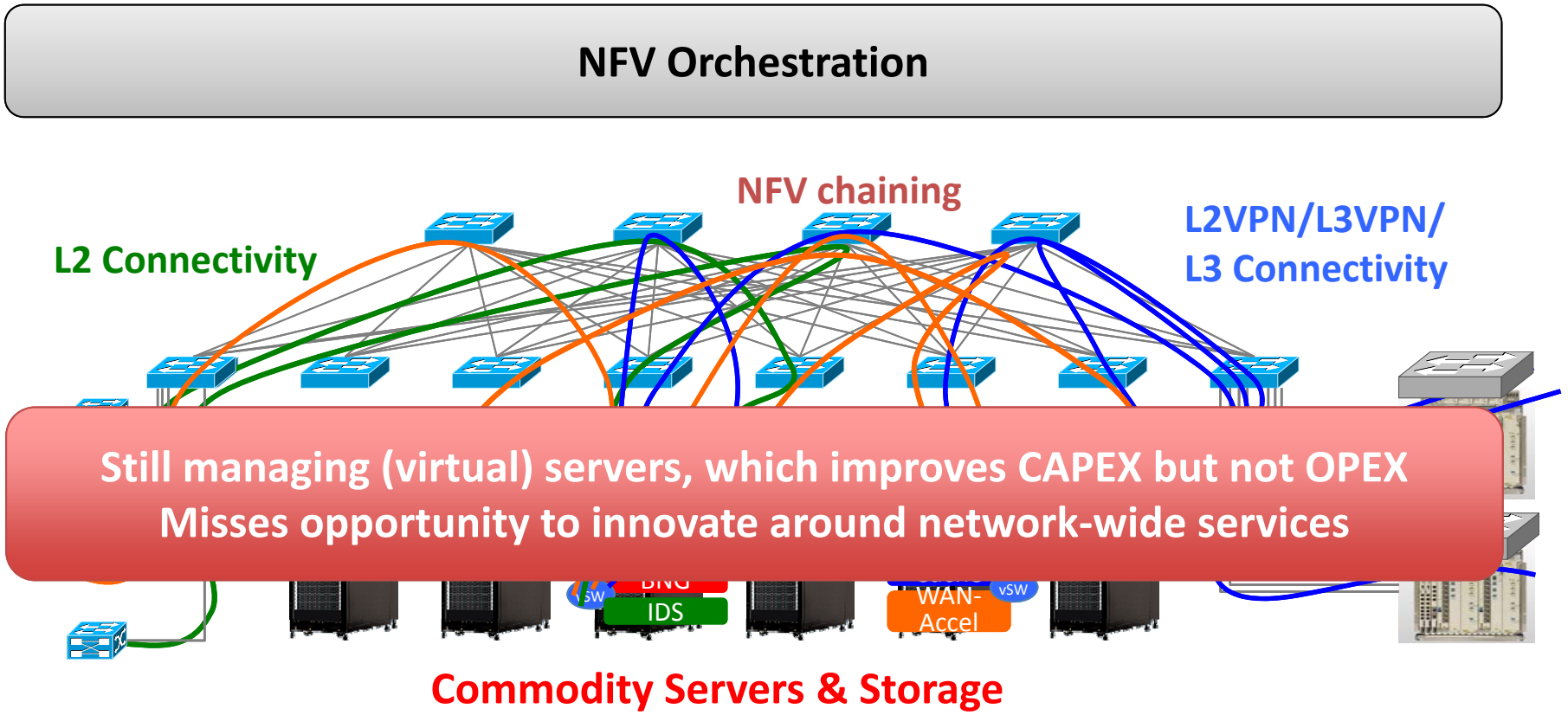


ONOS- Initial Service Provider Use Cases

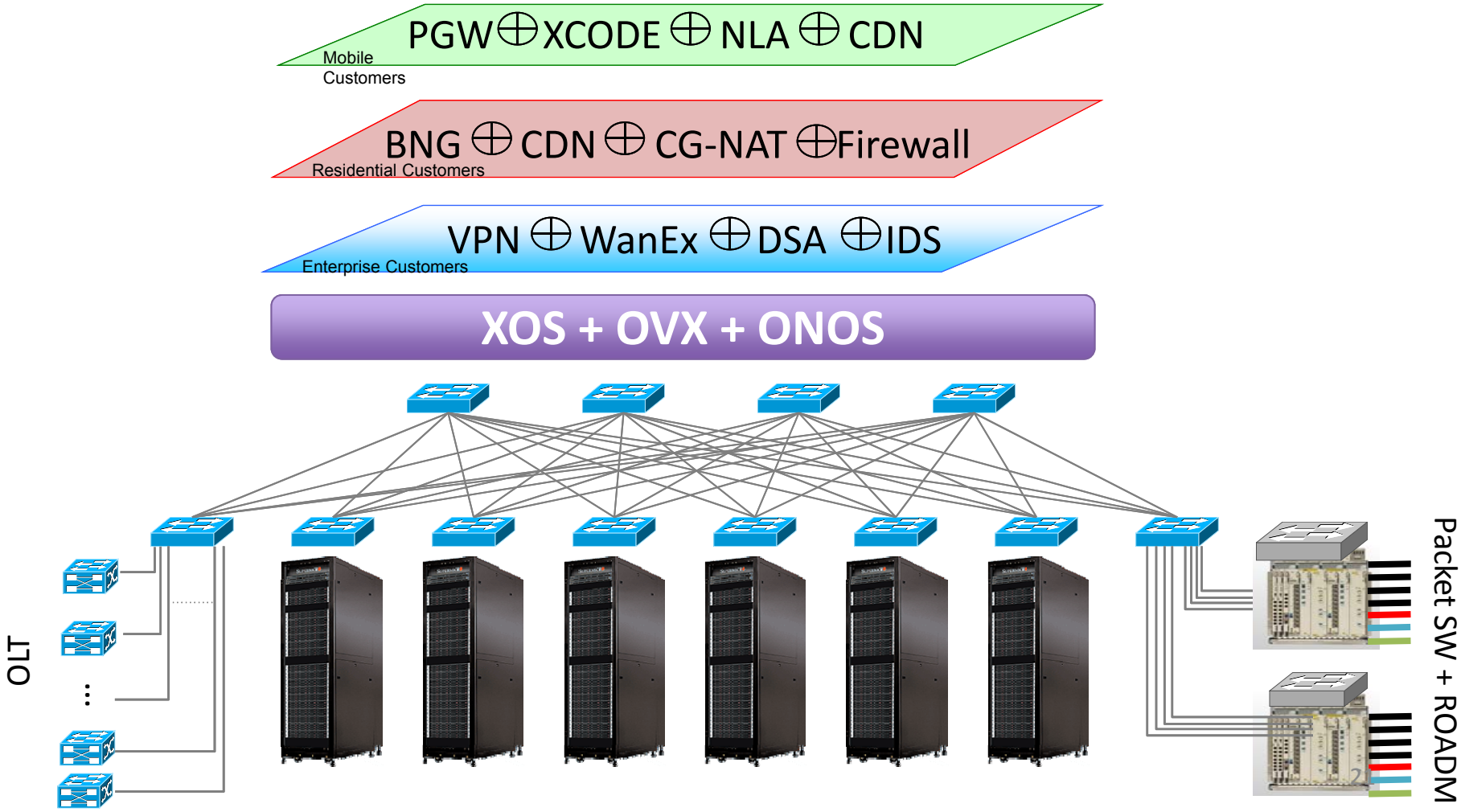
3. Segment Routing



Central Office as a Data Center



NF as a Service (NFaaS) in Central Office



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Open Network Operating System
“Avocet” released on Dec 5th, 2014

http://onosproject.org/resources/

Webinar

Introducing ONOS™ and its value proposition – Nov 2014

Whitepapers

SDN Adoption in Service Provider Networks

ONOS Overview

Presentations

ONOS Use Cases ONRC Meeting October 2014

ONOS Architecture ONRC Meeting October 2014

Videos

ONOS Beta Architecture Presentation

IP Optical Use Case Demo

SDN IP Use Case Presentation

ONOS Avocet Overview Demo

SDN IP Use Case Demo

SPRING-OPEN OVERVIEW

Network Functions as a Service Demo Using OpenCloud OVX and ONOS

Huawei SDN IP RAN L3VPN Demo

For more videos, visit our Youtube ONOSProject Channel

Open Source Release Highlights

- Intro webinar
  - 700+ registered
  - 500+ attended
- Deep dive webinar
  - 600+ registered
  - 400+ attended
  - 200+ stayed beyond 2hrs

Very good interest and participation

- Open Source Release (Dec 5-8)
  - ~400 downloads
  - ~1200 visitors to Gerrit/github/Wiki
  - ~30,000 page views to Gerrit/github/Wiki (mostly on Wiki)
  - ~300 views of ONOS overview videos
  - ~250 views of ONOS Use Cases

Very good for a SDN OS for service providers

But Open Source ONOS is just the beginning…

Images: NASA

ONOS: Solid Foundation, Initial Use Cases
Open Sourced on Dec 5th

ONOS: Full functionality, hardened, ready-to-deploy
Built by the community

Community will be instrumental in helping ONOS realize its potential by:

Strengthening core platform

Building on ONOS

Evolving NB Abstractions, APIs, interoperability

Adding SB adaptors for existing devices, enabling whiteboxes

Doing trials and deployments

OPEN SOURCE ONOS PROJECT

ONOS Ecosystem

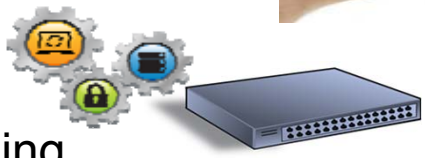
ON.LAB

- Non-profit, Carrier and vendor neutral
- Build core platform
- Provide technical shepherding, core team
- Build community

Service Providers

- Provide funding
- Provide requirements
- Develop use cases
- Drive POCs, deployments
- Bring vendors along

Vendors



- Provide funding
- Provide engineering resources
- Build products and solutions
- Provide integration, test and support services

Community

- Drive every aspect- technical, process, roadmap, deployments
- Bring in diversity
- Help ONOS evolve & thrive

Why one more open source project?

- Active participation of service providers
- ONOS as SDN OS
  - Clean slate design with features for and focus on service providers
- ON.Lab team
  - A single team to architect, shepherd, and maintain focus
- Active participation of vendors
  - Vendors committed to bringing “real SDN” to service providers
- Unique governance
  - Combination of technical meritocracy with ON.Lab’s “neutral role”

Industry and SDN as a Disruptive Innovation

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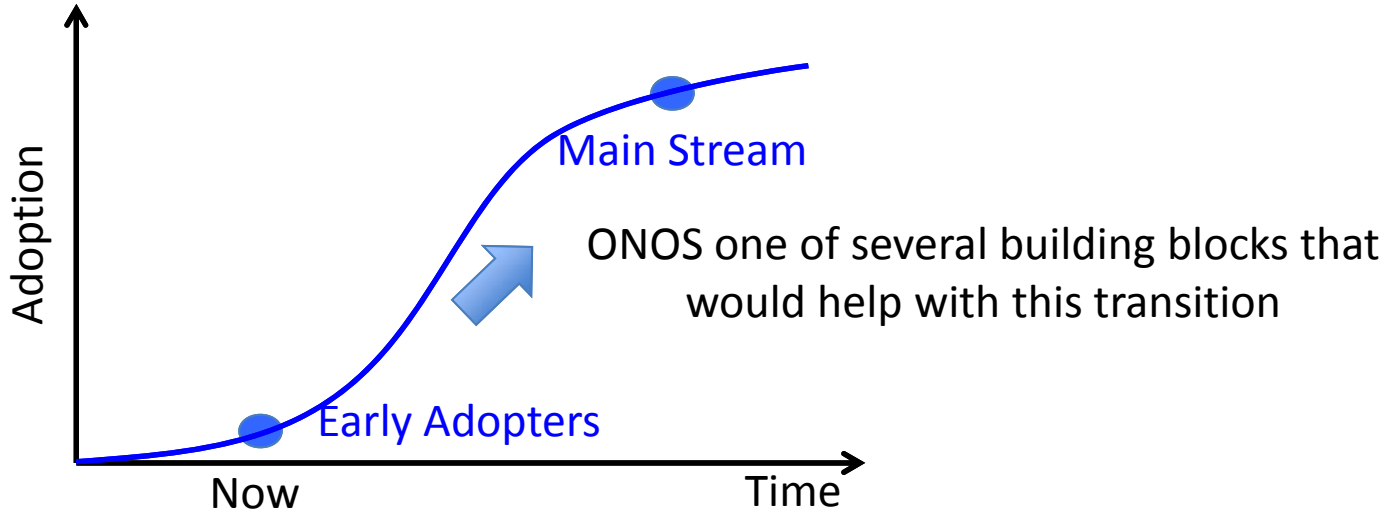
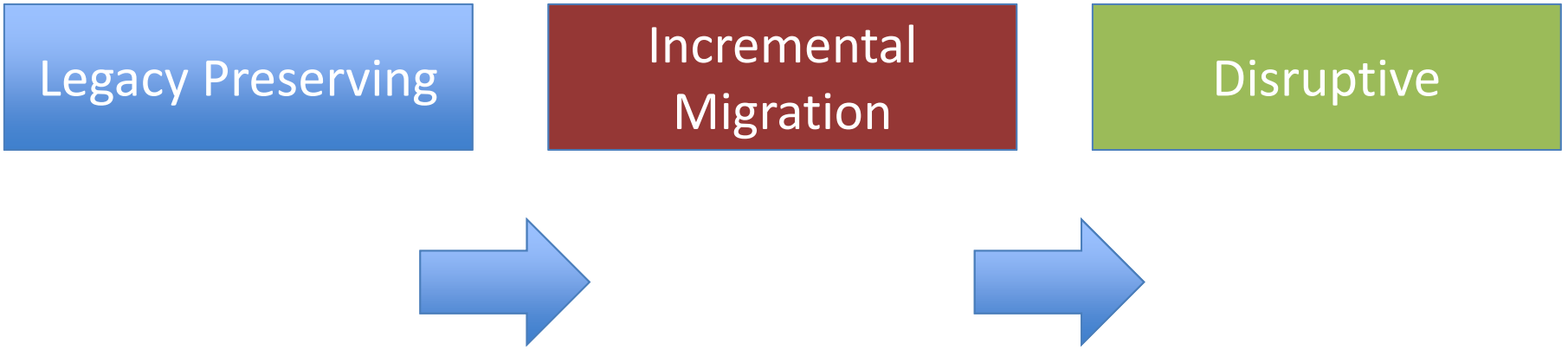
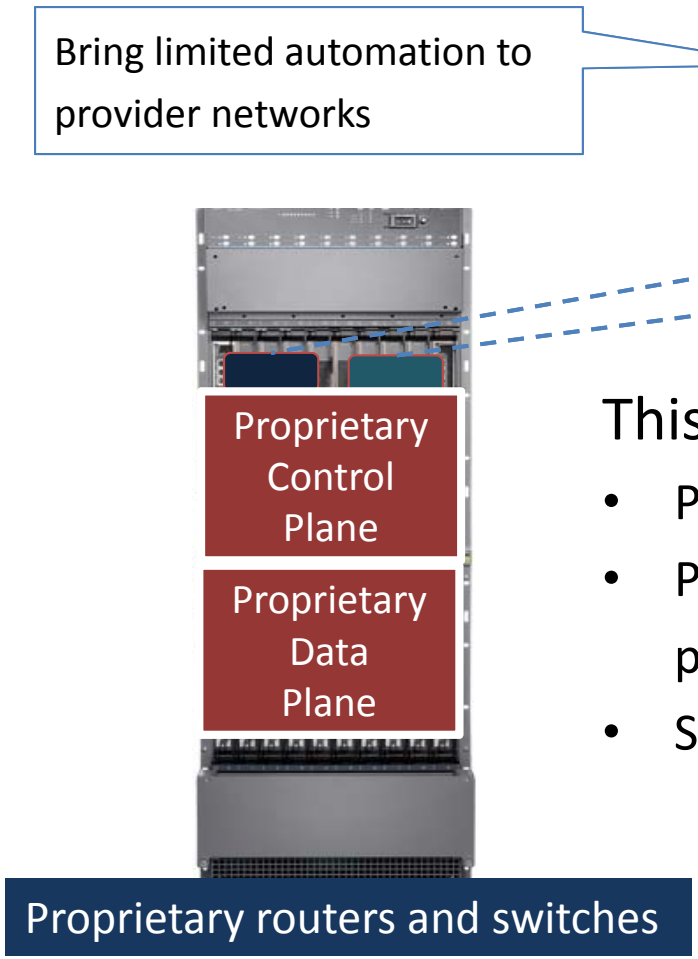


Industry's Approach to SDN



- Incumbent vendors cannot avoid incrementalism
  - They want to continue to monetize existing products
- Even a single company has groups following different approaches
  - Legacy group has more influence as they bring all the revenue

Incumbent Vendors Approach to SDN



This approach entails:

- Proprietary HW and router/switch OS
- Point Apps: monitor manager, CLI automation, provisioning
- SDN controller (either open source or proprietary)

Not possible to unlock the full value of SDN with this approach!

Disruptive SDN

Network of
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Boxes

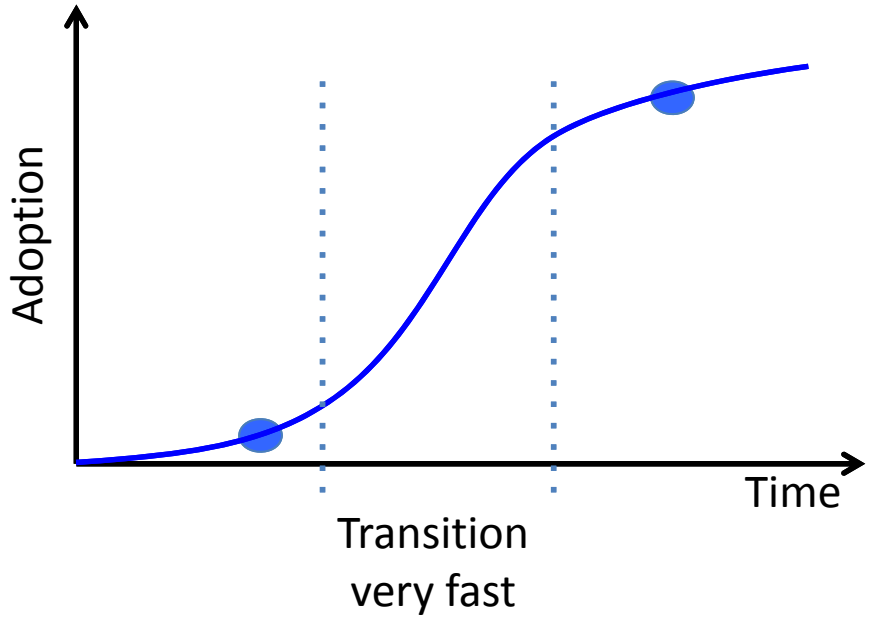
Network Control
& Management
Applications

open source™

Network OS

White boxes using
Merchant Silicon

How does a Disruptive Innovation Transform an Industry?



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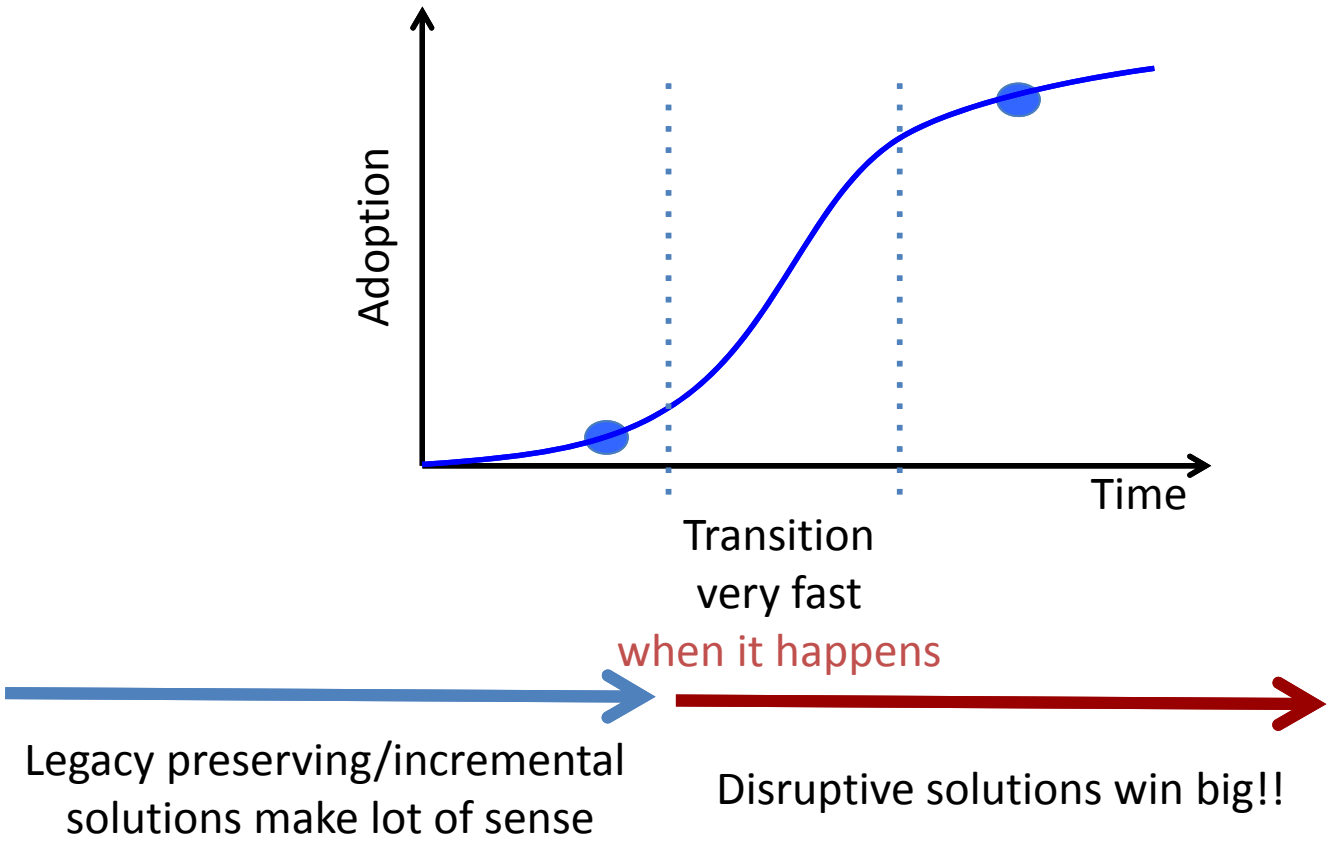

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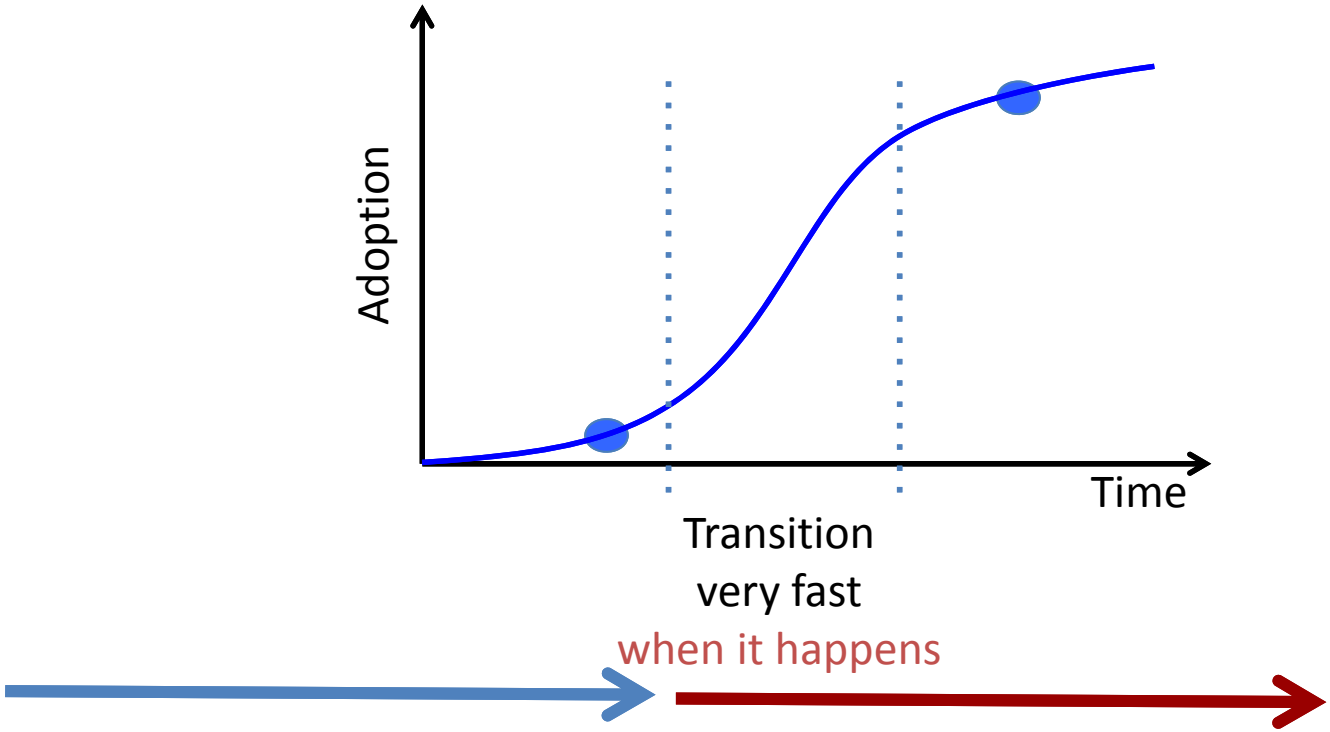
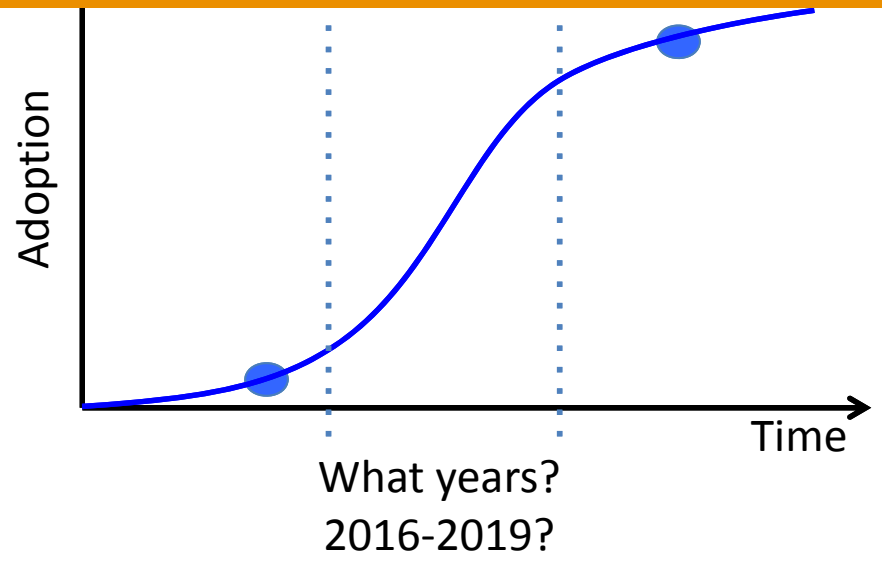


Service Provider Network Transformation

Is your company well positioned to lead this transition to gain market share and value?



What companies would gain value or what companies would lose?

Please send your feedback on ONOS and join ONOS community at
join@onlab.us

BUILD

USE

CHAMPION