An Introduction to Residential CORD (R-CORD)

First CORD Summit, Sunnyvale, July 29th, 2016

AT&T

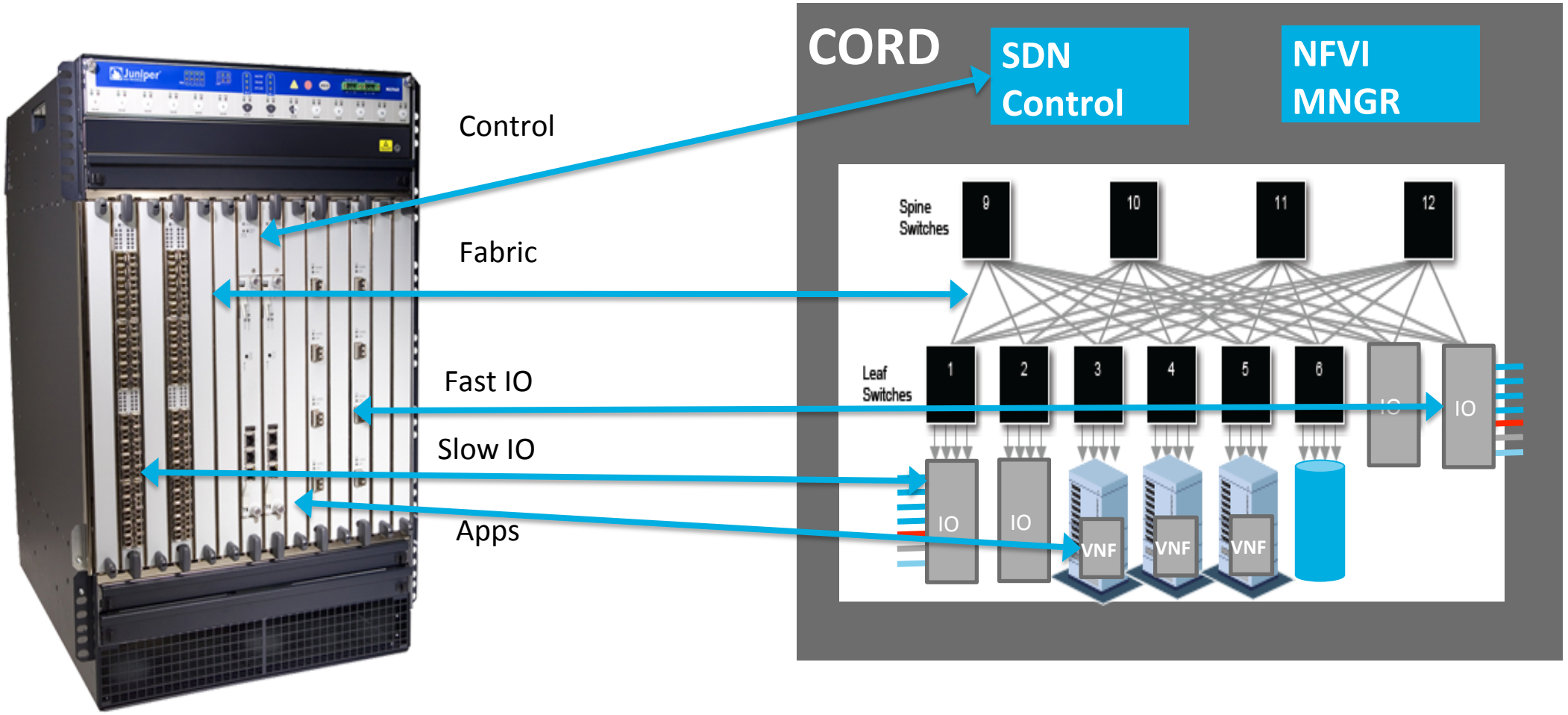
Tom Anschutz

Architecture & Planning
1057 Lenox Park Blvd.
Room A473
Atlanta, GA 30319

+1.404.499.7003
tom.anschutz@att.com

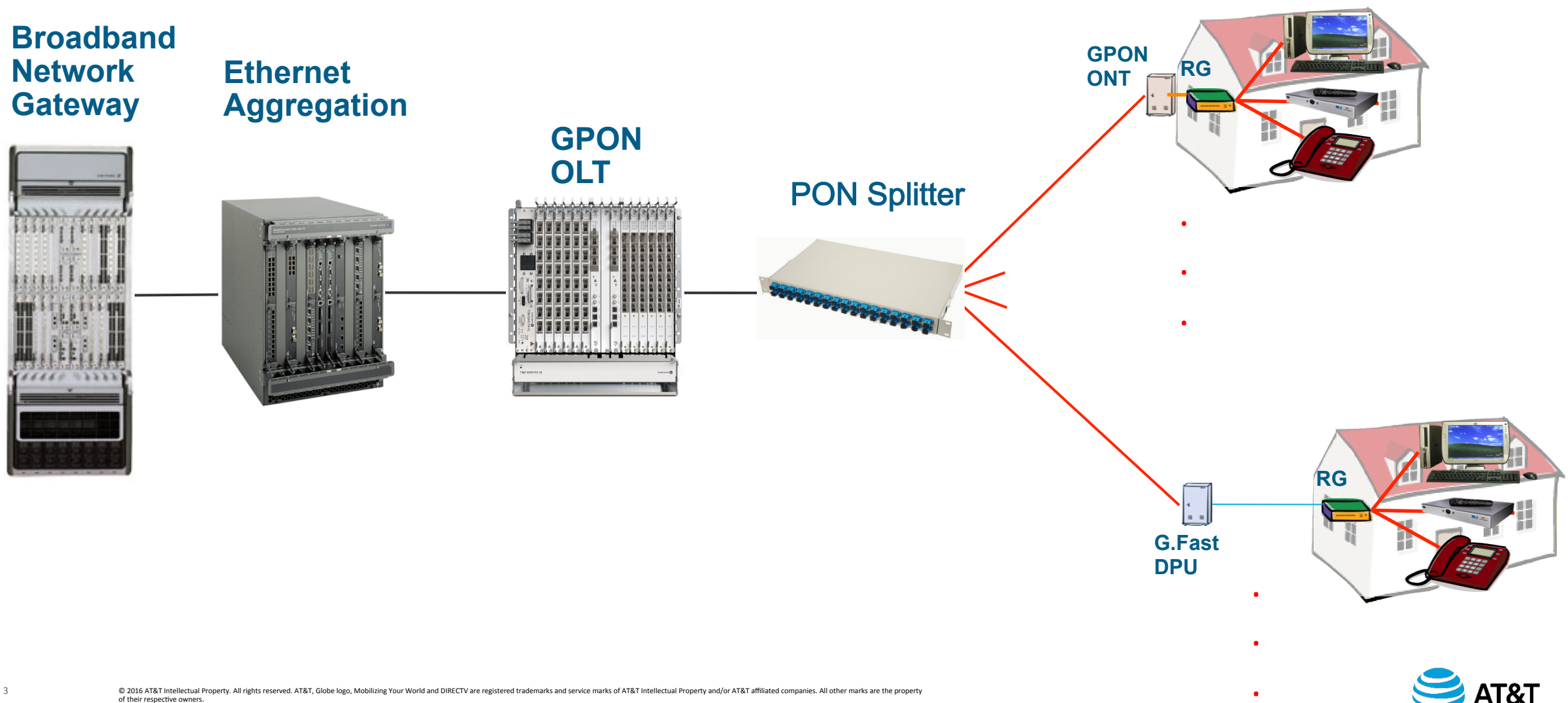
AT&T

A Reminder About Re-architecting as a Datacenter



AT&T

Legacy Broadband Access Architecture
(Using GPON as well as G.Fast)

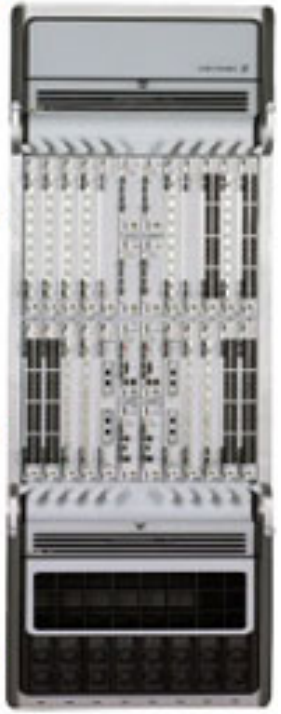


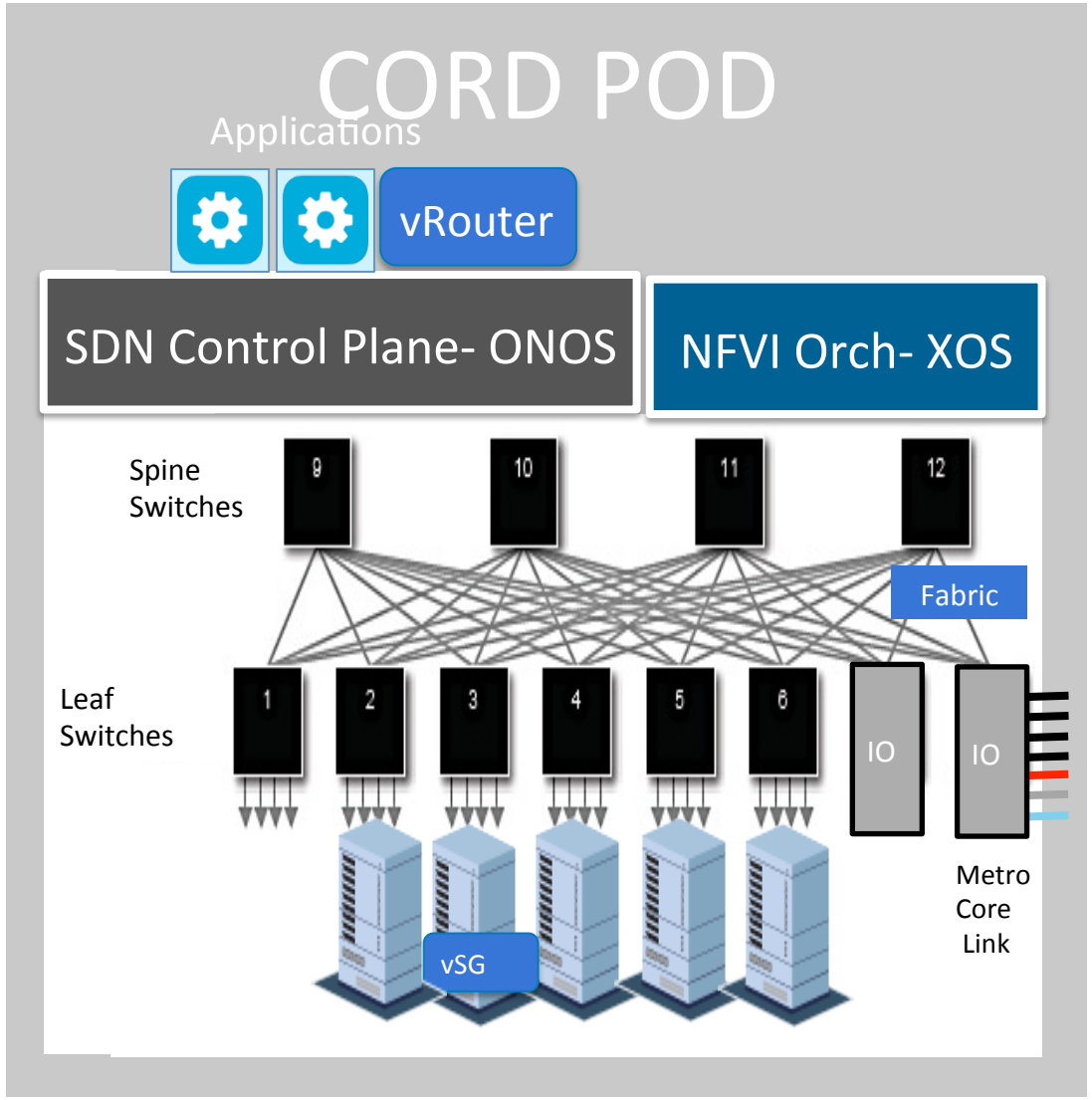
AT&T

Virtualizing an Broadband Network Gateway (BNG)

Everything can be virtualized and moved to NFVI using standard:

- Fabric Switches
- Subscriber Management VNFs
- SDN Control and Agent software
- Routing VNF
- Servers
- Scale-out Architecture





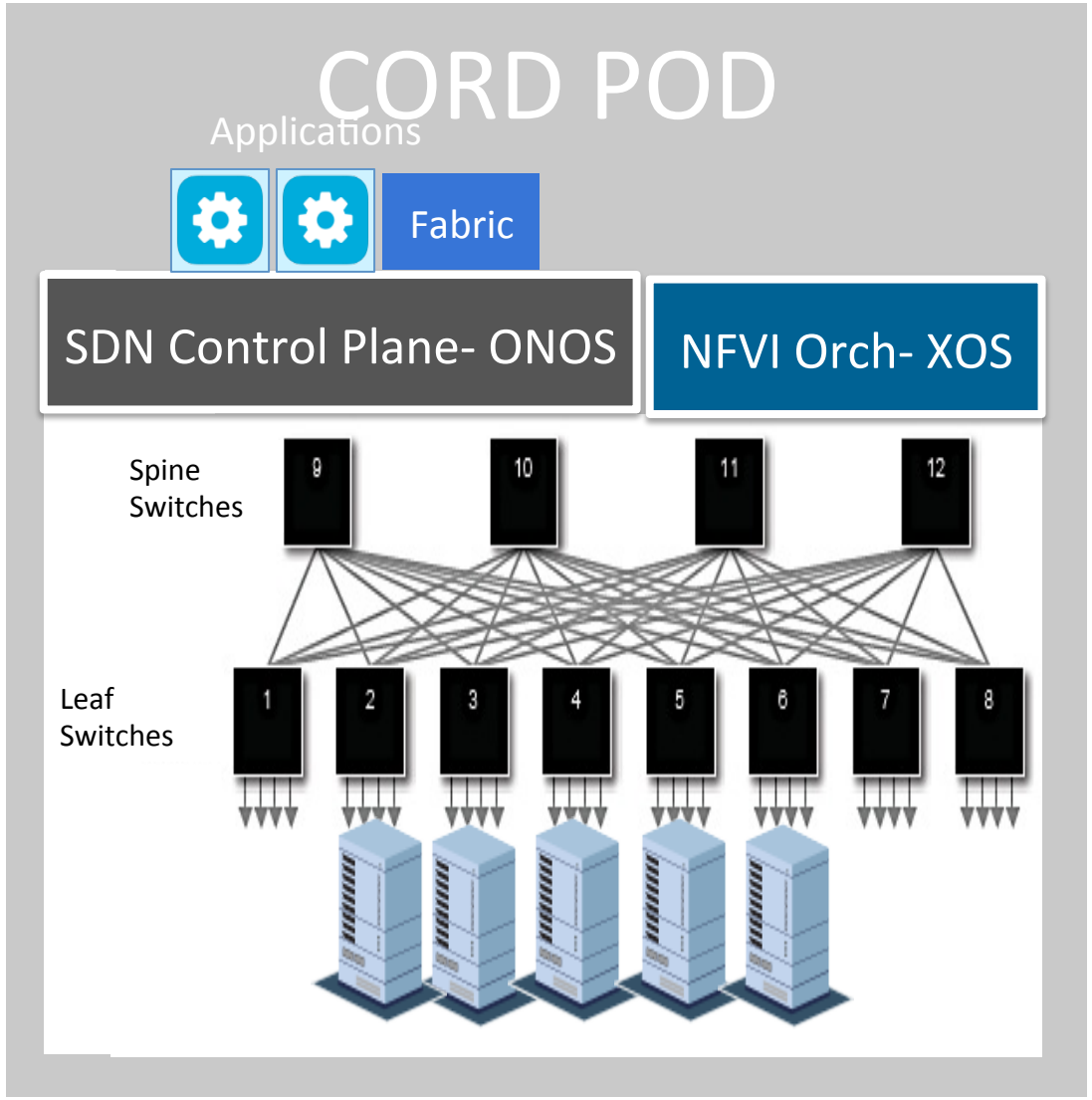
Commodity Hardware

AT&T

Virtualizing an Ethernet Aggregation Switch

Everything can be virtualized and moved to NFVI using standard:

- Fabric Switches
- SDN Control for Fabric
- Servers
- Scale-out architecture



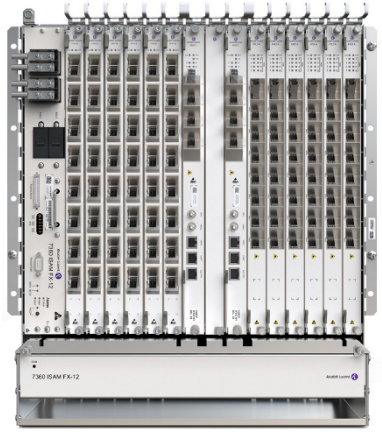
Commodity Hardware

AT&T

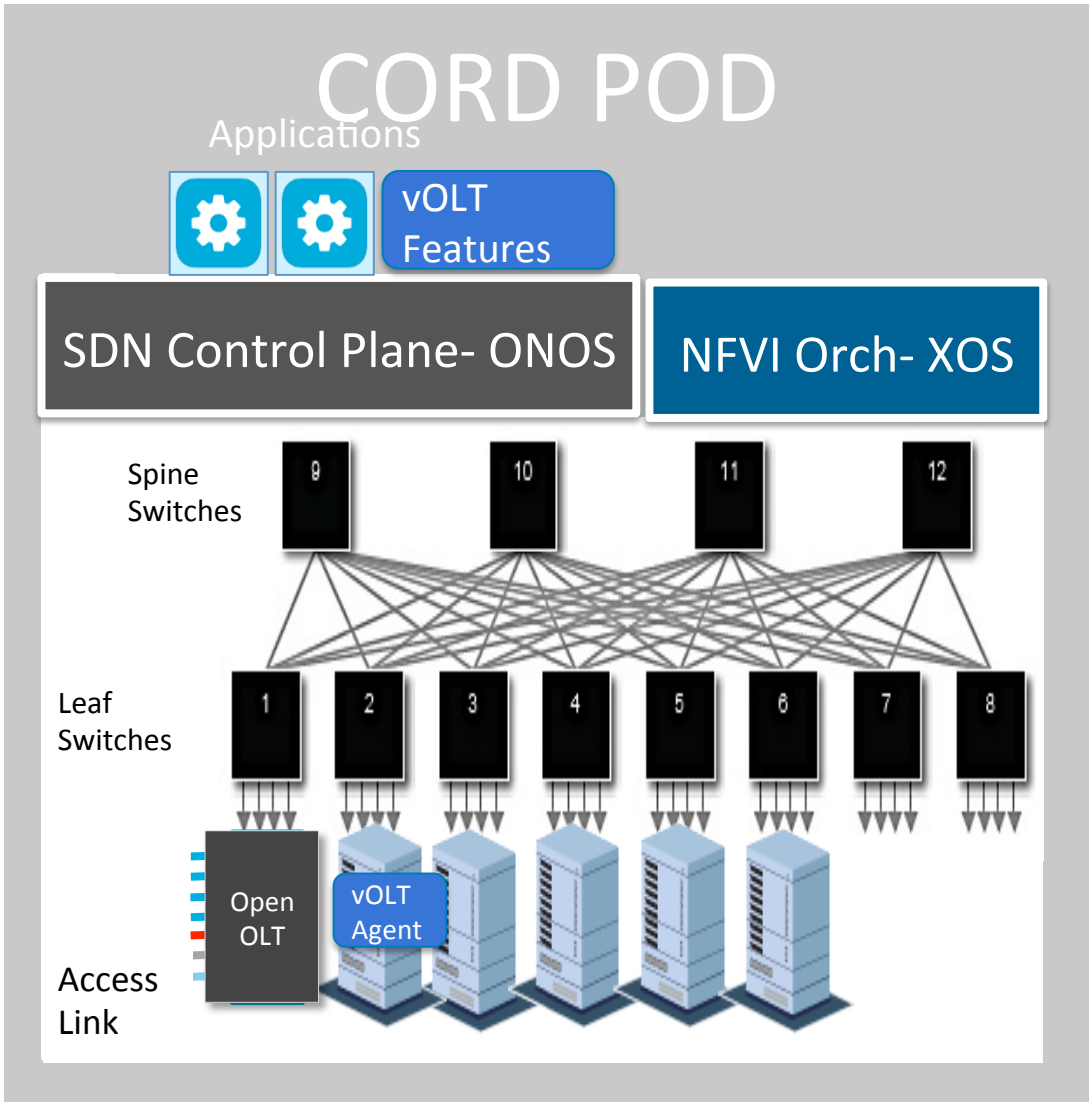
Virtualizing an OLT (vOLT)

Everything but the MACs can be virtualized and moved to NFVI using standard:

- Fabric Switches
- SDN Control and Agent Software
- Servers
- Scale-out control architecture



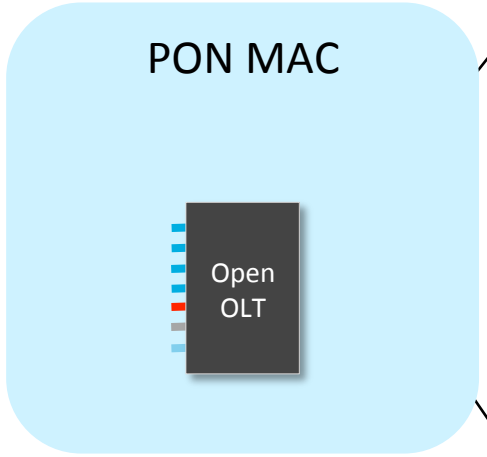
We need to create a new standard high volume (HV) PON MAC

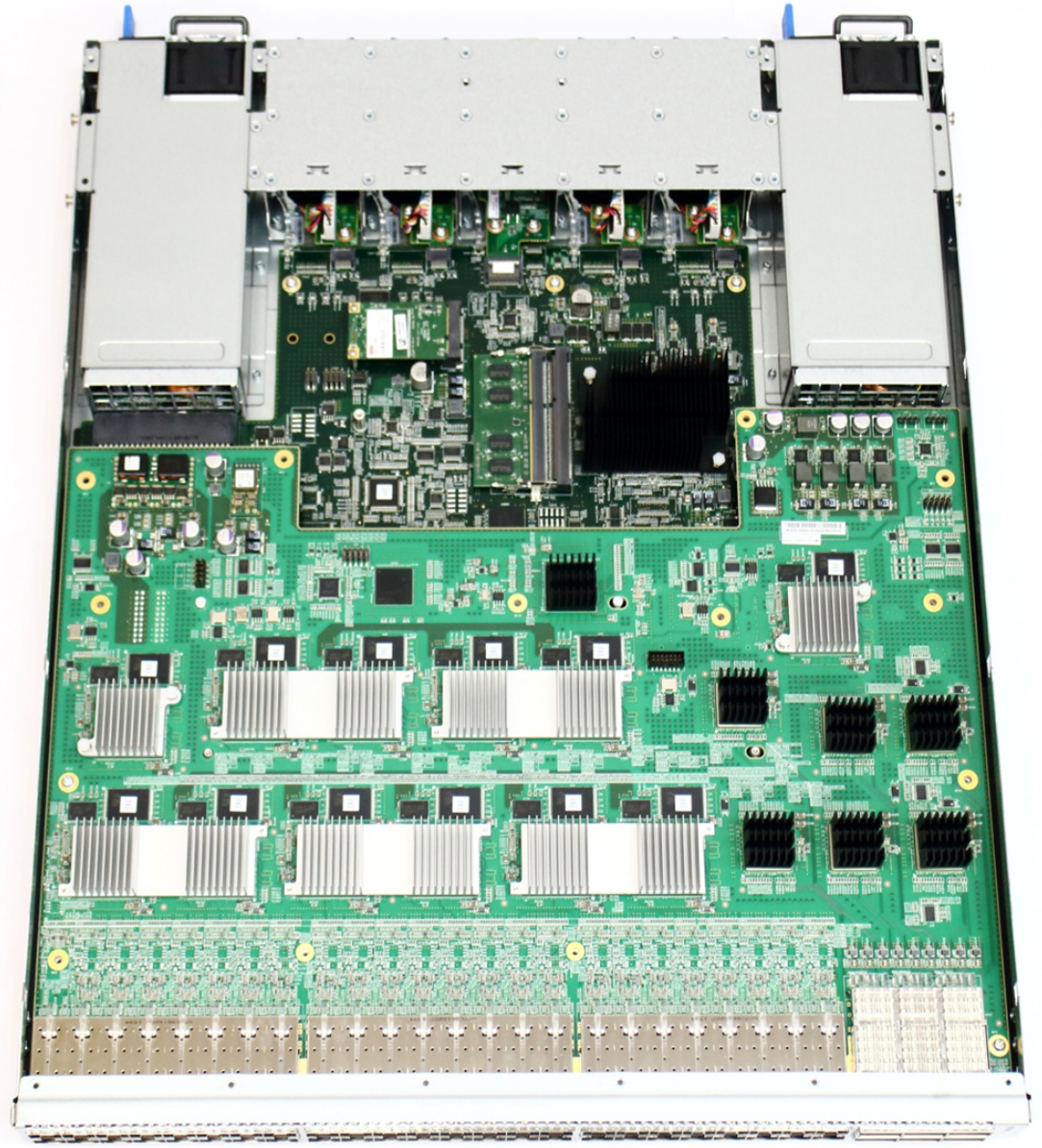


Commodity Hardware

AT&T

Design a Standard High-Volume OLT PON MAC



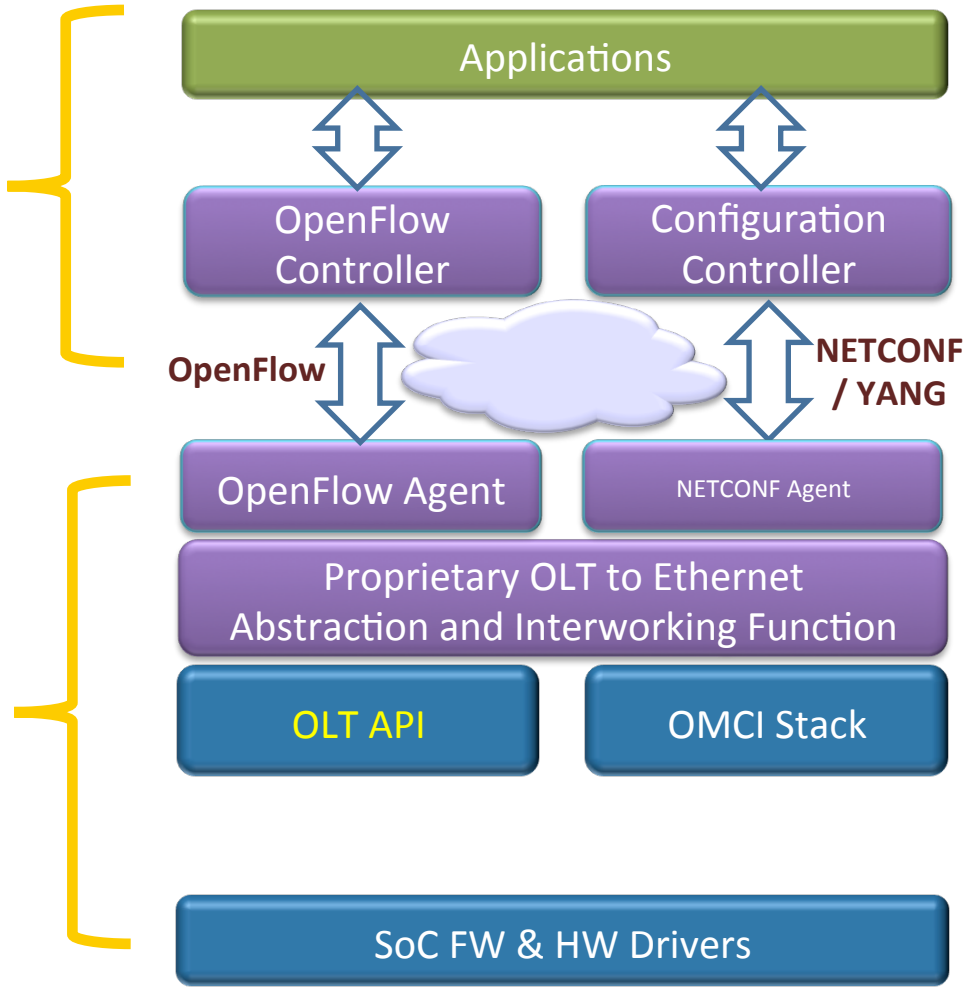


AT&T

Open GPON Software Stack

Features

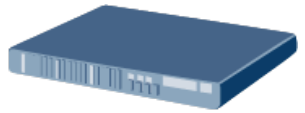
Agent

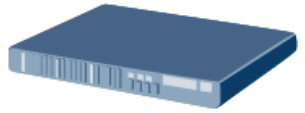


SDN controller, applications, and agents run on standard servers

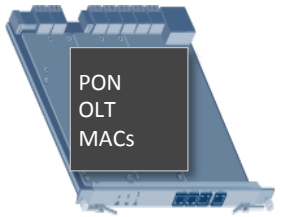
HW drivers runs on SOC

DC Server



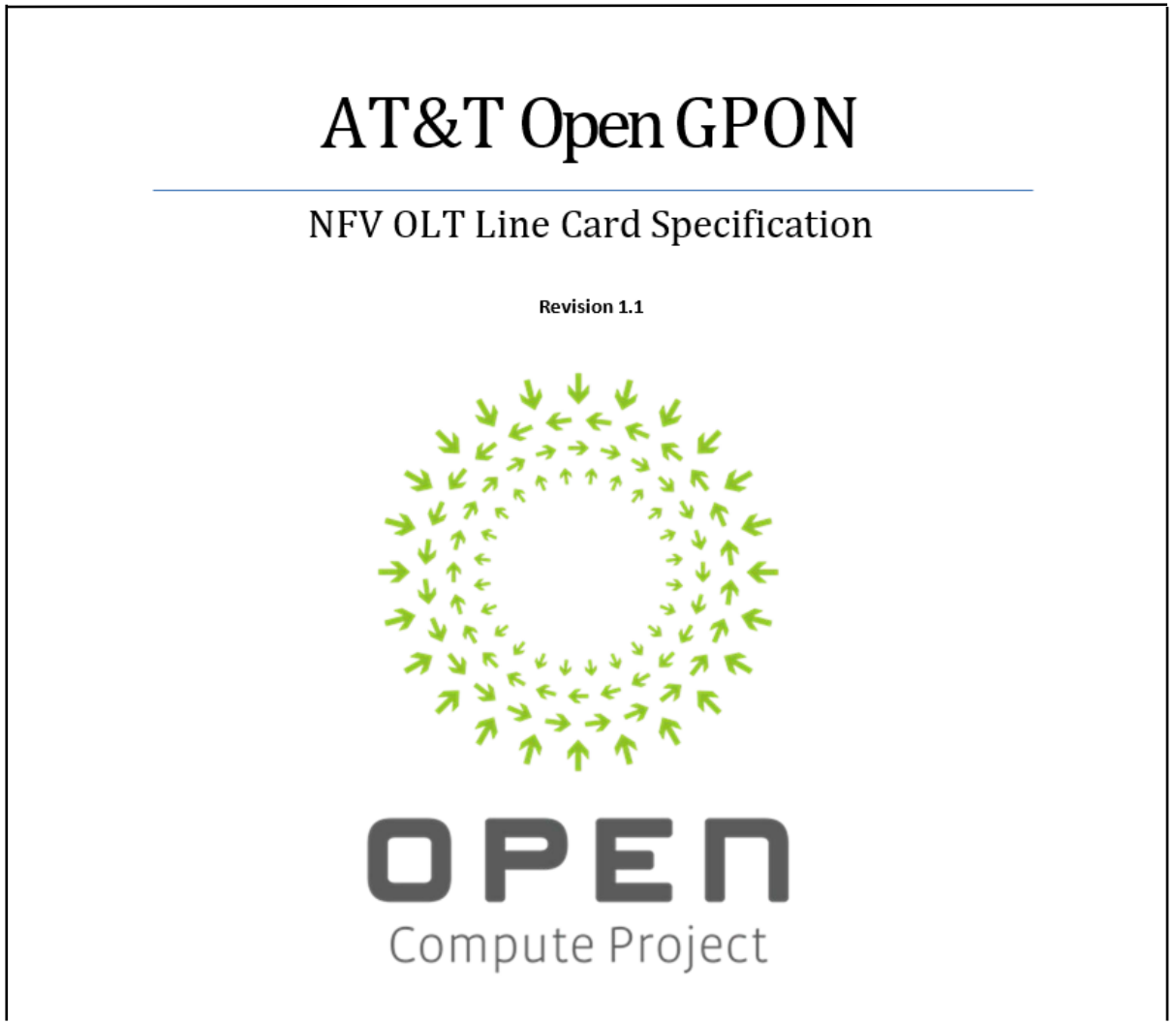


GPON OLT IO Blade



AT&T

vOLT is an Open Compute Project Specification



AT&T

Virtualizing Customer Premises Equipment (CPE)

CPE Devices are already High Volume devices, with standard SoCs and layouts that become customized by OEMs and carriers

The physical interfaces must remain in CPE at the home to be useful

However, there is opportunity in controlling and orchestrating CPE in concert with the NFVI

CPE may host both types of VNFs

CO-based VNFs can augment the CPE's basic function

AT&T

Some More Thoughts on Re-architecting

When physical network elements are mapped to CORD, it's advantageous to disaggregate them.

Disaggregation supports smaller, simpler VNFs that are easy to re-use.

Some functions, like aggregation, can be de-duplicated across elements and replaced with a single "fabric" application.

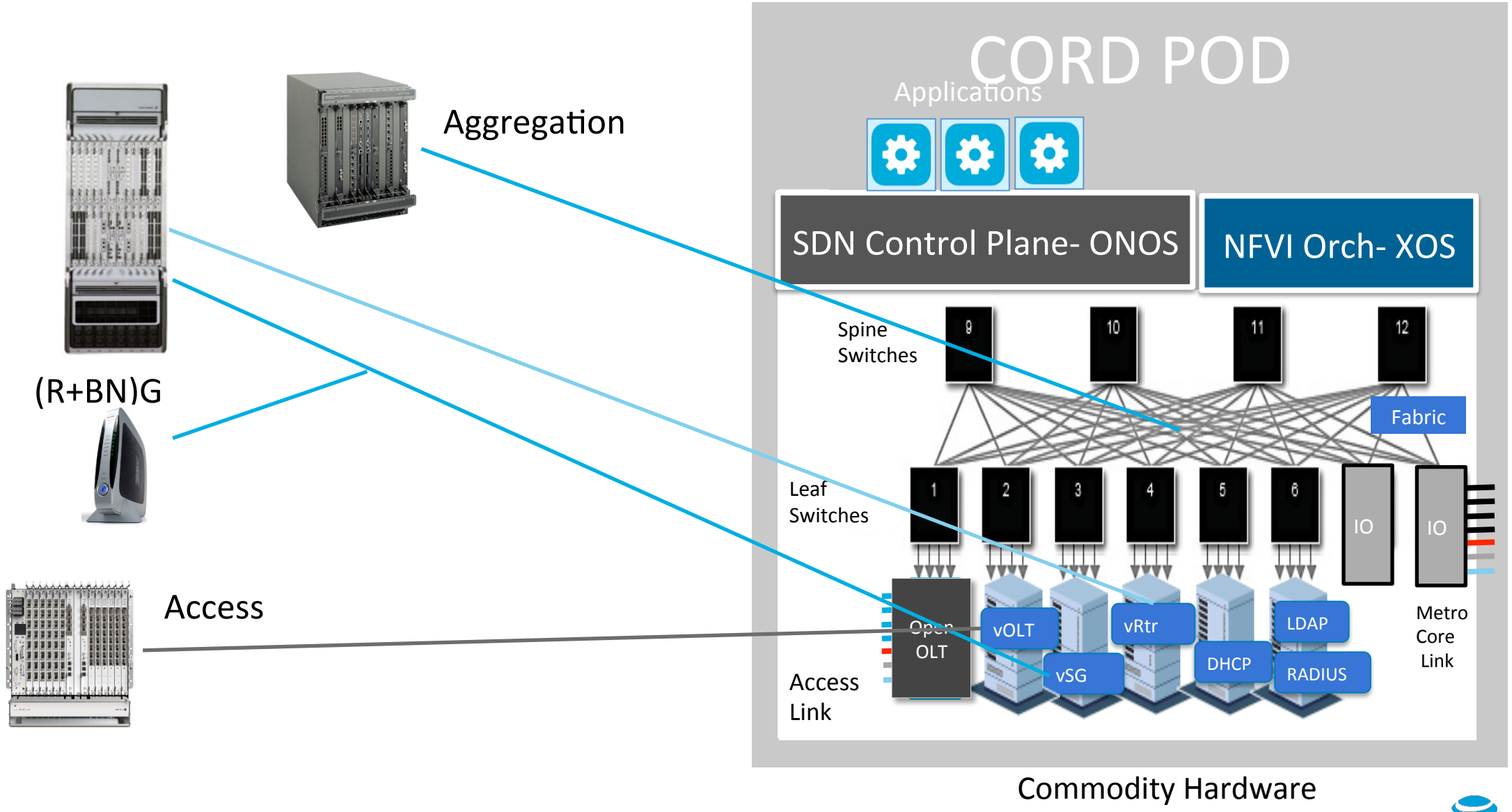
Rethink protocols for the cloud – information may not need to be shared widely.

Rethink system behavior from an operations perspective. You might gain more from lowering recurring ops costs than from reducing one-time capital costs.

Scale-out is a desirable characteristic, but many times the hard work is in scaling down to small locations with modest amounts of NFVI.

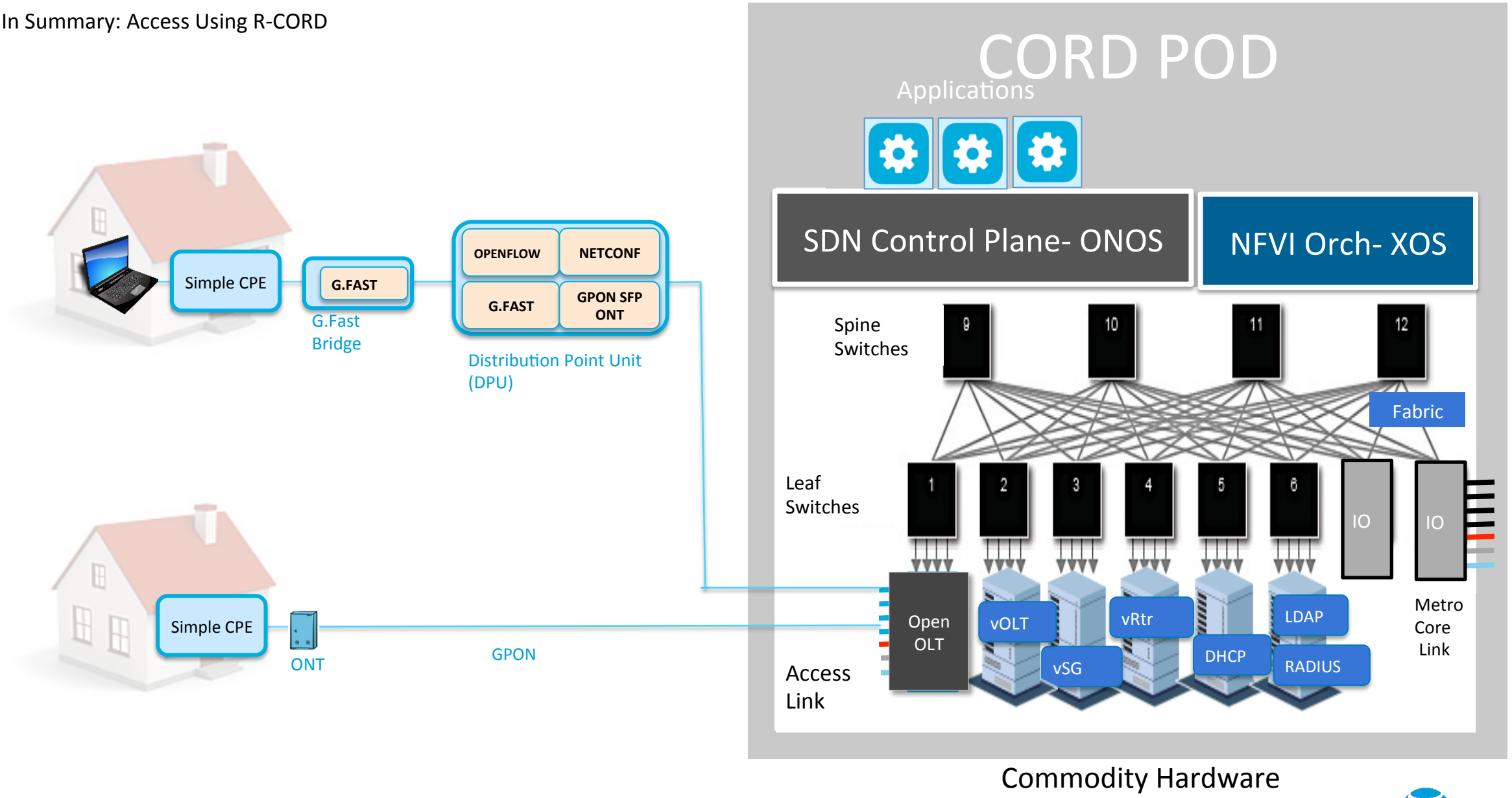
AT&T

Mapping All the Legacy Elements into CORD



AT&T

In Summary: Access Using R-CORD



AT&T

What's in R-CORD?

- R-CORD is both hardware and software - all of which is open.
- R-CORD is included in the BoM for a development and test environment that will run CORD.
- R-CORD software is a distribution of ONOS, XOS, OpenStack and example applications that provide the functions needed to support broadband access.
- Other variations on CORD add applications and equipment that supports: Mobility, Metro Ethernet, Analytics, and Transport.
- The underlying platform does not change across these variations, so both new applications, as well as mash-ups of the existing applications are possible – even likely.
- The CORD platform is a multi-tenant cloud, so it can support multiple services, service providers, and concurrent applications from networking to content to cloud applications: both WAN and LAN.
- Because it's based on SDN, the Network slicing and flow-based control allow much more sophisticated applications than simple L2 sharing or IP-VPN.

AT&T

R-CORD Value Proposition

Expand supplier ecosystem to include Open Source, startups, and non-traditional vendors.

Espouse open source and open spec. All of CORD is OCP and Open Source. There is nothing that is not re-usable or re-workable in CORD. No one holds CORD users hostage. All the hardware is as open as it gets. Absolutely no lock-in and easy interchangeability.

Shorten Time to Market. CORD was developed from inception to AT&T field trial in 9 months. Following the agile development and dev-ops model demonstrated by ON.Labs can help carriers learn to be agile and use dev-ops.

Collaboration – several carriers are collaborating on the CORD architecture, so it's got the benefits of community inputs and support. ON.Labs has collected 13 members, 40 Collaborating organizations and over 950 individual contributors.

Separate Innovation from commercialization. The open source community innovates on CORD, and several members commercialize it. This supports multiple business engagement models along the make-vs-buy spectrum.

New Service architectures. CORD provides a consumer cloud-bursting architecture. Many new types of services can be applied to consumer, business, both from wireline and wireless access… including integrating and homogenizing those market segments.

AT&T