



CORD

Delivering cost-performance leadership and cloud-style agility to Service Provider networks

An ONOS Project solution POC

CORD Highlights

CORD Partnership



What is CORD?

1 CORD is an end-to-end solution POC that combines SDN, NFV, Cloud with commodity infrastructure and open building blocks to deliver datacenter economies of scale and cloud-style agility to service provider networks

CORD Value proposition

2 CORD enables service providers to build an underlying common infrastructure in Central Office with white boxes, ONOS, OpenStack, and XOS with a diversity of organizations building the services and solutions above.

CORD open building blocks

3 ONOS(SDN Control Plane), Openstack(Virtual infrastructure mgmt), XOS (Services mgmt), open commodity hardware, OF-enabled OLT MAC and G.fast DPU

What problems does CORD address?

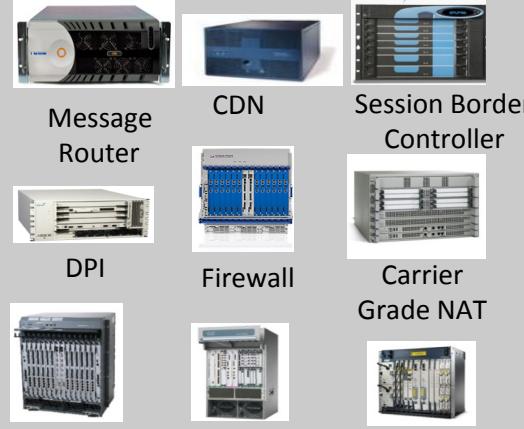


Problem:

Today's Telco Central Offices (COs) are huge source of CAPEX/OPEX and their design/infrastructure is not geared for programmability, agility



Huge source of CAPEX/OPEX



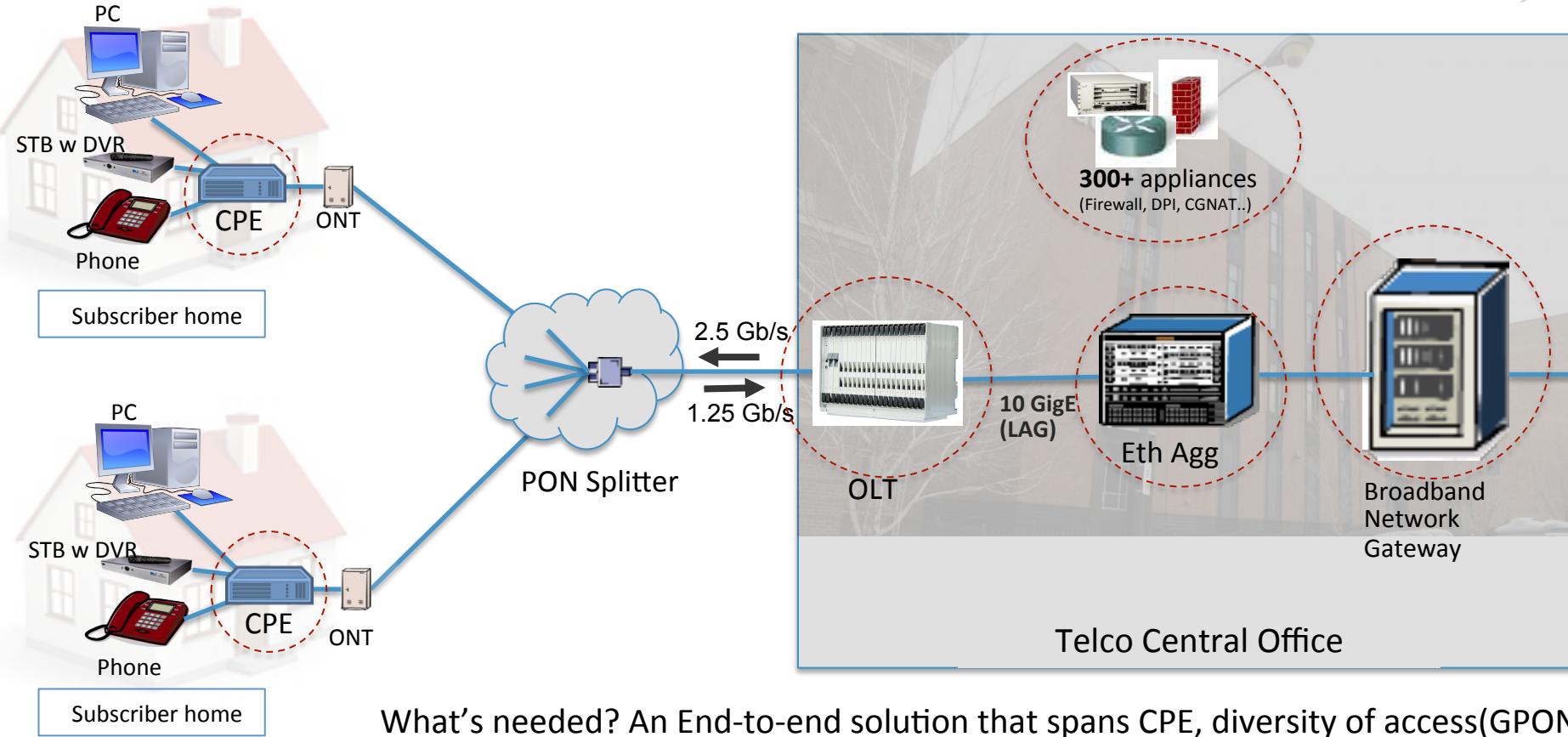
- Fragmented non-commodity hardware.
- Physical install per appliance per site
- Nearly **300+** unique deployed appliances.

What's needed? Common underlying infrastructure based on commodity hardware/whiteboxes and open platforms

Source: AT&T

Problem:

Piecemeal virtualization does not yield full benefits of SDN/NFV/Cloud



Introducing CORD

What is CORD?



CORD:

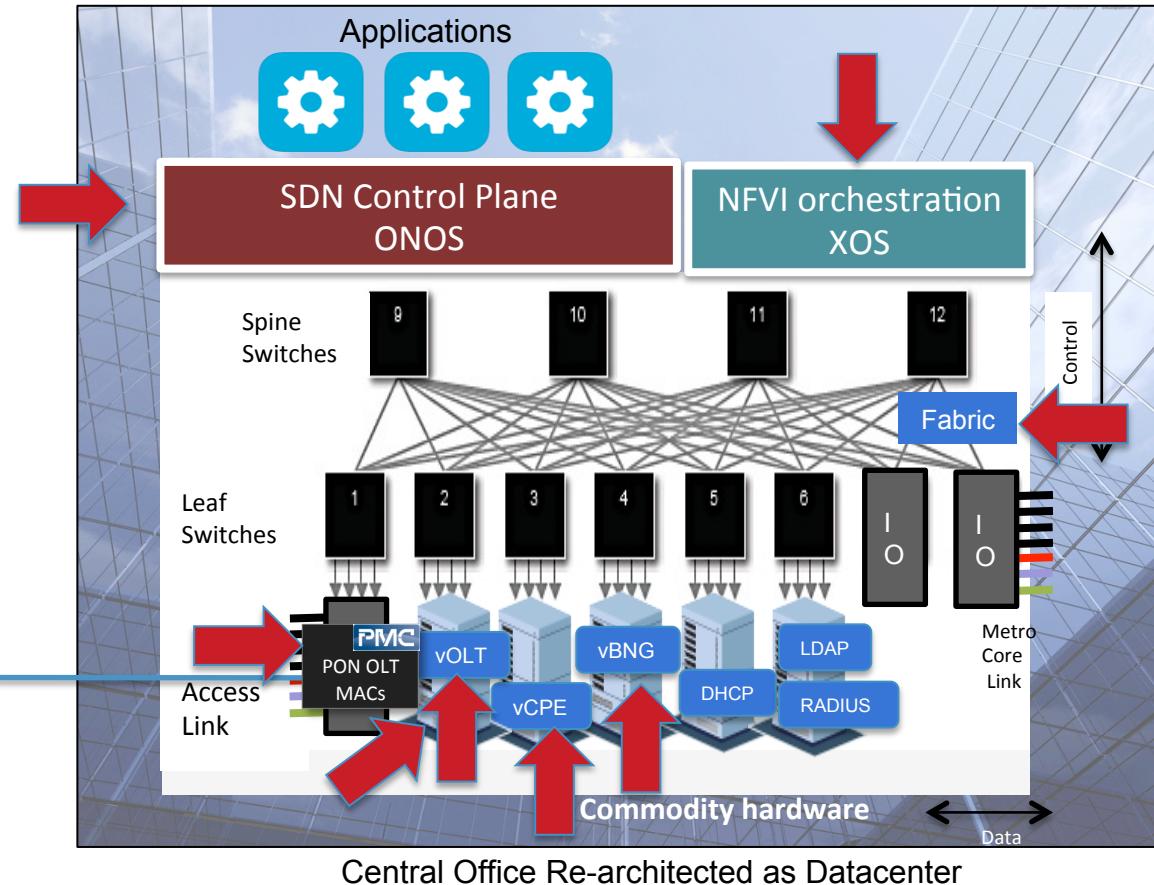
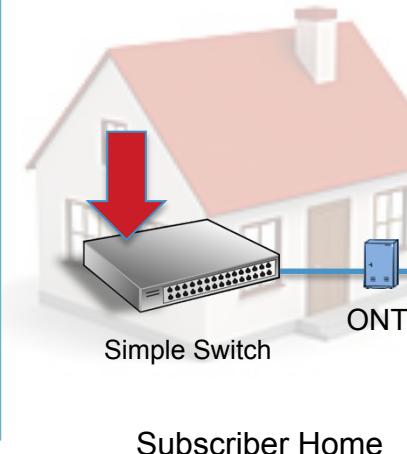
- is an end-to-end solution POC that spans Telco Central Office, Access (GPON, G.fast..), Home/Enterprise
- combines SDN, NFV, Cloud with commodity infrastructure and open building blocks to deliver datacenter economies of scale and cloud-style agility to service provider networks
- enables service providers to build an underlying common infrastructure in Central Office with white boxes, ONOS, OpenStack, and XOS with a diversity of organizations building the services and solutions above.
- proof-of-concept solution will be demonstrated at ONS 2015

CORD Key Building Blocks



CORD key components-

- Commodity hardware
- SDN Control Plane (ONOS)
- NFVI Orchestration (XOS, Openstack)
- Open Leaf Spine Fabric
- Simple on-prem CPE + vCPE
- Virtualized Access (PON OLT MAC + vOLT)
- Virtualized Functions
- Virtualized BNG

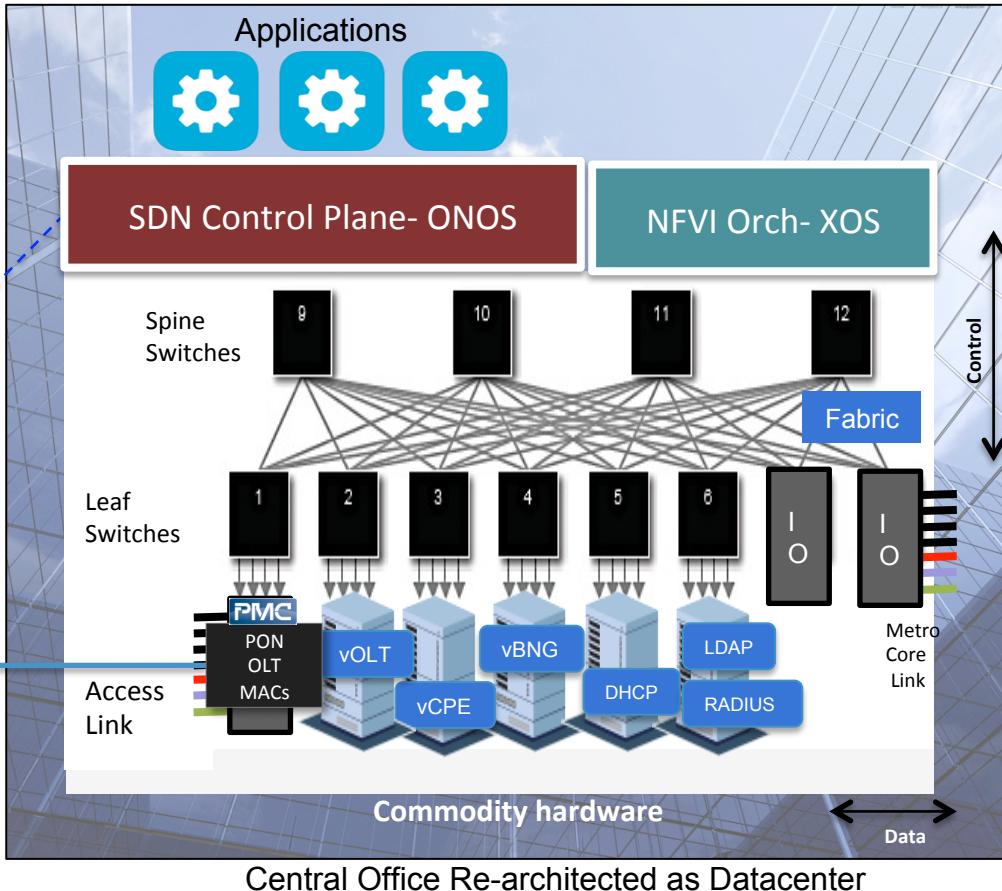
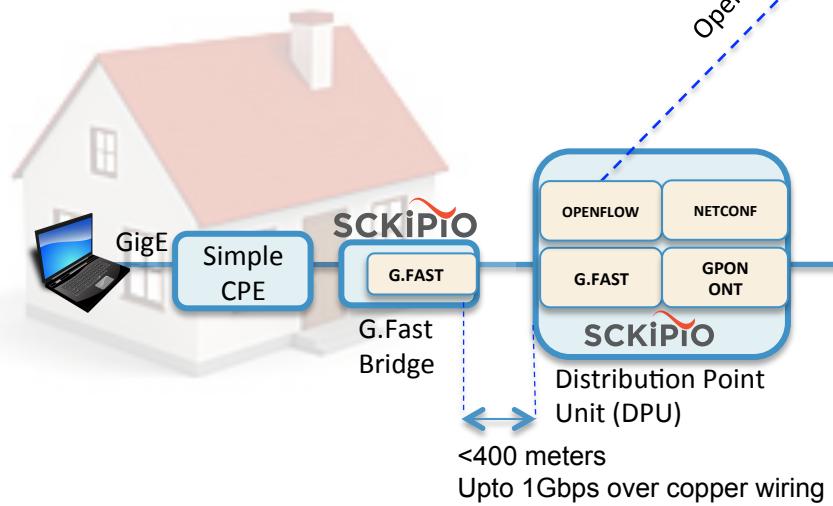


CORD is applicable to diverse access technologies



CORD is applicable to a diversity of access technologies-

- GPON
- G.Fast
- Potentially DOCSIS and others..



CORD value proposition

1



End-to-end SDN/NFV solution
Solution spans Central Office,
Access (GPON,G.fast..), Home/
Enterprise

2



Common infrastructure with
Open Building Blocks
Architected using best-of-breed, open software and hardware building blocks

3



Reduces CAPEX
Disaggregates proprietary boxes, virtualizes their functions and instantiates on commodity hardware

4



Reduces OPEX

Reduces OPEX with automated service orchestration

5



Faster time-to-market

Accelerates time-to-market with programmable, flexible networks

6



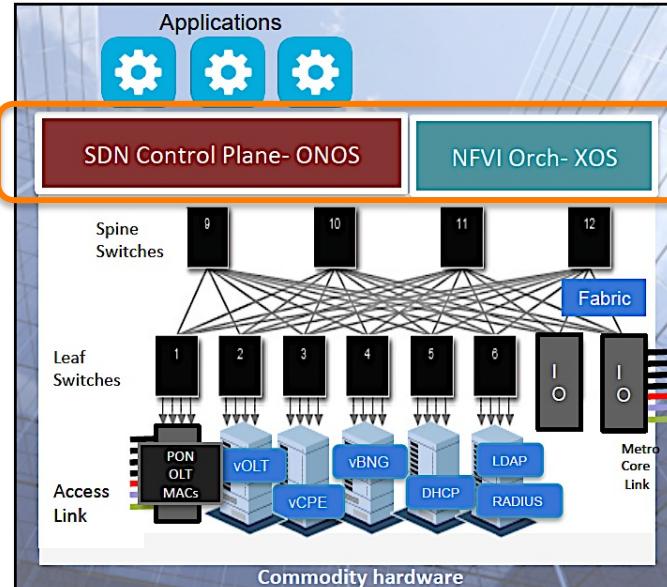
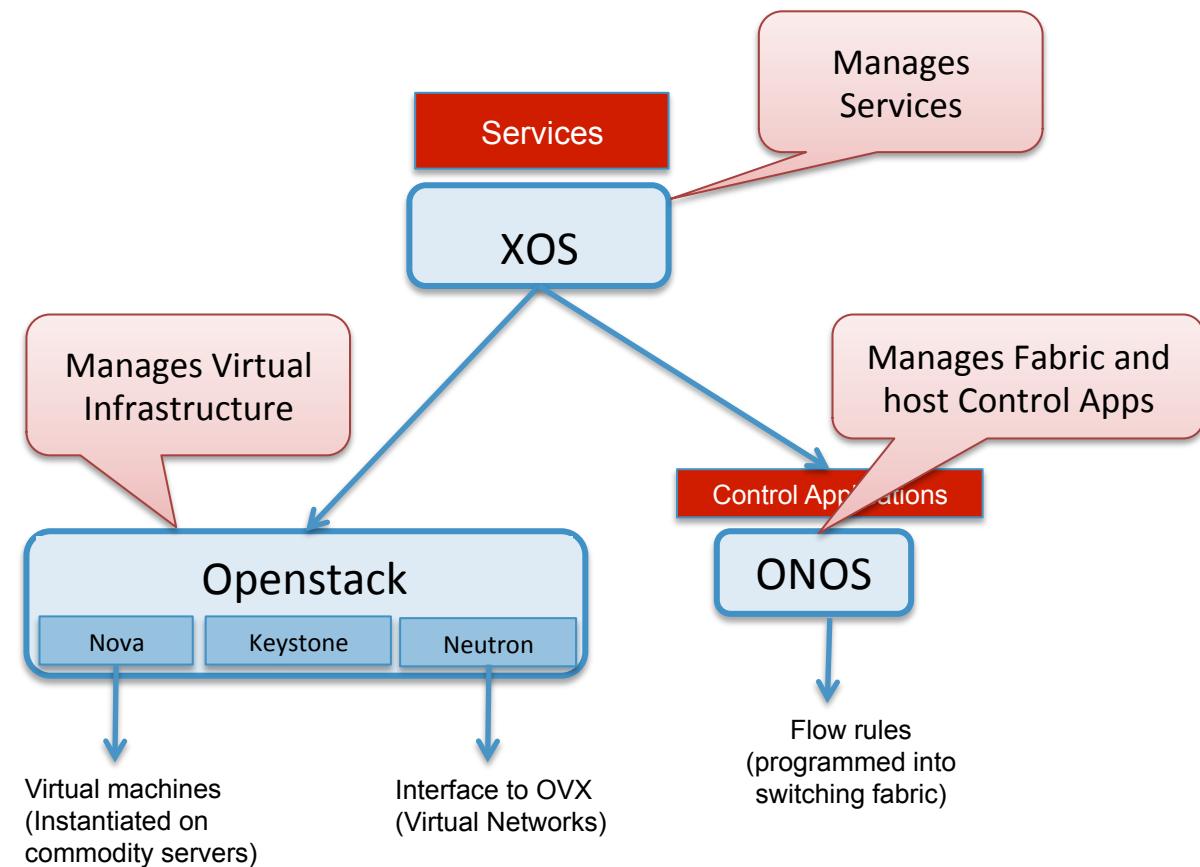
Adds value to cloud services

Adds value to existing cloud services by adding edge footprint.

CORD delivers Cost-performance leadership and Cloud-style agility to Service Provider networks

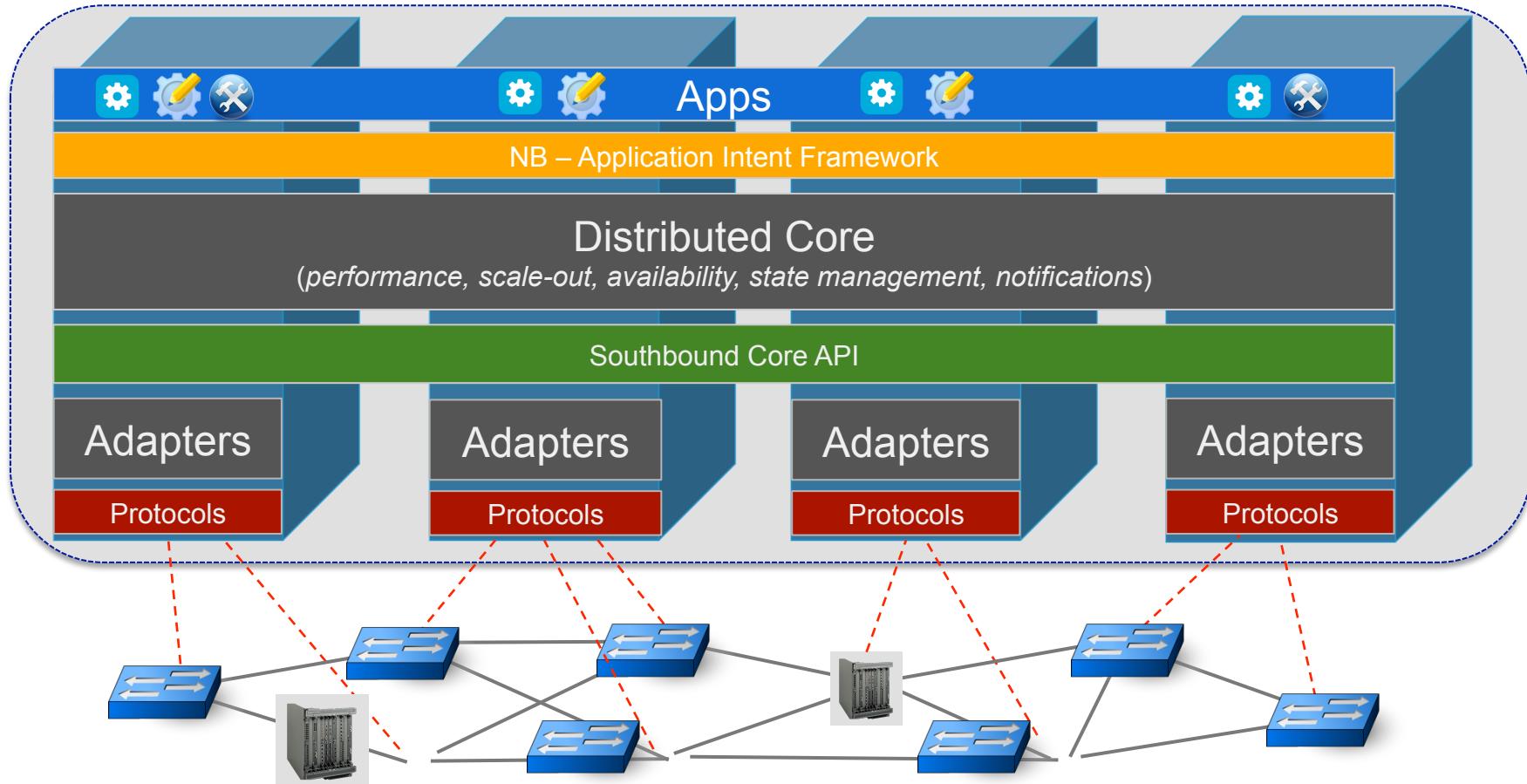
CORD – what's under the hood?

SDN Control Plane/NFVI Orchestration

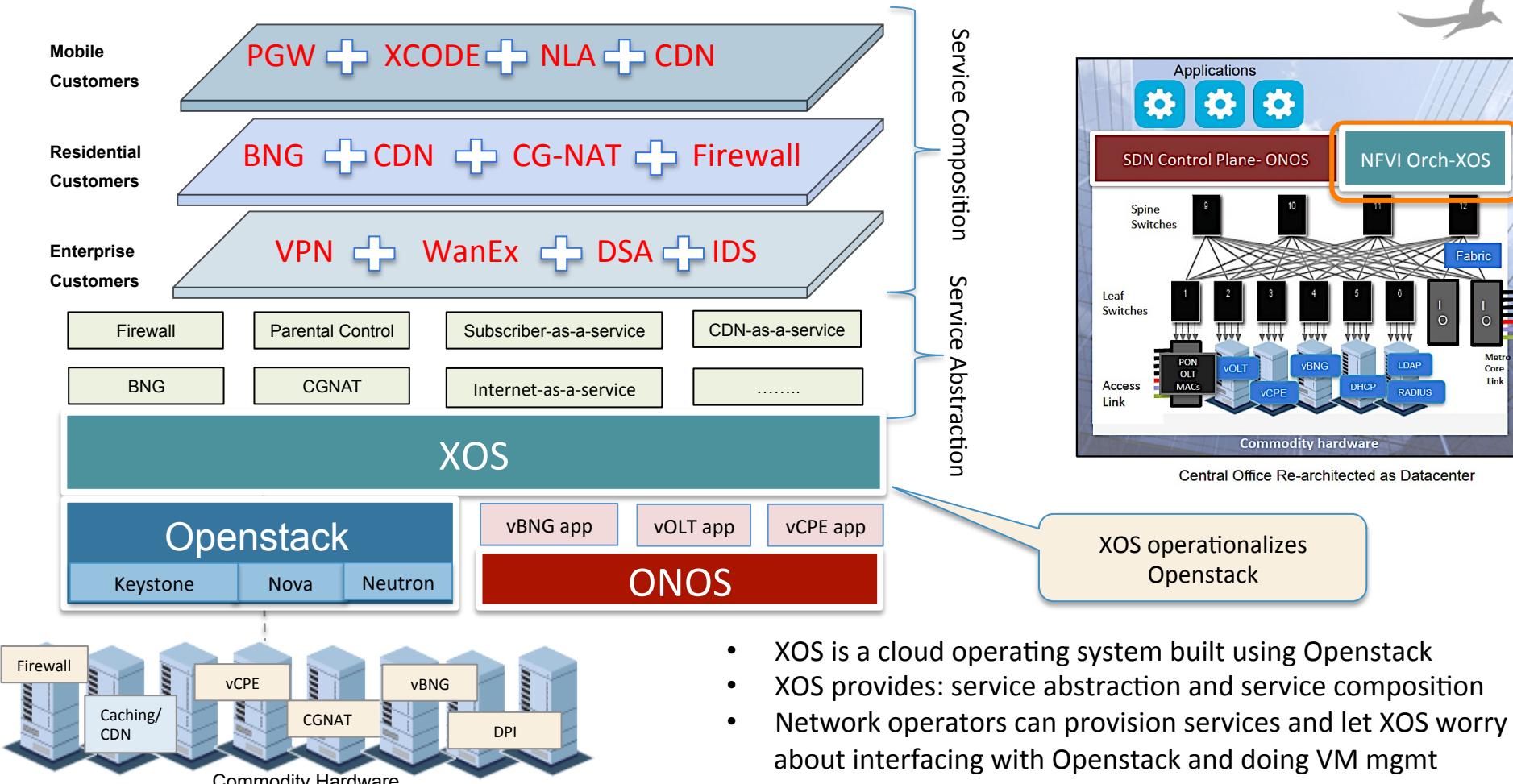


Central Office Re-architected as Datacenter

SDN Control Plane - ONOS



A closer look at XOS- Service Orchestration for CORD



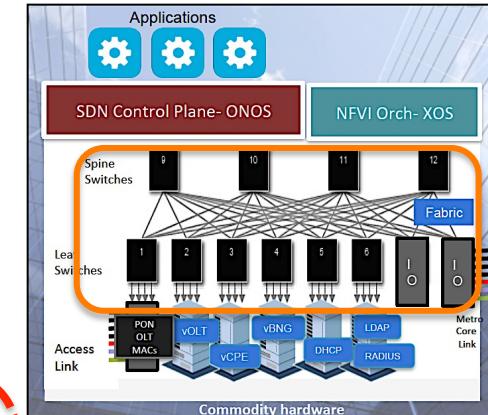
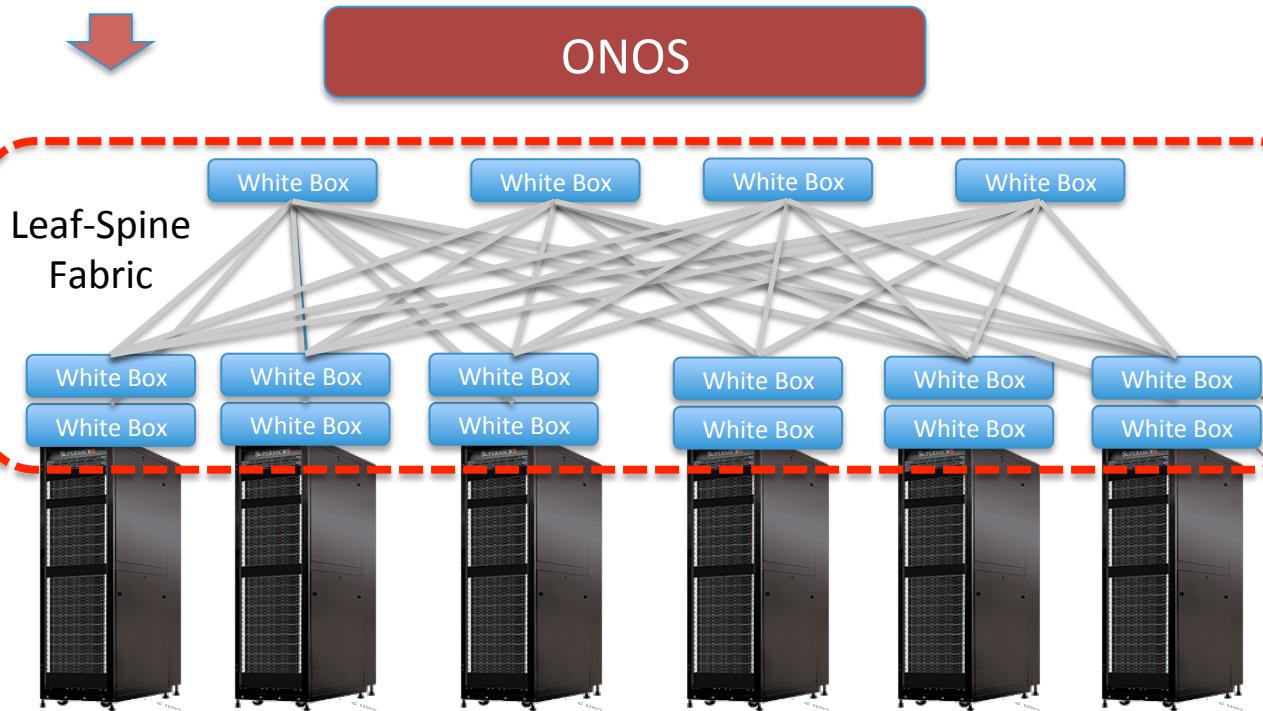
Open Leaf-Spine Fabric



Open Source
SDN-based
Bare-metal

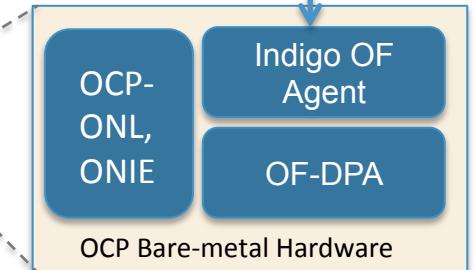


L3 Clos Segment Routed
Fabric Control app



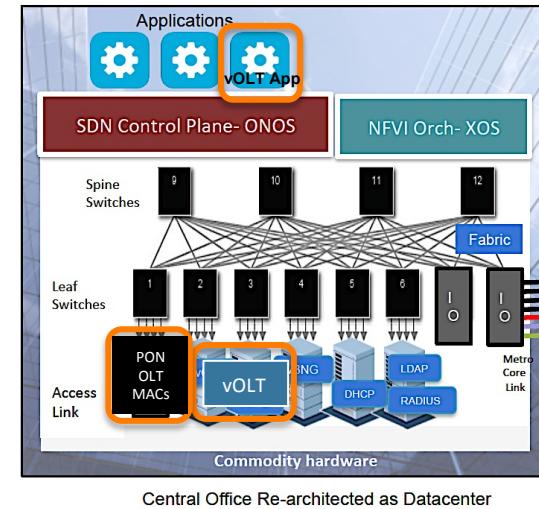
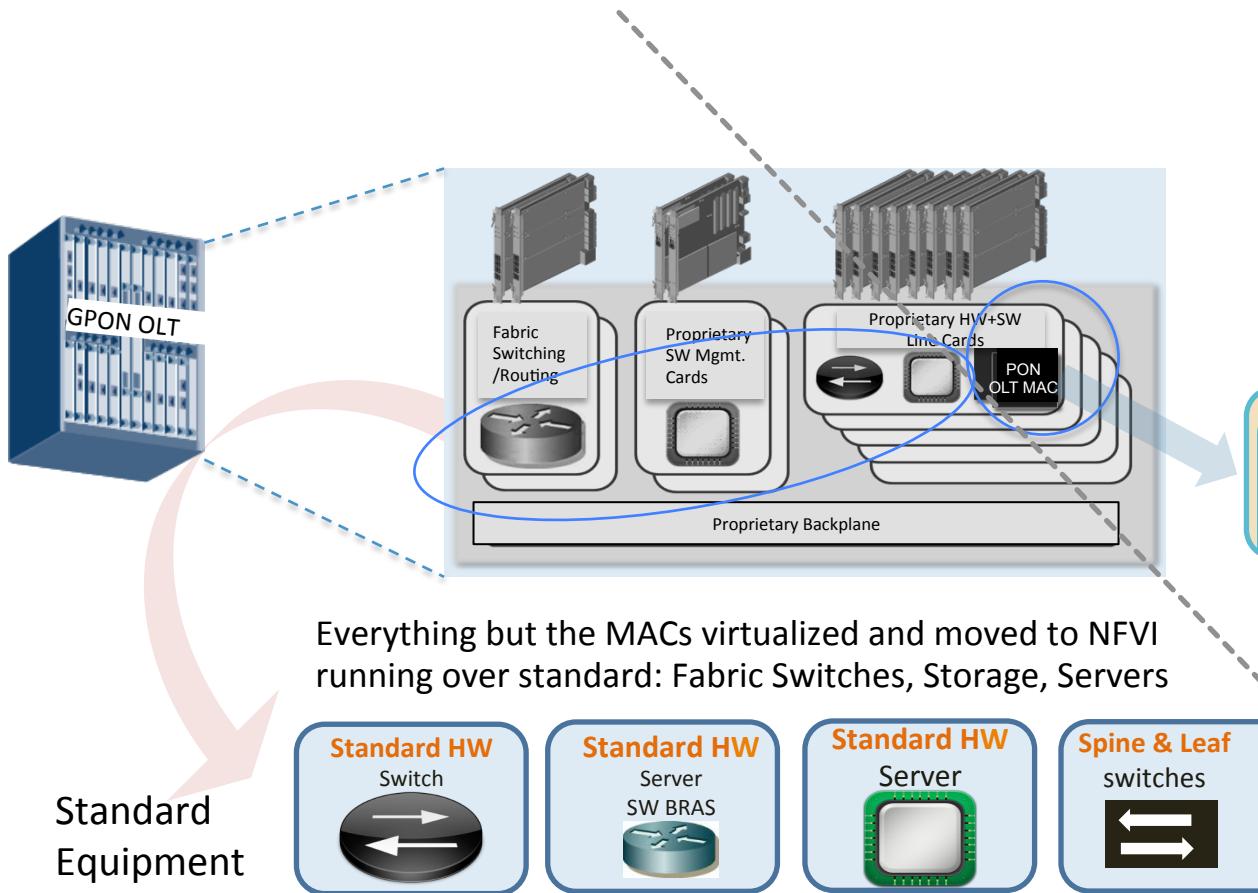
Central Office Re-architected as Datacenter

OF 1.3 + TTP



Whitebox

Virtualizing the OLT



Central Office Re-architected as Datacenter

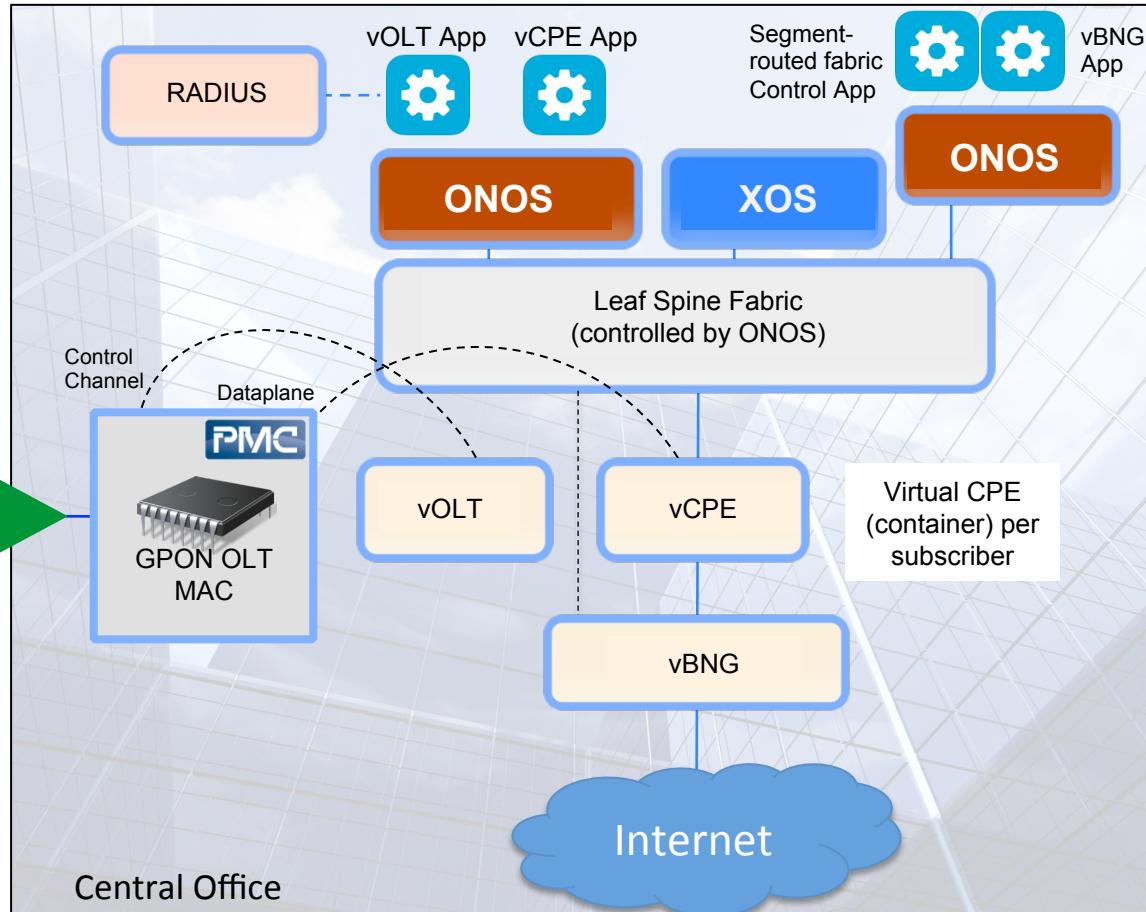
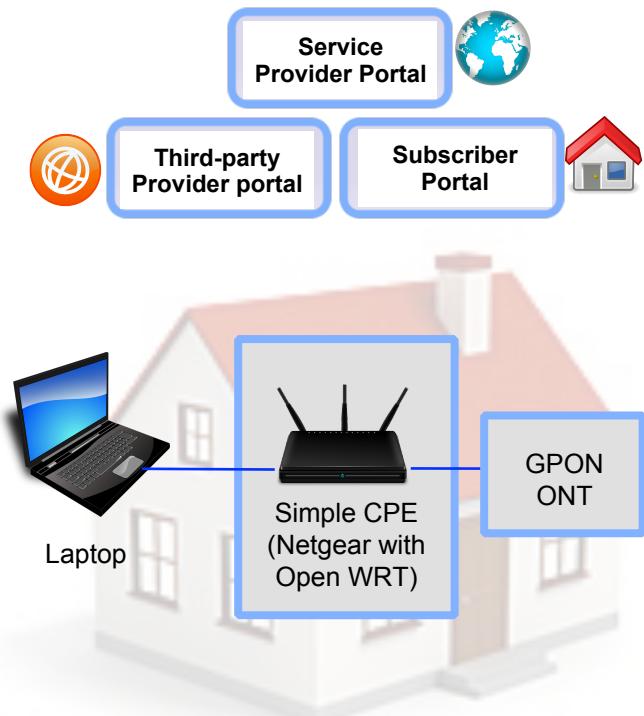
PON MACs moved to
standalone HW

NFV OLT

Source: AT&T

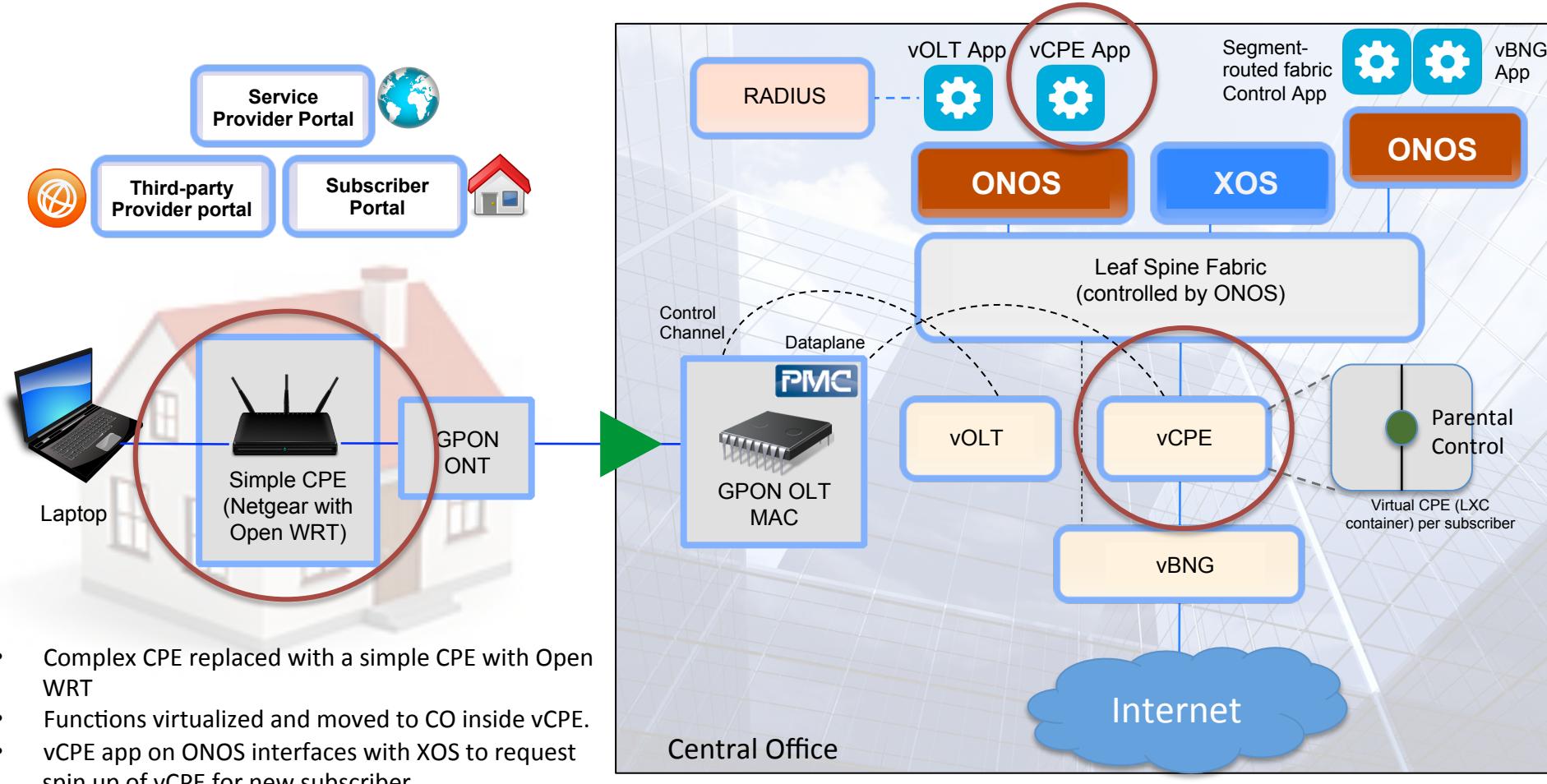
CORD Demo at ONS 2015

CORD Demo at ONS 2015

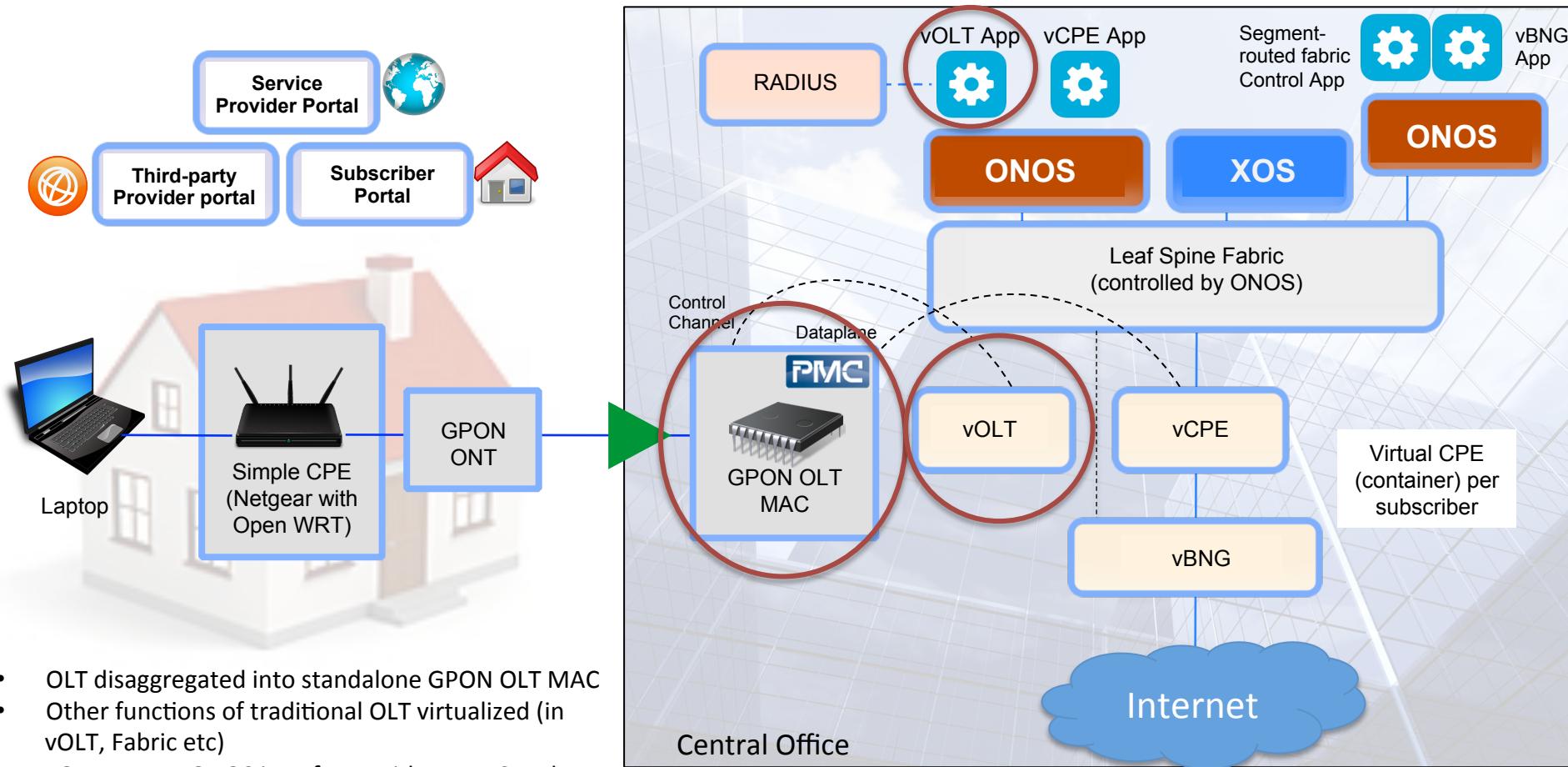


CORD Solution POC demo at Open Networking Summit on June 15-18, 2015

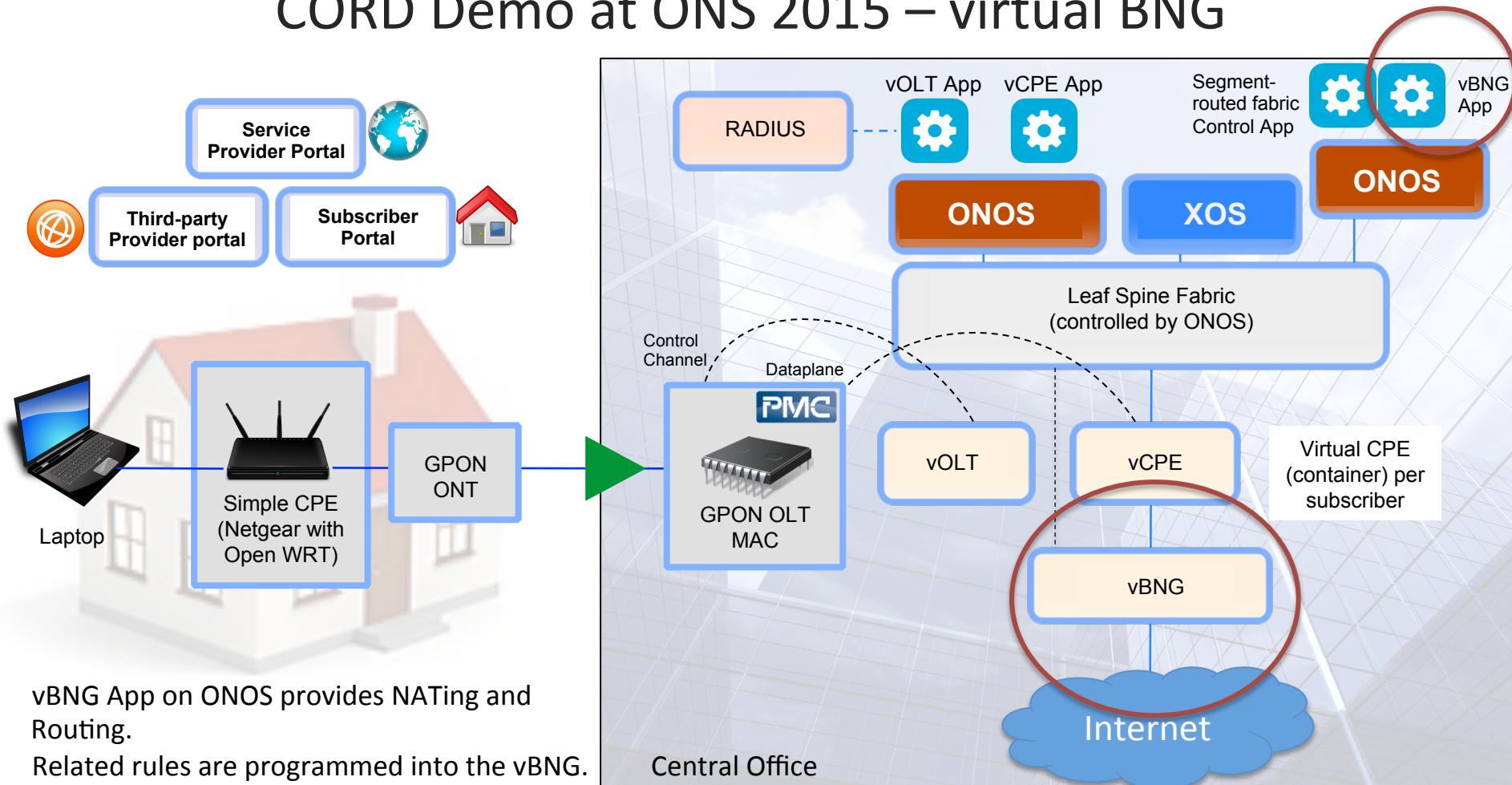
CORD Demo at ONS 2015 – virtual CPE



CORD Demo at ONS 2015- Virtual OLT



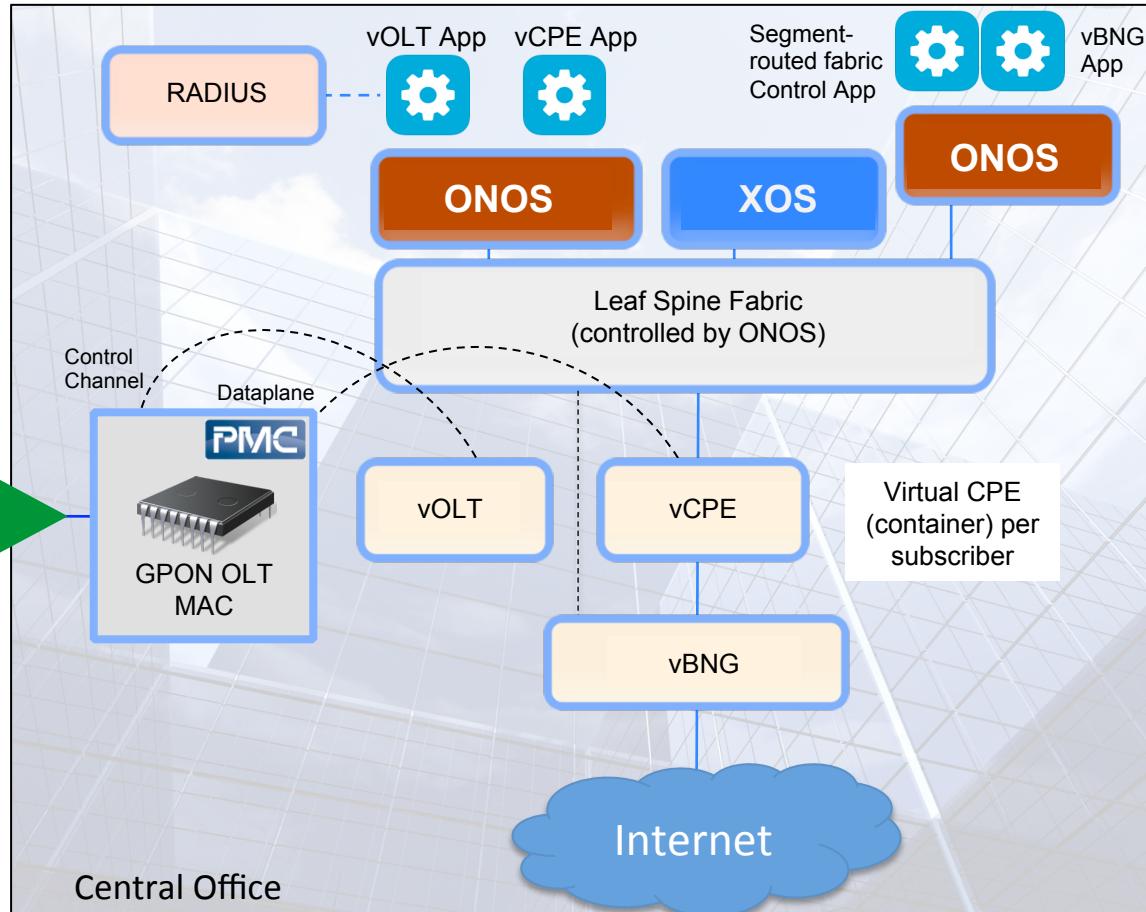
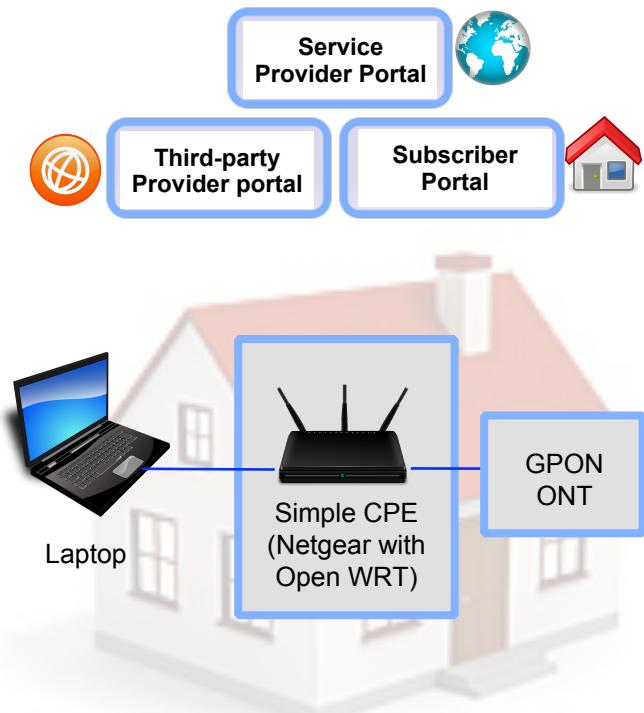
CORD Demo at ONS 2015 – virtual BNG



- vBNG App on ONOS provides NATing and Routing.
 - Related rules are programmed into the vBNG.

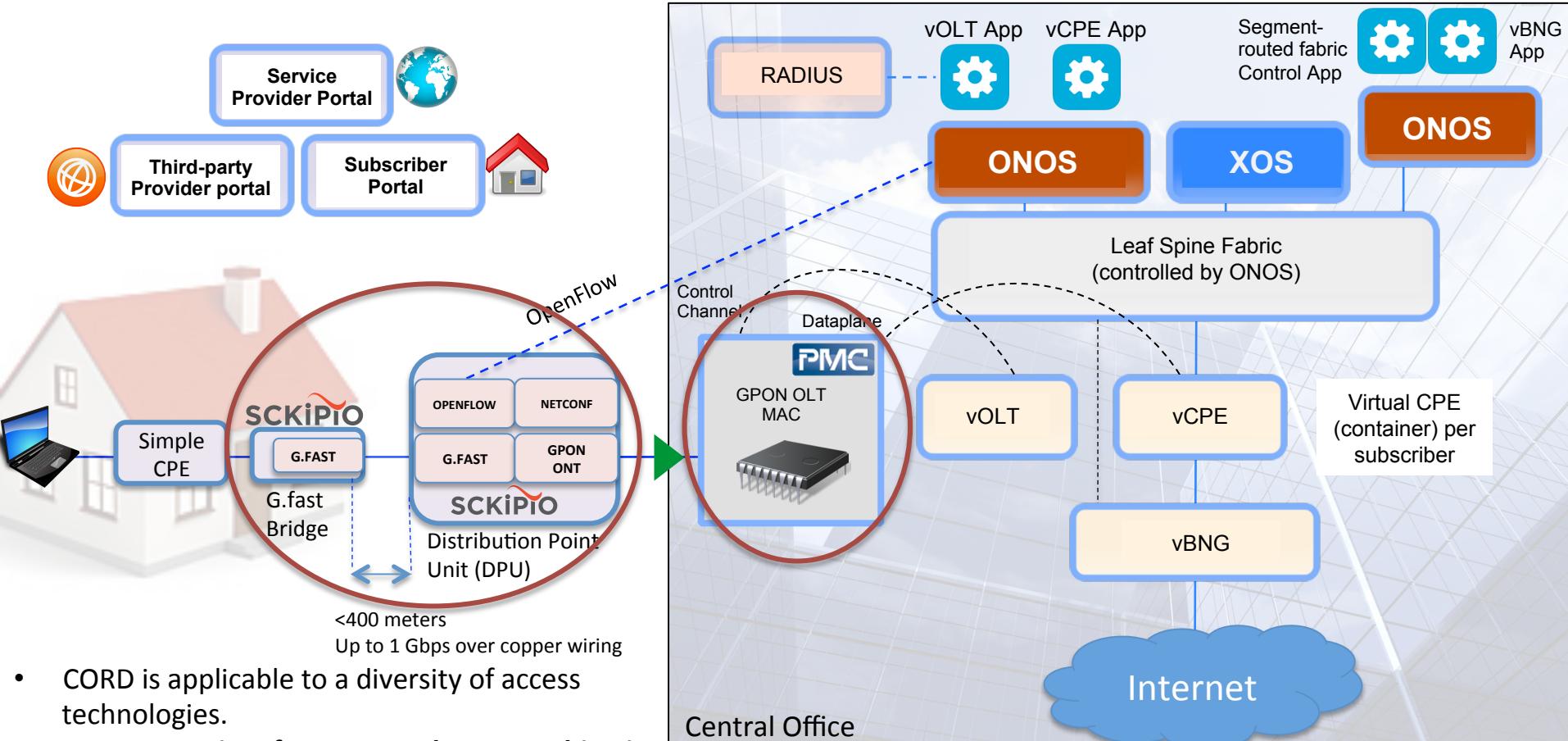
Note- the demo only includes partial virtualization of BNG functions – specifically those related to Internet connectivity

CORD Demo at ONS 2015 (GPON)



CORD Solution POC demo at Open Networking Summit on June 15-18, 2015

CORD Demo at ONS 2015 (G.fast + GPON)

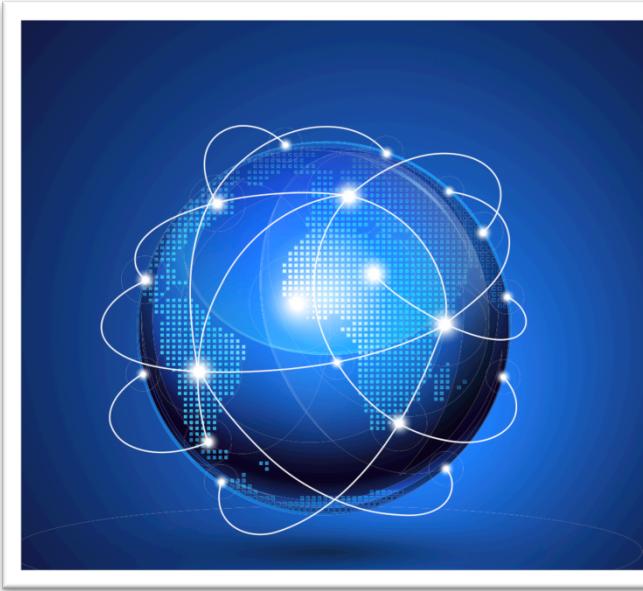


- CORD is applicable to a diversity of access technologies.
- Here access is G.fast + GPON but everything is applicable as is.

CORD Demo- From the users' perspective



Subscriber



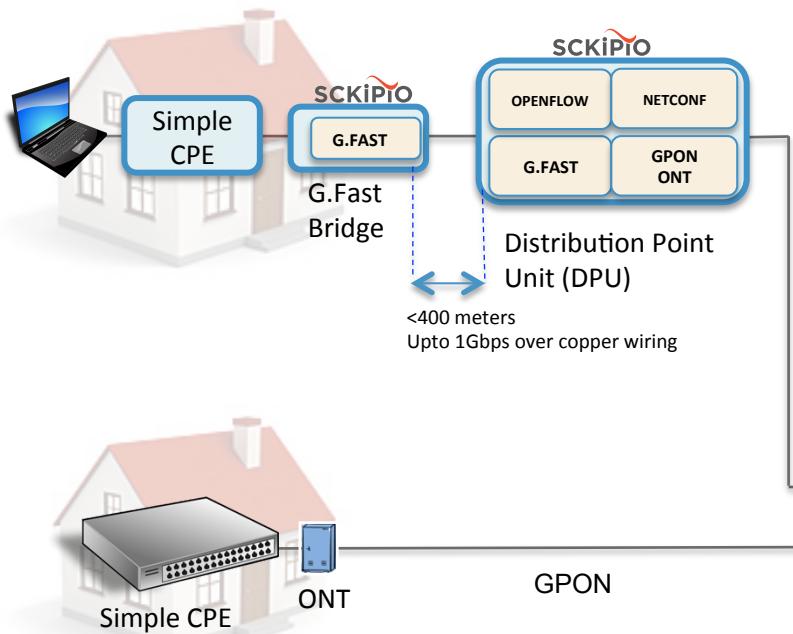
Service Provider



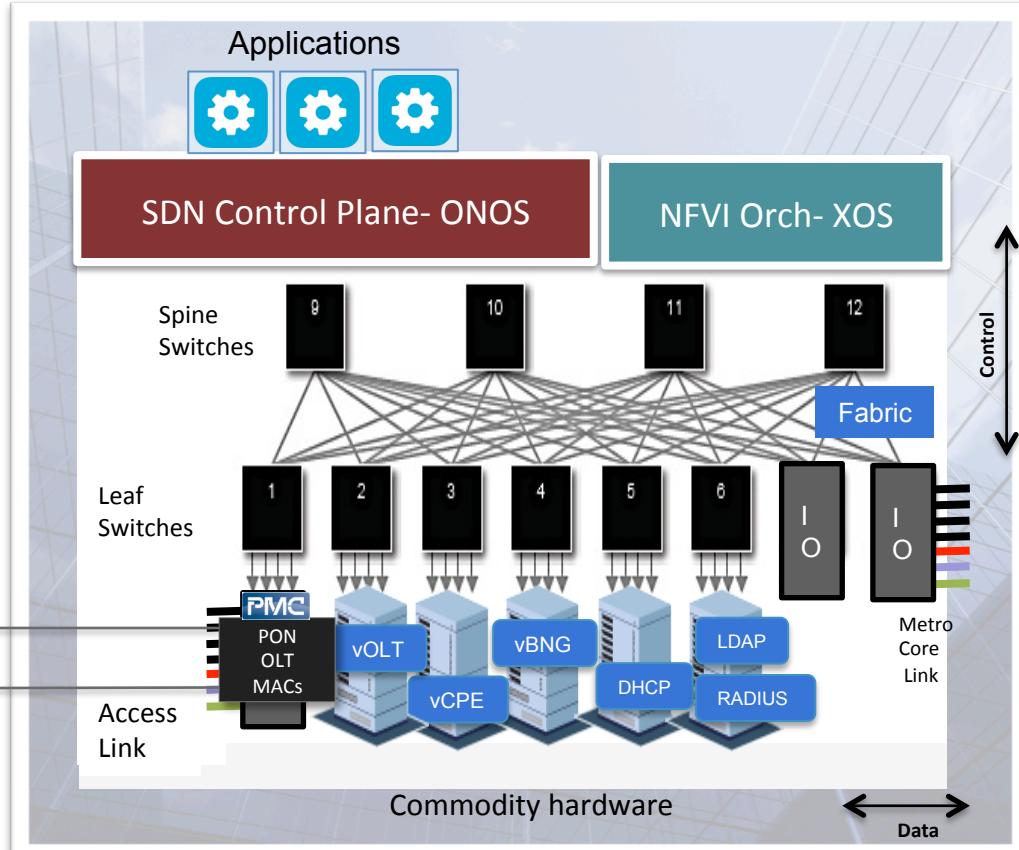
Third-party content provider

Demo showcases the CORD solution from the perspective of 3 users

CORD Demo- Proof-of-concept Central Office



A CORD “Pod”, with all these software and hardware building blocks will be on the demo floor.

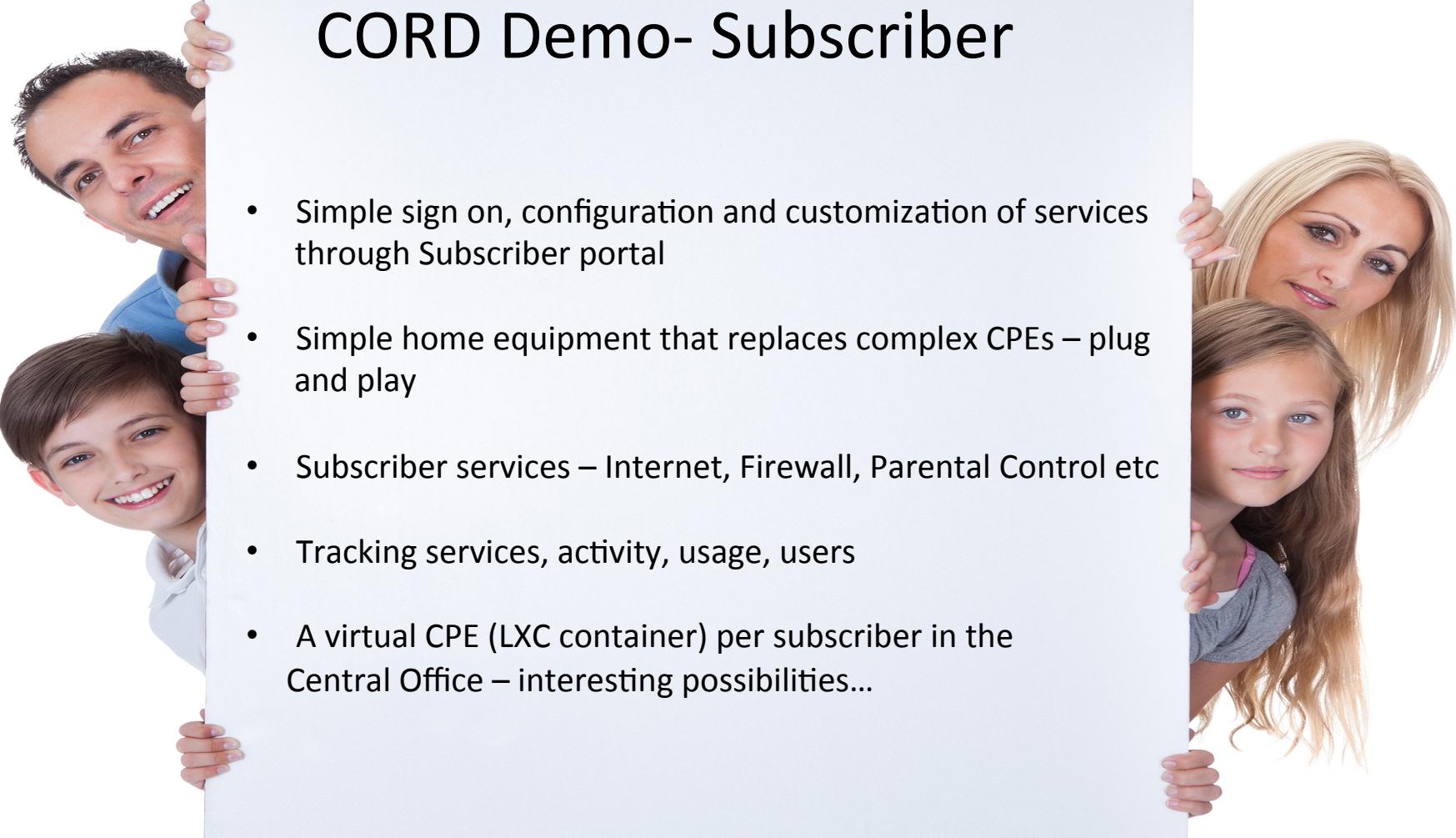


Central Office Re-architected as Datacenter

CORD Demo- Service Provider

- Service Provider portal for intuitive provisioning, management and scaling of services, monitoring
- Proof-of-concept central office, virtualized access and virtual CPE - with open building blocks
 - as described on previous slide
- Services
 - Access-as-service
 - Subscriber-as-a-service
 - Internet-as-a-service
 - Caching/Content delivery-as-a-service
 - Firewall, URL Filtering, Parental Control





CORD Demo- Subscriber

- Simple sign on, configuration and customization of services through Subscriber portal
- Simple home equipment that replaces complex CPEs – plug and play
- Subscriber services – Internet, Firewall, Parental Control etc
- Tracking services, activity, usage, users
- A virtual CPE (LXC container) per subscriber in the Central Office – interesting possibilities...

CORD Demo- Content Provider



- Simple sign on, configuration and customization of services through Third-party provider portal
- Third-party provider service- Content delivery (Caching) for its own content in the Service Provider network
- Tracking service, activity, usage



CORD Roadmap

CORD Roadmap – From demo to deployment

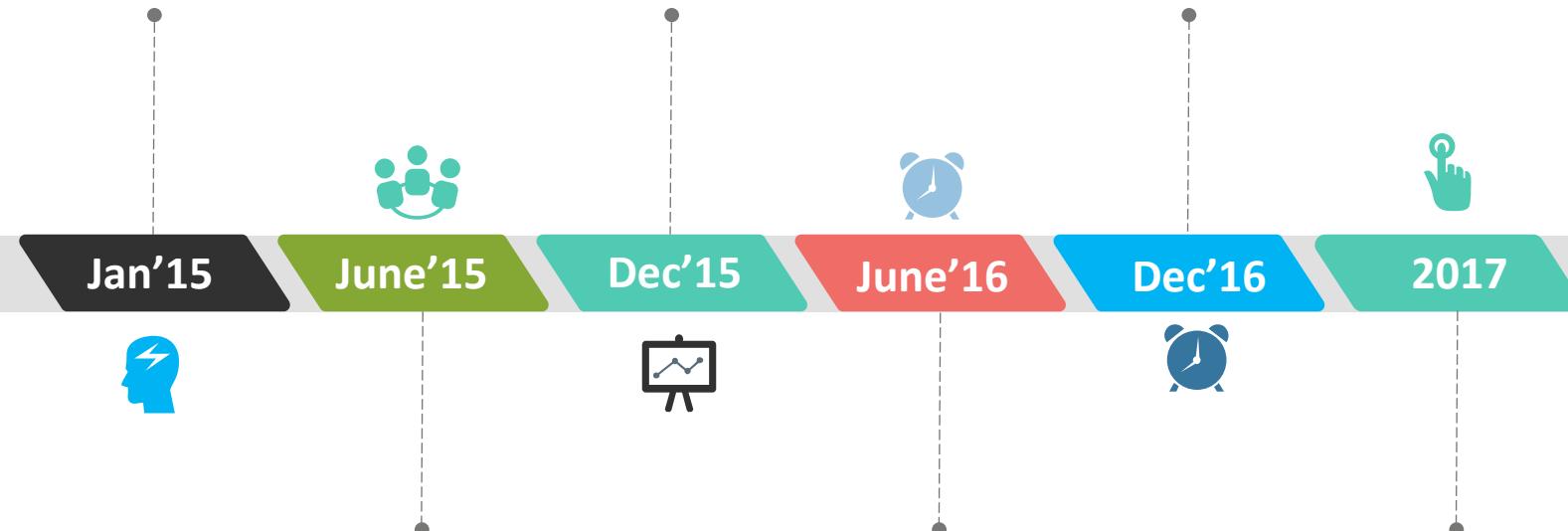


AT&T and ONOS project
define CORD Solution POC

CORD Lab trials

Lab trials with CORD POD

CORD trial deployments
– phase 2



CORD POC demo at ONS

CORD trial deployments
– phase 1

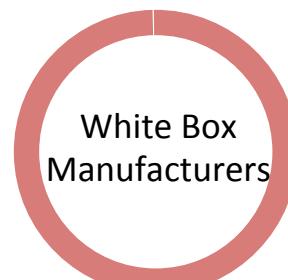
Service Provider deployments
Deployments by multiple Service
Providers

CORD Roadmap – Expanding the team

June 2015



2015-2016





ON.LAB



PMC

SCKiPIO

CORD- first end-to-end SDN/NFV/Cloud solution POC demo at ONS
spanning Central office, Access (GPON, G.Fast), CPE

See CORD in Action at the Open Networking Summit June 15-18, 2015

<http://opennetsummit.org/conference/showcase/sdn-solutions-showcase-participants/>

Stay tuned for updates as CORD moves from demos to trials to deployments!



Software Defined Transformation of Service Provider Networks

Join the journey @ onosproject.org