

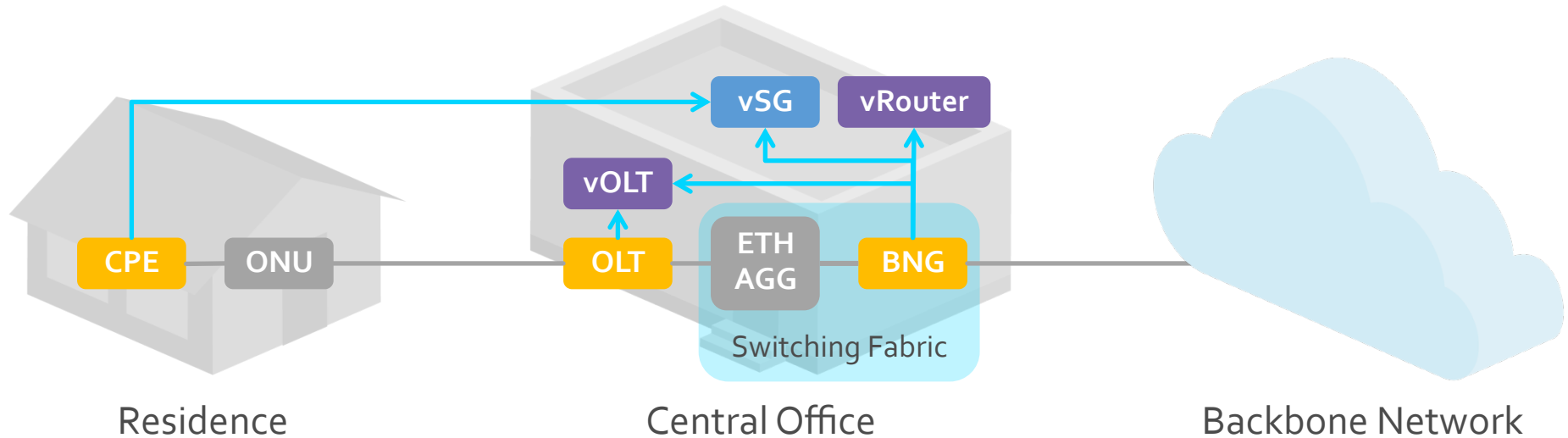


Residential CORD

Jonathan Hart, ONF

ONOS Build 2017, Seoul
September 22, 2017

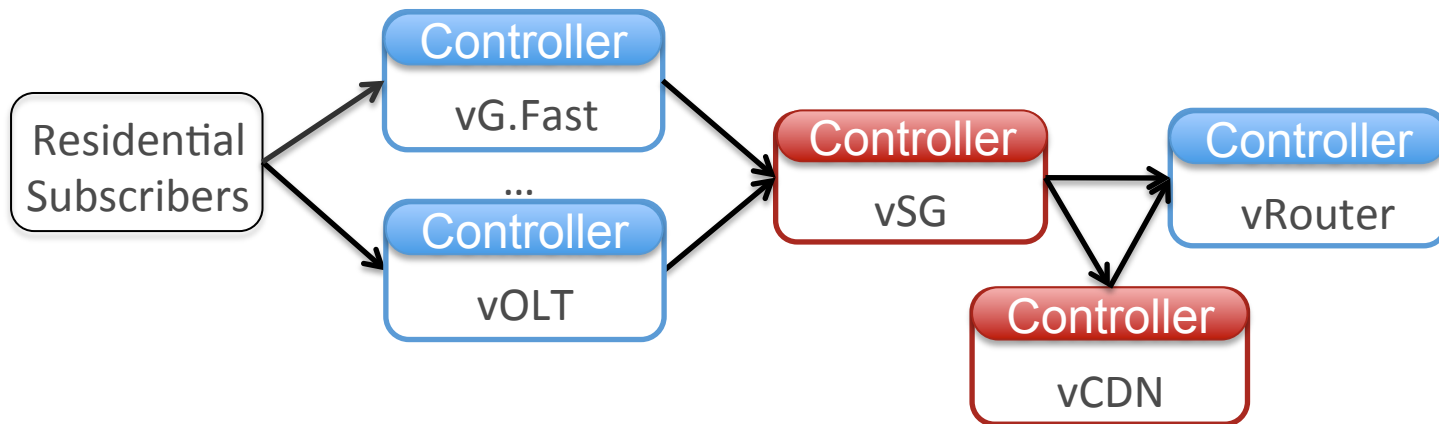
Disaggregation



CPE: Customer Premises Equipment
ONU: Optical Network Unit
OLT: Optical Line Termination
BNG: Broadband Network Gateway

Residential CORD

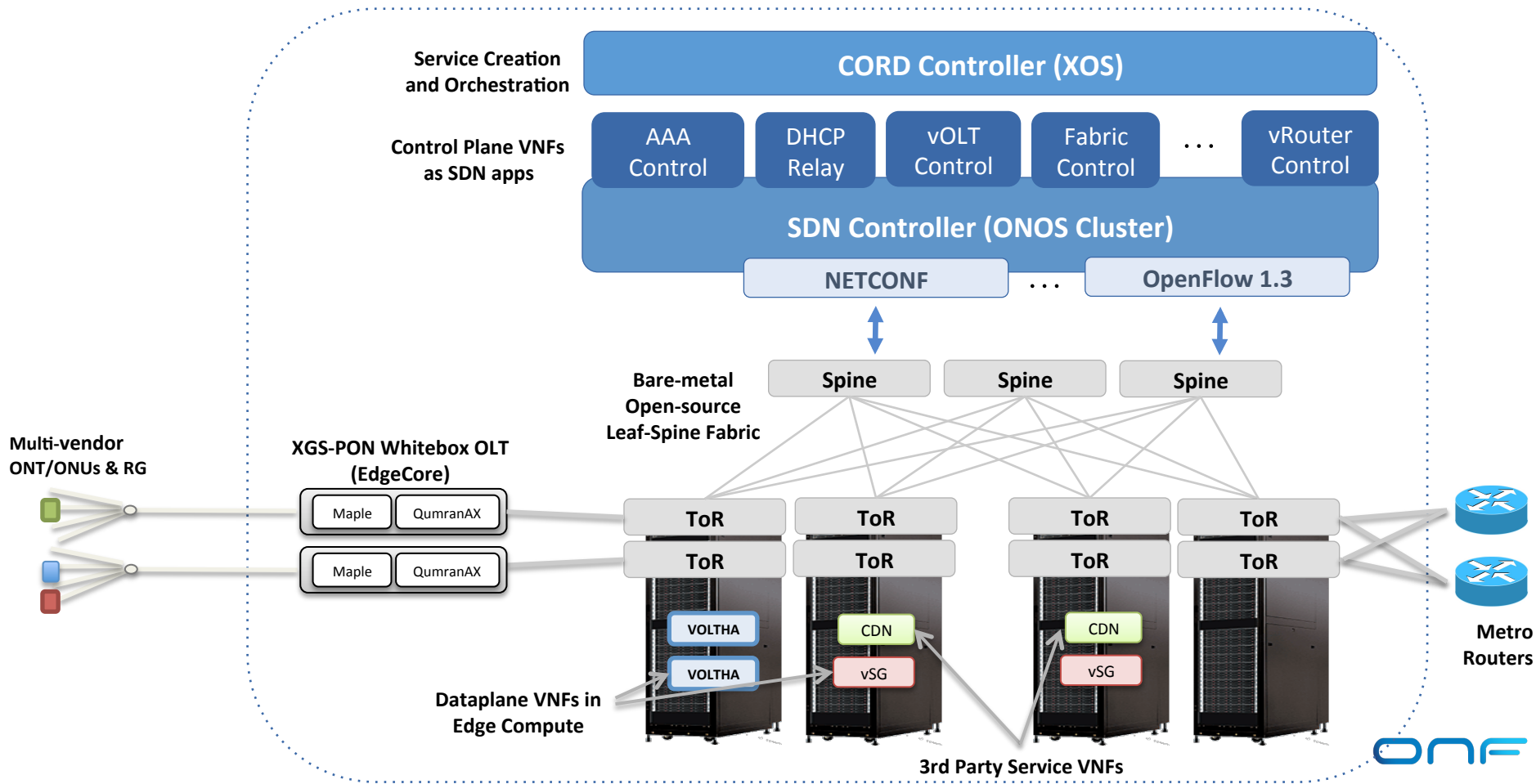
Service Composition in CORD Controller (XOS)



Blue: Control plane services running on ONOS

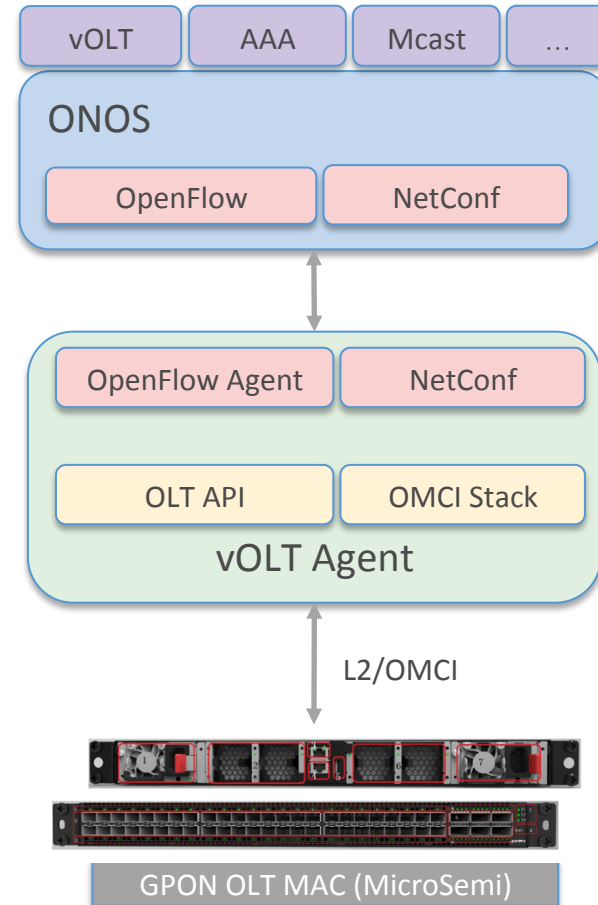
Red: Dataplane services running on x86

Residential CORD



Disaggregating the OLT with VOLTHA

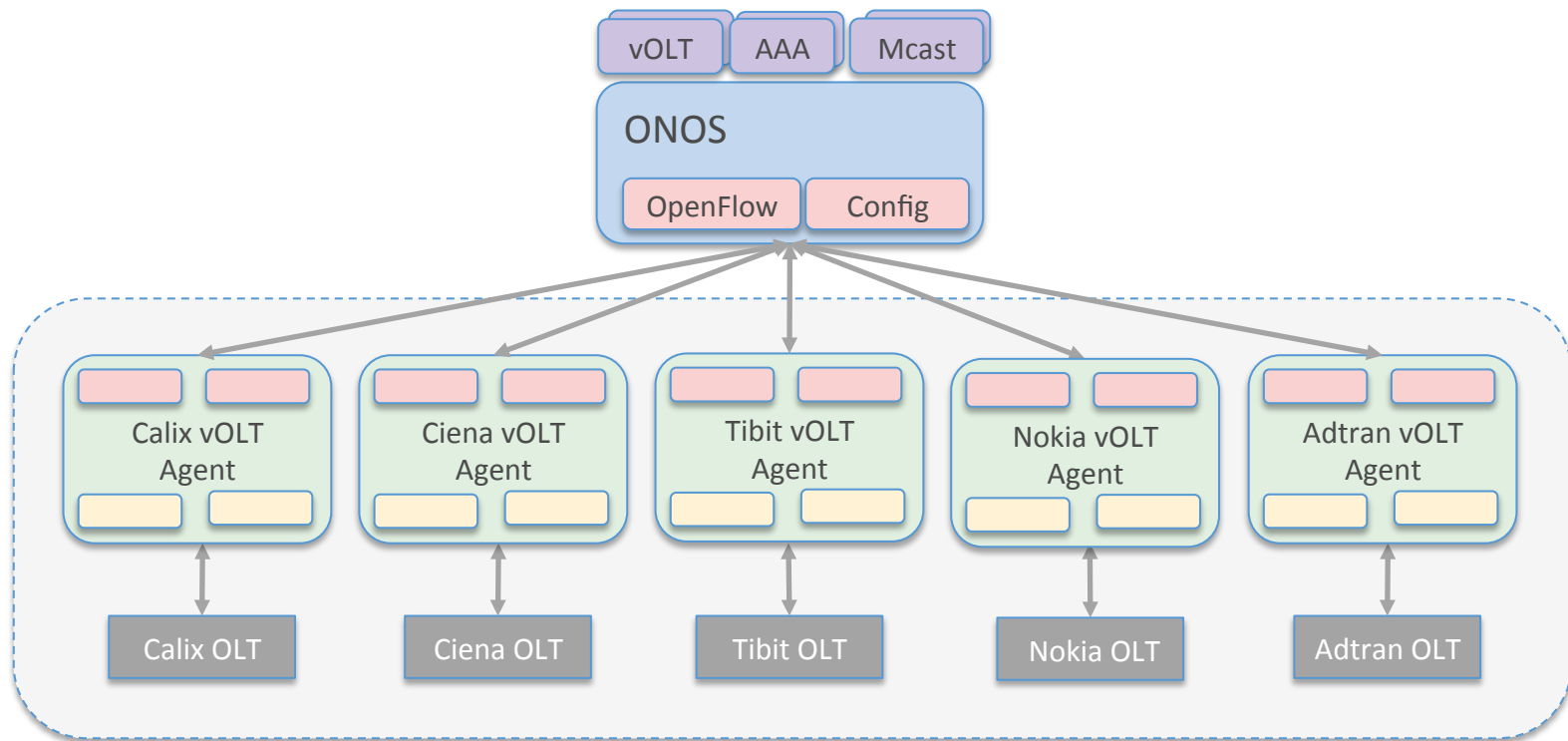
OLT Disaggregation



This is what we (the CORD community) accomplished as part of the R-CORD POCs

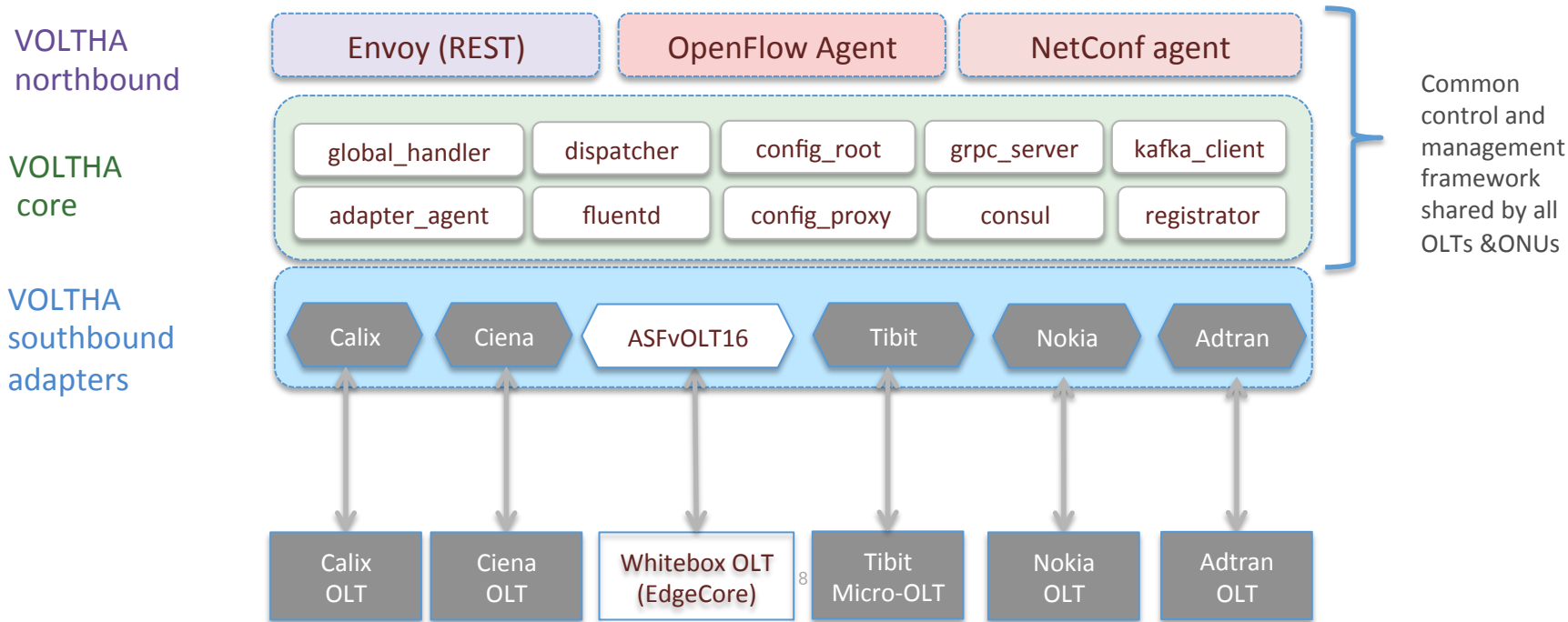
How to expand to support multiple vendors?

How do we expand support for this so that many vendors can participate and not have to rebuild the same vOLT agent stack while providing some abstraction to the control and management planes?

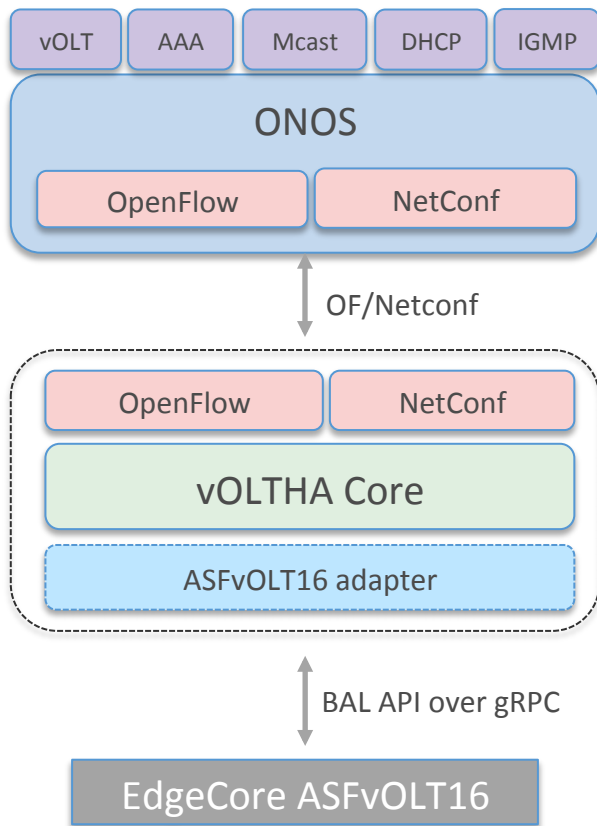


Virtual OLT Hardware Abstraction (VOLTHA)

VOLTHA hides PON-level details (T-CONT, GEM ports, OMCI etc.) from the SDN controller, and abstracts each PON as a pseudo-Ethernet switch easily programmed by the SDN controller



Virtual OLT with VOLTHA



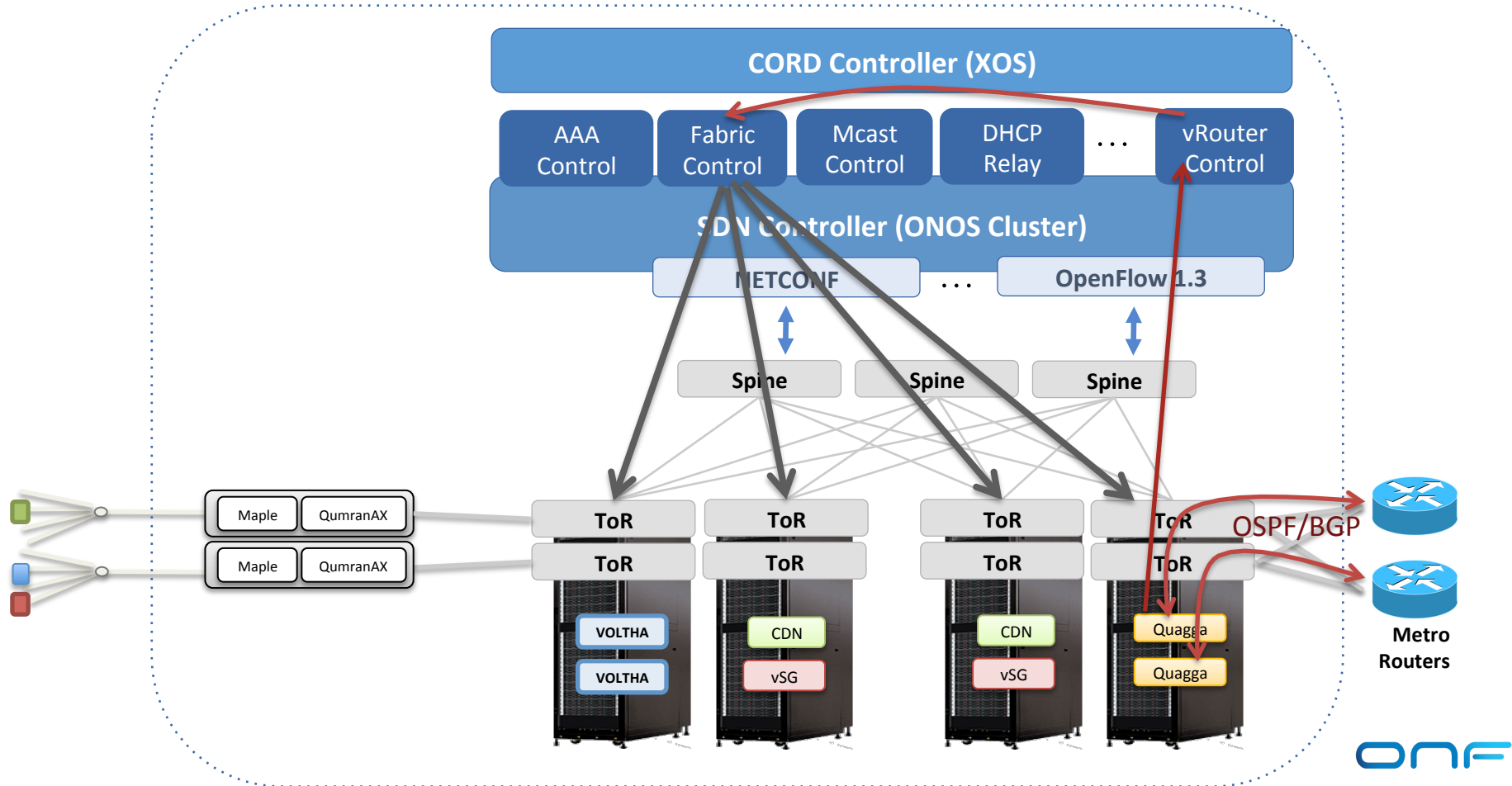
- Legacy control plane functions run as control apps on ONOS
- VLAN provisioning, multicast, IGMP snooping/proxy, AAA (802.1X, RADIUS), DHCP relay
- VOLTHA handles PON specifics and abstracts different HW
- ASFvOLT16 adapter uses BAL API to program device
- Whitebox open HW (EdgeCore ASFvOLT16)
- 16 10G XGS-PON ports based on BRCM Maple chip
- 1x 100GBE Qumran AX switching chip

Disaggregating the BNG with vSG and vRouter

Virtual Subscriber Gateway (vSG)

- Subsumes per-subscriber functionality from CPE and BNG
- A separate vSG instance is create for each subscriber
- Runs as a container VNF
 - Reference implementation is a simple Docker container running DHCP, DNS, NAT on behalf of each subscriber
- Many design options available regarding which functions get moved to vSG

Upstream Connectivity with vRouter



Roadmap

- Integrate VOLTHA into R-CORD
- Add automated deployment of vOLT and vRouter
- Investigate how to implement vSG functionality in programmable switches using P4 (e.g. QoS, PPPoE termination)
- Multi-access edge (R+M-CORD)

Conclusion

- R-CORD disaggregates residential broadband access using three main services: vOLT, vSG, vRouter
- Reference implementation uses completely open, commodity hardware
- Functions implemented in software as ONOS control apps or VNFs
- VOLTHA agent provides common abstraction across different OLT access hardware
- Pathway for fast path entirely in hardware

Thank you!

Questions?