vOLTHA Project: The Story and Where We Are

ONF & AT&T

BBWF
October 19, 2017

Agenda

- vOLTHA – What , Why, and Some Framework Stuff
- vOLTHA Releases in 2017
  - vOLTHA before and after May 2017
  - Release roadmap and features

vOLTHA

What , Why, and Some Framework Stuff

What is vOLTHA?

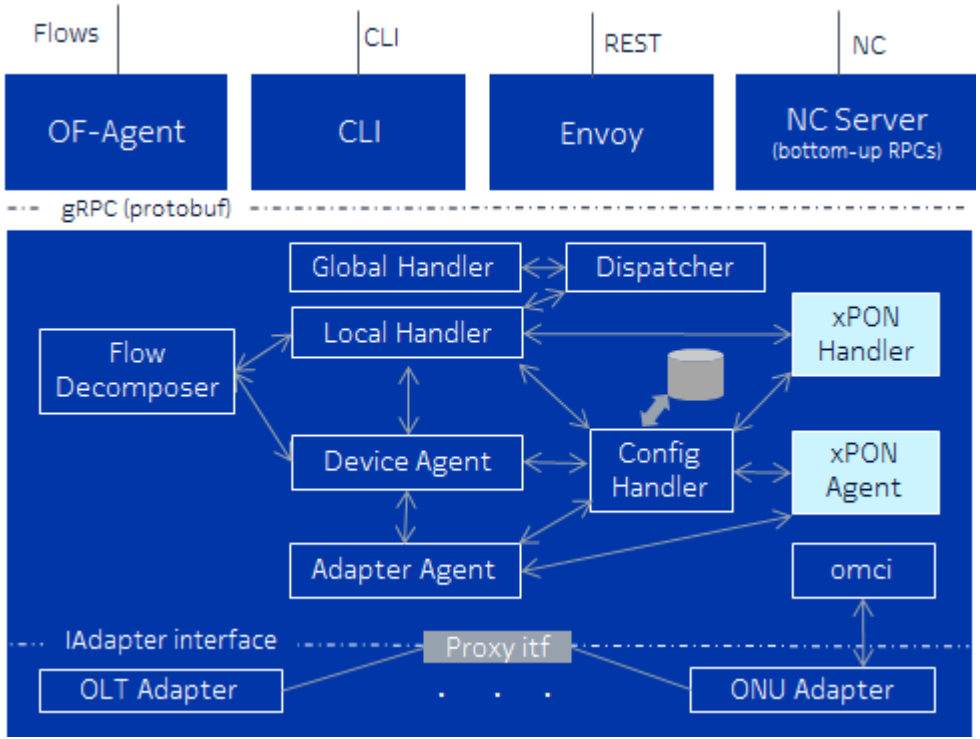
- **V**irtual **O**ptical **L**ine **T**ermination - **H**ardware **A**bstraction
- Layer of abstraction atop legacy and next generation network equipment
  - **Initially** – PON (G-PON, E-PON, XGS-PON)
  - Ultimately –G.Fast, NG-PON2 DOCSIS, Ethernet
- Key Value add of vOLTHA:
  - **Network as a Switch**: Making an access network look like an abstract programmable switch
  - **Evolution to virtualization**: works with legacy as well as virtualized devices. vOLTHA can also run on the device, on general purpose servers or in a DC
  - **Unified OAM abstraction:** provides unified, vendor/technology agnostic management interface such as device lifecycle, system monitoring, alarms, troubleshooting, etc.
  - **DevOps bridge to modernization:** bring the latest development techniques to telecommunications

Why vOLTHA?

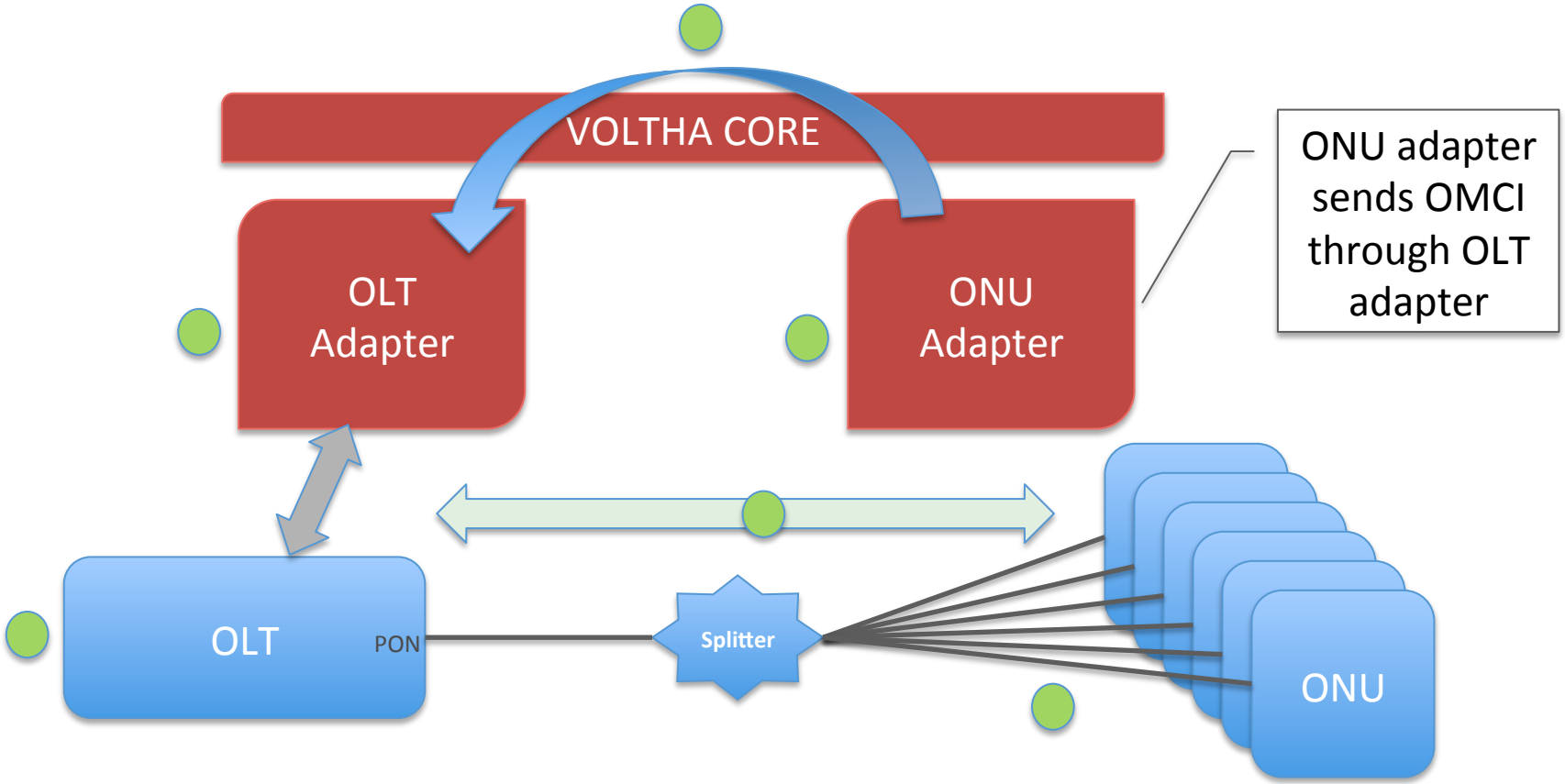
- **Service Providers' Nightmare**
  - Control and management of legacy access devices is a mess
  - Each access technology brings its own protocols and concepts
    - Worse: Each vendor has his own interpretation of the same standards, yielding vastly diverging set of solutions, for example OMCI messages
- **What Service Provides want**
  - all vendors for a given access technology would provide an identical control and management interface
    - **This is NOT happening!**
- **vOLTHA provides a first step to address the issues**
  - Confines the differences of access technology to the locality of access and hiding from the upper layers of the OSS stack

vOLTHA High Level Architecture

- vOLTHA Containers communicate over gRPC
- Main container publishes events to **Kafka**; and persists data in **Consul**
- Use **consul** for service discovery
- Southbound OLT/ONU adapters will be their own containers as well - *Targeted for vOLTHA 2.0*
- **Split adapters**; i.e. OLT adapter and ONU adapter -> enables OLT-ONU interoperability



ONU Adapter Provides OLT & ONU Interoperability



vOLTHA Project

Where we were; where we are; and where we will be

vOLTHA Project Evolution

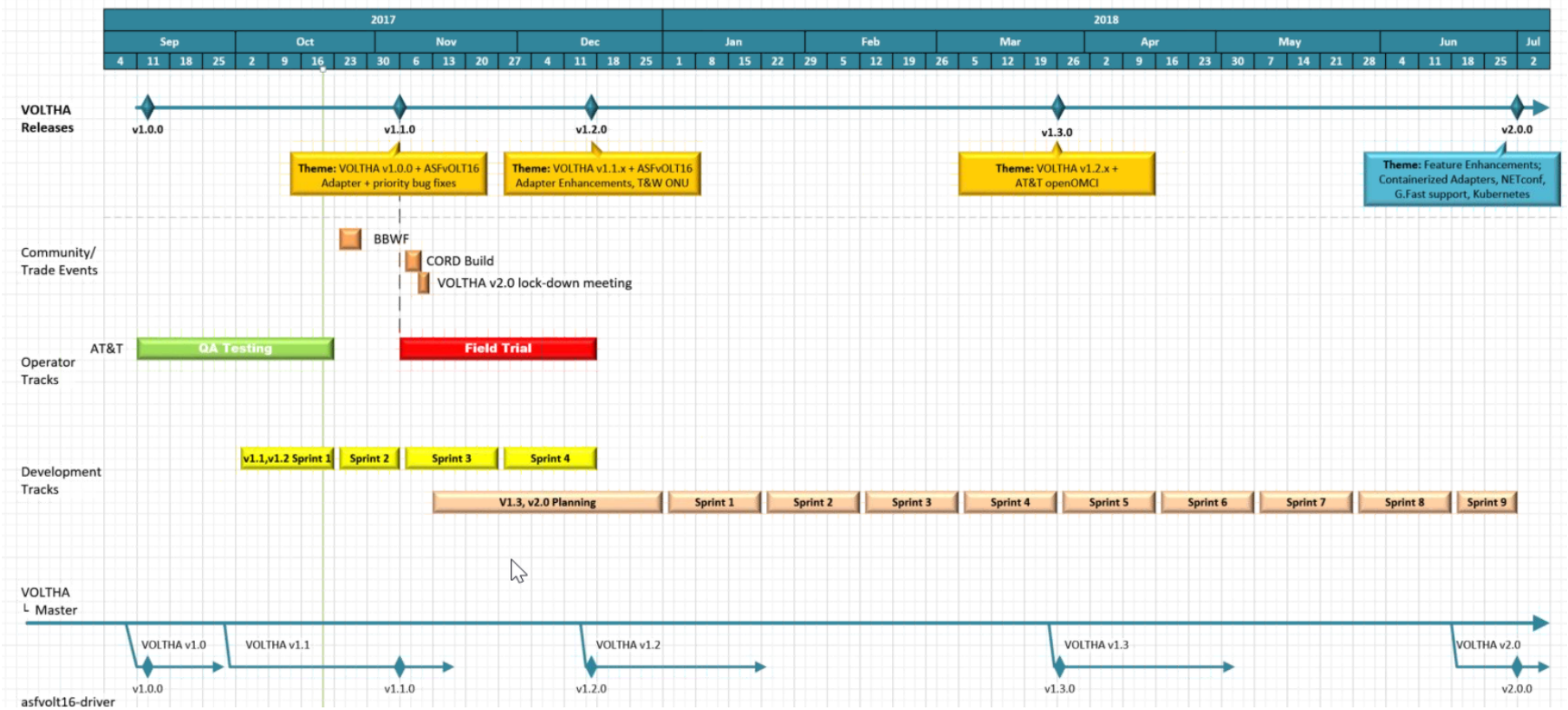
Initial proposal accepted in 09/2016 with end of year Lab Entrance

- R-CORD brigade consisted of ON.Lab, Ciena/Blue Planet, and Tibit as contributors
- Supported OLT Hardware
  - Tibit MicroOLT
  - PMC PAS5211-based G-PON OLTs, specifically the Celestica Ruby
  - Broadcom Maple chip based (XGS-PON) XGS-PON OLT

[**May '17**] Established separate vOLTHA Project with more vendors involvement

- **Product Owner**: AT&T; **Scrum Master**: Donna Reineck-Wehan/Uyen Chau
- Additional **technical leads** were added, plus contributions from other vendors
- Targeted 8/31 for vOLTHA Release 1.0 with new features – Roadmap Slide
- Added OLT/ONU Hardware adapters:
  - Nokia OLT/ONT, Adtran OLT/ONT, Calix OLT/ONT, Edge-Core ASFvOLT16 OCP Whitebox OLT

vOLTHA v1.x & v2.0 Release Milestones



Support Branches for v1.0 and v1.1 Releases

- V1.0 released on 9/13, with non-blocking defects
  - Defects found during QA Testing will be addressed on the v1.0 support branch until the v1.1 support branch is created
- V1.1 will be released once the initial Edge-Core ASFvOLT16 adapter work is done, estimate 9/25
  - Edge-Core ASFvOLT16 is a XGS-PON OLT Whitebox based on the OCP design
  - A v1.1 support branch will be created and v1.1.0 release will be tagged
- All defect fixes will continue to be on the v1.1 branch until start of field trials in November, 2017

Externally Visible Deliverables

- vOLTHA v1.1.x Maintenance release with defects/fixes from QA Testing Nov 3, 2017
- vOLTHA v1.2 release with ASFvOLT16 Adapter enhancements Nov 17, 2017
- vOLTHA v2.0, May 2018
- ASFvOLT16 v1.0 release, May 2018

- BBWF Oct 25-27
- vOLTHA v1.1.x & v1.2 Field Trial in Q4 2017
- R-CORD integration into Satisfying Cactus Jan 15, 2018

VOLTHA Roadmap

vOLTHA v1.0 (9/13/2017)

Theme:
Basic Management and Operations of vendor OLT solutions (XGS-PON)

Features

VOLTHA High Availability
- w/ Docker Swarm
- Database redundancy with Consul

VOLTHA Remove Internet network access dependency for Install, Deploy and Runtime

PON Management & Configuration
- BBF WT-385 implementation
- AutoDetect ONU
- ONU Registration
- Control Plane

VOLTHA Backup /Restore

VOLTHA Security
- Local Access Control Least Privilege Access (Install, Instantiate, Maint)
- No Open Ports

VOLTHA Software Maintenance (patching documentation)

Exploratory/Foundational Work:
YANG Common Data Model - NETCONF/YANG
G.Fast (DPU Driver)
Harmonizing PM KPI's
K8s Container Management

vOLTHA v2.0 (Q2 2018)

Theme:
Feature Enhancements

Features

Containerized Adapters
NETCONF Support (NBI) (RFC 6241)
- SSH and TLS support

Standards-based Yang Model Support (BBF & IETF)
PON & ONU Management Part II
PON Config Part II
G.Fast Support (DPU Driver/Adapter)
Finalize Whitebox OLT Adapter (OCP)
Alarms & PM Support
VOLTHA Software Component Upgrade
VOLTHA Stability Enhancements
Migrating from Docker Swarm to **Kubernetes**
Reference implementation of VOLTHA - CI/CD
Traffic Management/QoS (upstream & downstream)
VOLTHA PON Scalability 2 OLT; 64 ONU/OLT*

Exploratory/Foundational Work:
Deployment Automation
OpenOMCI Stack
IEEE 802.3 PON
Examine all the existing GPBs in order to map to standard YANG models
YANG aware transactional database support

vOLTHA v3.0 (Q4 2018)

Theme:
Productization

Features

Netconf Call Home (RFC 8071) support
YANG aware transactional database support

VOLTHA Security
- Encrypted Messaging
- Global Access Control (e.g. CORD Platform)
- Audit Logging

Harmonizing Alarms and Events (YANG model?)
Implementation of PM KPIs (based on harmonized work)

OLT / ONT Interoperability
OpenOMCI Stack
ONT Adapter (OpenOMCI common adapter)

Rogue ONU mitigation
VANILLA Architecture Refactor
TOSCA Support
Ethernet PON Support

Exploratory/Foundational Work (TBD):

Edge-core Adapter (ASFvOLT16) Roadmap

ASFvOLT16 v0.1

Theme: Initial XGS.PON release for R-CORD reference implementation

Package:
- Adapter is part vOLTHA Container package

OLT Hardware:
- Edge-core ASFvOLT16
- Edge-core Device Driver

Compatibility Matrix (validated and supported):
- BRCM BAL 2.4 (2.4.3.6)
- vOLTHA v1.0 Standalone
- ONOS v1.10.3
- R-CORD v4.0 (Shared Delusion)
- Default ONU Adapter (BRCM ONU or TBD)

Applications:
- EAPOL
- DHCP
- HSIA

Provisioning:
- Manual Provisioning of OLT Devices
- Initial OLT Activation
- Detection of connected ONUs
- Detection of new ONUs (subsequent to initial detection)

Performance PMs:
- Link to PM list in VOLTHA Jira

Alarms:
- Basic OLT/ONU Fault Alarms
- Monitoring/alerts control comm to device (heartbeat) and PON signal state (LOS)

ONU Scale:
- Single OLT per Adapter instance
- Up to Nine ONTs
- Up to 3 PON ports per OLT, on any port index (1-16)

Out-of-Band Management Supported
- OLT communication via management plane

Security Documentation
- Scope Vulnerability/Potential Risk

ASFvOLT16 v0.2

Theme: Feature enhancements

Defect fixes from PoC 3

Device management of the OLT
- Monitoring device(s) health
- Redfish API implementation

Alarms
- Monitoring new devices discovered

ONU Adapters
- Support for T&W

vOLTHA v2.0

Infrastructure & process improvements

- CI/CD with reference implementation of VOLTHA and HW setup
- Separation of VOLTHA and Adapters into separate repos to enable independent releases
- Establish common mini-milestones for integration testing based on common high-level integration test plan
  - Plug-fest to work through features and interop issues (TBD)

Feature planning: End of October, 2017 for Q2 2018 Release

- Feature list - Refer to Roadmap slide

Grow the community with more service providers and vendors engagement

Check out Useful Information

- vOLTHA Wiki Page: https://wiki.opencord.org/display/CORD/VOLTHA
  - vOLTHA 1.0 features and Release note can be found in vOLTHA Wiki
- Join VOLTHA meetings - see CORD calendar for VOLTHA TST Meetings
  - A separate meeting schedule for ASFVOLT16 OLT adapter work
- Welcome to join our effort to create an vendor & technology agnostic Access Network Architecture
  - More Questions: Contact Shawn Ying at sying1562@gmail.com