VOLTHA v2.10 Techinar
July 7, 2022 | 9am PDT

Andrea Campanella - ONF
Amit Ghosh, Elia Battiston - Radisys
Outline

- SEBA RD 2.0 and VOLTHA Architecture, project state and deployments
- VOLTHA 2.10 release
  - Fiber to the Building (FTTB) Support
  - Scale enhancement and Rolling software upgrade capabilities
  - Initial Combo PON support
  - Platform stabilization (ONOS 2.5.8, Extended Message Support, Unknown MEs handling, ONU Delete and re-discovery)
  - BBF Adapter Initial Implementation
  - Testing (FTTB, Memory Leak, TIM, DMI, Rolling upgrade)
  - Certification of new OLT
  - ONOS replacement Design
- VOLTHA 2.8 LTS Support
- Transition to Community leadership & new TST
- Q/A
SEBA 2.0
Exemplar Architecture

Focus on access: ONOS and VOLTHA

Seba RD 2.0 is Released
SEBA RD 2.0 Webinar
VOLTHA: Virtual OLT Hardware Abstraction

- Common Control & Management for PON networks (OLTs and ONUs)
- Different brands of OLTs and ONUs
- Multiple services and operator workflows (ATT, TT, DT, TIM) - FTTH and FTTB
- Device Management Interface for non datapath operations (e.g. olt software upgrade)
- Scale deployments (4096 ONUs per Stack)
- Software update (VOLTHA and ONUs)
- gRPC for inter container communication
- Hardware, scale, soak testing
- 2.8 LTS release

VOLTHA 2.9 Webinar
https://docs.voltha.org/master/release_notes/voltha_2.9.html
VOLTHA Deployments with Operators

Voltha is in production with live customers:

- Deutsche Telekom (DT) as part of the A4 project
  - DT's first live deployment
  - mass market deployments with VOLTHA 2.10
- Turk Telekom (TT)
  - TT initial deployment
  - TT scale to million of subscribers

At least 4 other operators have VOLTHA based solutions in several stages of field trial and production
Fiber to the Building (FTTB) Support

- FTTB (Fibre to the Basement) uses DPU (Distribution Point Unit) as the termination of the PON network towards the subscribers.
- DPU has two parts, a G.fast part responsible for switching of traffic towards the multiple subscribers connected to the DPU and a PON part (ONU) for connecting to the PON network.
- VOLTHA is responsible for managing only the PON part of the DPU.
- DPU talks NETCONF and ANCP towards its PMA. It would work on a specific VLAN for this traffic. All the DPUs use the same VLAN for this management traffic.
- Each subscriber is identified by a unique S-TAG, same as FTTH.
- Design doc available at https://docs.google.com/document/d/1l3RHt3c0Pc3BcyqRsCOleawTNqlQFZz3VDpC7Pv3L8U/
Fiber to the Building (FTTB) Support

**FTTB Subscriber removal**

- De-allocate/Remove TCONT, GEM
- Remove flows from OLT
- Pass T-CONT, GEM info for sub
- Remove flows for sub/Add and T-CONT,GEM
- OMCI (Remove TCONT/GEM and remove VLAN filtering)

**End FTTB Subscriber removal**

**DPU Power OFF/PON LoS**

- ONU DYING_GASP or ONU LoS (from olt adapter)
- Remove ALL flows for DPU (MGMT&ANCP and All sub flows)

**End DPU Power OFF/PON LoS**
Scale enhancements & Rolling software upgrade

- **Scale enhancements**
  - 4096 subscribers on one OLT with 1 VOLTHA stack
  - 4096 subscribers on two OLTs with 1 VOLTHA stack

- **Rolling software upgrade**
  - Kubernetes rolling upgrade of pods
  - Requests served with no pod downtime
  - In Service Software update of VOLTHA PODS
  - ONOS ISSU mechanism

Support for in production Updates and for full 64 Ports GPON OLT completely loaded with ONTs in just one stack.
Initial Combo PON support

- **Initial Combo PON support**
  - Framework for dynamic detection of PON Transceiver Technology
  - Configure the MAC and PON modes.
  - Different PON port ranges reported to VOLTHA-core
  - BBSIM support

Deploy COMBO OLT now with GPON ONTs, move to XGSPON as per customer needs in the future with no OLT change.
Platform stabilization

- **OMCI Extended Message Support**
  - Reduced number of messages for ONU Software Upgrade and MIB template download
  - Higher speed of software image and MIB template download

- **Unknown MEs handling**
  - Relaxed decoding of unknown MEs
  - Discarded unknown entities but proceed with ONU MIB download for that ONU.

- **ONU Delete and re-discovery**
- **Resource Cleanup**
- **ONOS 2.5.8**

Better overall error handling and new ONUs support, code quality and extensibility, ensuring longer lifespan.
The ONF-BBF collaboration

VOLTHA’s features closely match the Broadband Access Abstraction (BAA) layer for PON Access Networks, defined in the Cloud CO Architecture (BBF TR-384).

A translation layer between CloudCO Access M&C and VOLTHA/ONOS has been introduced. It translates the northbound NETCONF APIs to enable a BBF-compliant management interface for VOLTHA Whitebox OLTs.
YANG models for VOLTHA

To expose operations through NETCONF, YANG models that capture the right information are necessary

Device-related operations
- Provision OLT hardware
- Retrieve list of OLT devices
- Enable OLT hardware
- Retrieve list of ONT devices

bbf-device-aggregation (BBF TR-383)
bbf-software-management (BBF TR-383)
ietf-hardware

Service-related operations
- Provision service subscription
- Delete list of service subscriptions
- Delete all service subscriptions

Work in progress, based on yet to release BBF models with VOLTHA specific augmentations
BBF Adapter architecture

NETCONF Clients (e.g. CloudCO Access MC)

NETCONF

voltha-northbound-bbf-adapter container

netopeer2
NETCONF server

sysrepo
YANG datastore

libsysrepo (with CGO)

bbf-adapter process

voltha.proto gRPC

VOLTHA apps REST APIs
VOLTHA+ONOS 2.10 Testing

New 2.10 Tests

- FTTB tests
- Memory leak tests, 200 device deletions
- Onu Adapter: Unknown ME tests and Extended OMCI message support for MIB Upload, Mib Audit, MDS mismatch
- ONU Delete and Rediscovery
- Mac Learning in TT Sanity
- DMI tests on ADTRAN hardware
- Rolling upgrade
- TIM workflow tests
- Unknown attribute tests

Nightly scale and 180+ Hardware tests and a Jenkins view for 2.10 Tests
https://jenkins.opencord.org/
VOLTHA+ONOS 2.10 Testing

1134 total nightly tests between HW and BBSIM (including Soak and Scale)

7 HW pods with 7 different OLTs certified, 5 different ONU brands, 1 DPU
Continuous Certification -- Zyxel SDA3016SS Combo OLT

VOLTHA 2.10 adds Zyxel SDA3016SS Combo OLT to the continuous certification:

- whitebox OLT
- 16 Combo-PON ports
- openolt agent and adapter
- temperature hardened
- x86 architecture COTS CPU

More info
Continuous Certification

180+ nightly Tests certify several HW:

- Edgecore ASFVOLT16 (XGSPON), ASGVOLT64 (GPON)
- Radisys 3200G (GPON)
- Radisys 1600G (GPON)
- Radisys 1600X (GPON)
- Adtran SDX 6320 (GPON)
- **Zyxel SDA3016SS Combo OLT**
- Sercomm FG1000 (GPON ONU)
- .......

ONF Marketplace:
[https://opennetworking.org/marketplace/?_product_project=voltha](https://opennetworking.org/marketplace/?_product_project=voltha)
Operator’s Procurements is based on successful ONF certification
[https://opennetworking.org/continuous-certification-program/](https://opennetworking.org/continuous-certification-program/)
Both Radisys and Netsia have working controllers loosely based on this architecture. Radisys has open source theirs, thanks!

Participate in TST discussions and architectural design for the next step of VOLTHA’s journey.
2.10 Accomplishments

- **Fiber to the Building (FTTB) Support**, DPU management, ancp traffic and rules single tagged with VLAN swap, Subscriber traffic, ADTRAN DPU
- **Scale enhancements**, 4096 subscribers per VOLTHA stack
- **Rolling software upgrade**
- **Initial Combo PON support**, dynamic detection of PON Transceiver Technology
- OMCI Extended Message Support with reduced number of messages and Higher speed for software Upgrade and MIB template download
- **Unknown MEs handling**
- **ONU Delete and automatic re-discovery**
- **BBF Adapter** Initial Implementation with Northbound NETCONF server for OLT and ONU info with standard BBF models
- Move to ONOS 2.5.8 with bug fixes
- Certification of new OLT

https://docs.voltha.org/master/release_notes/voltha_2.10.html
Support for 2.8 VOLTHA LTS release

VOLTHA 2.8 was the first Long Term Support and ONF committed to update, patch and maintain the software (more info).

During release 2.10 continuous testing was done on 2.8 and more than 15 fixes, between codebase and tests, were back ported.

Continuous updates were provided to the upstream 2.8 helm charts and documentation.

VOLTHA 2.8 will be supported until December 2022.
VOLTHA
in context of ONF

Timon Sloane - ONF
Open Networking is at an inflection point

ONF has crossed an inflection point and momentum is now with us

- Phase I: OpenFlow Era
  - SDN started with broad industry interest
  - Lots of excitement and momentum

- Phase II: Platform Era
  - ONF created a partner funded development team to "push the boulder up the hill" to prove what was possible
  - Progress grew more challenging once we started building real deployments

- Phase III: Adoption Era
  - Now that ONF platforms have gained their own momentum, ONF has shifted to building community and broadening adoption

2011 - 2015
2015 - 2021
2022 -
ONF Through Phase II
Partner-Funded Engineering

- ONF owned & led OSS platform development
- 40+ developers funded by Partners
- Small outside dev community

ONF in Phase III
Open Community-Based Approach

- ONF hosts platforms & nurtures developer community
  - Small engineering team for release mgmt & CI/CD
  - Much larger dev community making majority of contributions

- Intel becomes a stronger community member
  - Former ONF engineers remain engaged in ONF projects
  - DARPA funding continues to support dev team contributing to ONF projects
ONF Org Chart

ONF Board
Andre Fuetsch – Chair

GM – Timon Sloane

Dir Membership
Eric Murrell

Dir Marketing
Denise Barton

Operations Manager
Michelle Roth

Chief Scientist
Larry Peterson

Girish: VOLTHA CI/CD Coordinator
Ajay: Mobile CI/CD Coordinator
Hung-Wei: Ops & Aether CI/CD Coordinator
Niloofar: PINS CI/CD Coordinator
Max: SD-Fabric CI/CD Coordinator
Hyunsun: Aether CI/CD Coordinator

Community and Project leadership

Mobile
Area Governing Board

Private 5G & Edge
Area Governing Board

Programable Networks
Area Governing Board

Broadband
Area Governing Board

SD-RAN TST
SEBA RDT
VOLTHA TST

SD-Core TST
SD-Fabric TST
P4 TST
PINS TST
ONOS TST

Models and APIs

Models and APIs

Dir Membership
Eric Murrell

Dir Marketing
Denise Barton

Operations Manager
Michelle Roth

Operational team in place to support Marketing/Events/Membership

Developers will focus on easing consumption and ability for community to contribute to the projects (rather than contributing code)

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### 2022 - Project Area Goals

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<th>Broadband</th>
<th>Open RAN</th>
<th>Private 5G &amp; Edge</th>
<th>Programable Networks</th>
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<td>VOLTHA community under solid community leadership, with adoption growing and community supporting the product deployments.</td>
<td>SD-RAN recognized as the leading open RIC platform.</td>
<td>Aether becomes de facto open platform for 5G/Edge research (for both academia and commercial)</td>
<td></td>
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<tr>
<td>Recruit additional operators to publicly share that they are consuming and supporting VOLTHA.</td>
<td>DT trial to have deployed another RAN CU/DU vendor, demonstrating dual source for all RAN components.</td>
<td>Aether adopted for at least 1 commercial SaaS product offering</td>
<td>DPU/IPU support integrated into SD-Fabric</td>
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<tr>
<td>Additional PON vendors certified with the project</td>
<td>Align SD-RAN with standardized O-RAN service models</td>
<td>SD-Core adopted by at least one provider building a private 5G solutions</td>
<td>P4 UPF implemented on DPU/IPU and integrated into Aether</td>
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<td>Align with BBF for VOLTHA to fit in with a CloudCO/BAA architecture</td>
<td>New use case demonstrated (power management?) with multiple interoperable xApps.</td>
<td></td>
<td>PINS demonstrating compelling ONOS-controlled SDN use case on top of conventionally routed network</td>
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Broadband Meetup Berlin

... a great success
SEBA/VOLTHA Community
A Special Thanks

Girish Gowdra, Hardik Windlass, Matteo Scandolo

Saurav Das
New Technical Steering Team Leads

Amit Ghosh
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Mahir Gunyel
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Thank You

TST Meeting
(Tuesday at 8 AM PST)
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