BBF and BBF-ONF Collaboration Update

May 20th, 2022
Topics

1. Broadband Forum – Overview
2. Background to BBF-ONF Liaison “Tiger Team”
3. Collaboration Scope and Objectives
4. BBF Work items of common interest
5. Summary and what’s next?
Broadband Forum - Scope

Global Open Standards Development
Certification and Performance Testing
Open Broadband Projects
BASe: Industry Education
BBF Areas of Focus and Innovation

Connected Home
- TR-069 (CWMP)
- User Services Platform (USP)
- Device Requirements
- Wi-Fi Performance

5G
- 5G FMC
- 5G Transport

Access/Next
- Fiber
- Copper
- Performance Measurement & Analysis

Cloud
- CloudCO
- Virtualization
- Disaggregation
- FANS
Background

- ONF completed the SEBA 2.0 RD and shared its content and vision with the BBF (inviting comments)

- BBF Internal review
  - Analysis against BBF WT-477 (Access Node Disaggregation) and other relevant BBF projects including Cloud-CO and WT-456 (Multi-Service Disaggregated BNG with CUPS)
  - Commonality in TRs 383 (Common YANG Modules for Access Networks) and 385 (ITU-T PON YANG Modules)

- Discussions between our organizations, led to a joint workshop (late 2021) identifying areas of common interest:
  - Potential of standardized APIs produced by the Broadband Forum to be downstreamed to ONF VOLTHA+ONOS App implementations.
  - ONF VOLTHA-ready whiteboxes integration into Cloud-CO widens ecosystem

Joint Tiger team setup to drive the opportunities forward
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Tiger Team Collaboration Scope

- Cloud-CO and SEBA Components and Interfaces:
  - Greenfield and brownfield deployment scenarios
  - Cloud-native, legacy support (BAA) and evolutionary migration to SDN

- Growth in demand for disaggregation and whitebox solutions
  - VOLTHA support adds disaggregated whitebox solution use cases (and suppliers)

- Three opportunities identified to leverage Opensource VOLTHA and Cloud-CO API definitions
  - Integration of the VOLTHA and ONOS Apps to the CloudCO Access management plane using TR-413 data models
  - Integration of Native OLTs into the VOLTHA framework
  - Integration of BBF’s vOMCI specification TR-451
    …Together, these address key requirements of WT-477

- Common Demonstration goals, joint resources, timebound target in BBWF
CloudCO: Disaggregated Control and User Plane

End-to-End Service Orchestration

Cloud-CO Domain Orchestrator

Premises MP

Access MC

vOMCI

BAA

OLT/TSF

ONU

RG

WiFi Mon

QED Probe

QED Analyzer

Edge MP

UPSF

BNG1

BNG2

AAA

VIM

NFVI

NFVO

Active

Inactive

VOLTHA

UP

CP
Integration of SEBA POD in CloudCO

- New interface and adapter layer
- Management and control of the functions are abstracted and automated via portals, NB Interfaces and orchestrators/controllers
- Enabling technologies are developed (mature) in open-source communities inc. ONF and BBF
  - Open APIs and de-facto protocols
- BBF Standardized data models and specifications
  - Changes for ONF SW support

Will be demonstrated as part of the BBF’s CloudCO demonstrations at BBWF in October 2022
Northbound BBF Adapter

- Translation layer between the VOLTHA Northbound APIs and the BBF yang model
- Enables VOLTHA to be integrated into Cloud CO deployments (N/Y)

- Implemented as a (ONF seeded) plugin for the sysrepo data store
- Uses libsysrepo and act upon requests coming from NETCONF clients through the netopeer2 NETCONF server
- A deployment of the adapter's container includes an instance of netopeer2 and the bbf-adapter process itself

- Get devices (list)
- Provision OLT and Provision a subscriber

Plugin | Data models | VOLTHA
BBF to VOLTHA Sysrepo Plugin

1. Requests/sets state for all(*) OLT and ONU list (operational datastore)

2. SR Plugin is subscribed to that Xpath, so it reacts to the request

3. Plugin parses data, extracts required arguments and sends request to VOLTHA.

4. VOLTHA sends back requested data.

5. Plugin parses data, builds Sysrepo node structure as defined in YANG model, and pushes operational data.(**)

(*) Note: May use content match nodes for filtering devices/components and multiple subtrees selection (see RFC 6241 6.2.5, 6.4.7, 6.4.8)

(**) Note: Sysrepo operational datastore (those leaves with config false in YANG models are state or operational data) does not store data, it is a volatile and session-dependent datastore built on-demand based on data stored in external databases or the system itself (see Sysrepo docs).

<table>
<thead>
<tr>
<th>VOLTATHL device list</th>
<th>TYPE</th>
<th>ROOT</th>
<th>PARENTID</th>
<th>SERIALNUMBER</th>
<th>ADDRESS</th>
<th>ADMINSTATE</th>
<th>OPERSTATUS</th>
<th>CONNECTSTATUS</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>ID</td>
<td></td>
<td>Root</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>db87c4b48843bb99567d3d94</td>
<td>openolt</td>
<td>true</td>
<td>a82b6b3678ae</td>
<td>1721000221</td>
<td>10.64.1.206:9191</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>082d7c2e628325ccc3336275</td>
<td>brcm_openomci_onu</td>
<td>false</td>
<td>db87c4b48843bb99567d3d94</td>
<td>unknown</td>
<td>ALPHae3d1cf57</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VOLTHA-to-BBF translator
Implementation of BBF/VOLTHA Adapter - Status

- Recorded overview of the implementation of the BBF/VOLTHA Adapter was presented on the 2022-04-22 and the recording is available [here](https://example.com), thanks to [Elia Battiston](https://example.com).

- Currently implements retrieval of OLT and ONU information.

- Service provisioning is waiting for model definition to complete:
  - L2-access from BAA.

- Pull-Requests for YANG models under review (BBF internal comments):
  - [Devices and Services PRs being merged](https://example.com).

- Message Flow Charts:
  - [BBF 2022 CloudCO: Data/Control Plane Disaggregation](https://example.com).

- [Wiki](https://example.com) for the collaboration.
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Cloud Open Standards of relevance to collaboration: Access Nodes

- Broadband Access Abstraction (WT-484)
- Access Node Hardware Disaggregation (WT-477)
  - Marketing whitepaper (MD-477)
  - vOMCI Interface (WT-451)
Cloud Open Standards: CloudCO

- Reference Architectural Framework (TR-384)
- Use Cases and Scenarios (TR-416)
- Migration and Coexistence (TR-408)
- Interfaces between CloudCO Functional Modules (TR-411)
- Management and Control Interfaces (TR-413)
- Subscriber Session Steering (WT-474)
- NETCONF requirements for Access Nodes and Broadband Access Abstraction (TR-435)
- YANG Modules for Access Network Map & Equipment Inventory (TR-454)
- Test Cases for Cloud CO Applications (TR-412)
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Companies involved - thanks

- Initial workshop on 16\textsuperscript{th} November 2021

- Bi-weekly Tiger Team meetings since 23\textsuperscript{rd} November
  - 1\textsuperscript{st} June 15:00 BST
  - bbf-onf-collab@broadband-forum.or

- 23 participants from 13 companies
  
  Altice Labs
  BISDN
  Broadcom
  Cap Gemini
  CommScope
  Intel
  Netsia
  Nokia
  Radysis
  Reply
  Son маСoma
  Telecom Italia
  UNH
  Vodafone
  ONF
Summary and what’s next

Summary

- The catalyst for “getting started” was a **mapping** between ONF VOLTHA operations and the BBF Cloud-CO API
  - Methods to existing YANG model
  - Prioritization of the operations

- Seeding the adapter with an existing ONF/BISDN Sysrepo plugin, provided momentum

- Common goal for BBWF 2022
  - Demo creation in progress

What’s next?

- **Northbound**
  - Software upgrade
  - VOLTHA Tech profile integration
  - Alarms and PMs
  - Device management interface (TR-383 based) integration to expose more info

- **Southbound**
  - BBF native OLT adapter (voltha-protos to BBF OLT models)
  - Phase I: 3 VOLTHA operations

- **vOMCI integration adapter**
  - voltha-protos to vOMCI model(s)
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Get involved in the future of Broadband and Cloud-based Access

- Full details at https://wiki.broadband-forum.org (members) and broadband-forum.org/membership
# VOLTHA API Calls List

<table>
<thead>
<tr>
<th>Call</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ListLogicalDevices</td>
<td>List all logical devices</td>
</tr>
<tr>
<td>GetLogicalDevice</td>
<td>Get a specific logical device by ID</td>
</tr>
<tr>
<td>ListLogicalDevicePorts</td>
<td>List all logical device ports by ID</td>
</tr>
<tr>
<td>GetLogicalDevicePort</td>
<td>Get a specific logical device port by ID</td>
</tr>
<tr>
<td>EnableLogicalDevicePort</td>
<td>Enable a specific logical device port</td>
</tr>
<tr>
<td>DisableLogicalDevicePort</td>
<td>Disable a specific logical device port</td>
</tr>
<tr>
<td>ListLogicalDeviceFlows</td>
<td>List all logical device flows by ID</td>
</tr>
<tr>
<td>ListLogicalDeviceMeters</td>
<td>List all logical device meters by ID</td>
</tr>
<tr>
<td>ListLogicalDeviceFlowGroups</td>
<td>List all logical device flow groups by ID</td>
</tr>
<tr>
<td>ListDevices</td>
<td>List all devices</td>
</tr>
<tr>
<td>ListDeviceIds</td>
<td>List all device IDs</td>
</tr>
<tr>
<td>ReconcileDevices</td>
<td>Reconcile devices</td>
</tr>
<tr>
<td>GetDevice</td>
<td>Get a specific device by ID</td>
</tr>
<tr>
<td>CreateDevice</td>
<td>Create a new device</td>
</tr>
<tr>
<td>EnableDevice</td>
<td>Enable a specific device</td>
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<tr>
<td>DisableDevice</td>
<td>Disable a specific device</td>
</tr>
<tr>
<td>RebootDevice</td>
<td>Reboot a specific device</td>
</tr>
<tr>
<td>DeleteDevice</td>
<td>Delete a specific device</td>
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<tr>
<td>ForceDeleteDevice</td>
<td>Force delete a specific device</td>
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<tr>
<td>DownloadImageToDevice</td>
<td>Download image to device</td>
</tr>
<tr>
<td>GetImageStatus</td>
<td>Get image status</td>
</tr>
<tr>
<td>AbortImageUpgradeToDevice</td>
<td>Abort image upgrade to device</td>
</tr>
<tr>
<td>GetOnuImages</td>
<td>Get onu images</td>
</tr>
<tr>
<td>ActivateImage</td>
<td>Activate image</td>
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<tr>
<td>CommitImage</td>
<td>Commit image</td>
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<tr>
<td>ListDevicePorts</td>
<td>List device ports</td>
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<tr>
<td>ListDevicePmConfigs</td>
<td>List device PmConfigs</td>
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<tr>
<td>UpdateDevicePmConfigs</td>
<td>Update device PmConfigs</td>
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<td>ListDeviceFlows</td>
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<td>ListDeviceFlowGroups</td>
<td>List device flow groups</td>
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<td>GetDeviceType</td>
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<td>GetImages</td>
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<td>SelfTest</td>
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<td>GetMibDeviceData</td>
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<td>GetAlarmDeviceData</td>
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<td>EnablePort</td>
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<td>DisablePort</td>
<td>Disable a port</td>
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<tr>
<td>GetExtValue</td>
<td>Get extended value</td>
</tr>
<tr>
<td>SetExtValue</td>
<td>Set extended value</td>
</tr>
<tr>
<td>StartOmciTestAction</td>
<td>Start OMCI test action</td>
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</tbody>
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