ONF’s Reference Designs

Reference Designs

- “Gold Standards” for what’s to be deployed in production networks
- Resources from Architecture, Design & Ops teams
- Collaboration between community of vendors, supply chain and operators.
- Operators to craft RFPs based on these designs

“Curated Open Source” Model

- Operator Consensus on ‘exemplar platforms” using Selected Components
- Implementation is aligned between operator’s requirements and supply chain offering

Reference design creation process

- Partner only definition/creation phase
- Member review and comment
- General public release
Overview of SEBA Reference Design

SEBA RD v1.0  
March 2019

SEBA RD v1.5  
October 2020

SEBA RD v2.0  
March 2021

Standardization
Open Source
Productization
RD1.0 vs. RD2.0 - High Level Target Architecture

RD1.0

RD2.0
RD 2.0 Additions

- Detailed NBI APIs for POD, OLT, ONT, Service Management
- Broadband Network Gateway (BNG) Updates
- Device Management (DM)
- Per OLT VOLTHA Stack Model for Scaling
- Access Technology – Fixed Wireless Access (FWA) / mmWAVE
- Use Cases for POD Lifecycle Management
Added NBI APIs for POD, OLT, ONT, Service Management

- With definitions
- With input parameters & return values
## RD2.0 - Northbound Interface APIs

### POD Management
- Provide inventory info
- Monitor hardware resources
- Status Reporting
- Alarm Management
- Performance Monitoring

### Service Management
- Provision/Delete service subscription
- Delete list/all of service subscriptions
- Enable/Disable service subscription
- Create/Delete technology profile
- Create/Delete/Get service definition
- List All service definitions
- Create/Delete/Get speed profile
- List all speed profiles
- List ONTs/UNIs having specific service
- Get service subscription info

### OLT Management
- Provision OLT hardware
- Assign CLLI associated to specific hardware inventory via serial number
- Retrieve list of OLT devices
- Retrieve OLT hardware inventory information
- Retrieve list of OLT NNI/PON ports
- Retrieve OLT PON port information
- Manage OLT software and upgrades
- Reset/Delete OLT hardware
- Run available OLT diagnostics and retrieve results
- Retrieve Operational Status
- Retrieve inventory information for SFP devices plugged into OLT ports
- Disable/Enable OLT hardware

### ONT Management
- Provision ONT hardware
- Update ONT hardware serial number
- Map upstream ONT identifications (OLT CLLI ONT port) to dynamic VOLTHA assignments
- Retrieve list of ONT devices
- Retrieve ONT hardware inventory info
- Retrieve list of ONT UNI ports
- Manage ONT software and upgrades
- Reset ONT hardware
- Manage associated ONT DB configurations
- Delete ONT hardware
- Run available ONT diagnostics and retrieve results
- Retrieve Operational Status
- Retrieve inventory information for SFP device plugged into the ONT
- Disable/Enable ONT hardware
- Reset ONT UNI port
- Enable/Disable ONT UNI
RD2.0 Broadband Network Gateway Updates

- Horizontal separation between Service Edge & Routing Part as well as functional decomposition (SEBA RD1.0)
- RD2.0 extends with vertical separation according to CUPS design principles of BBF TR-459
- Definition of requirements & implementation of the three important interfaces of BBF TR-459
  - Management interface for general aspects
  - State control interface for programming the forwarding
  - Control packet redirection interface for sending control plane information
- Focus on deployment options
- Complementary to BBF TR-459, analysis & implementation work in ONF TASSEN for BNG/UPF data plane abstraction with gRPC and P4Runtime
BNG deployment options

Native BNG-SE$_C$

Combined BNG-SE$_C$ and BNG-SE$_U$ with a simplified SDN control layer

Standalone BNG-SE$_C$

SE: Service Edge
Learn from the OpenFlow experience
- Formal specification of the forwarding pipeline is essential
- Re-use proven cloud native technologies (gRPC) and focus on capabilities for operator use cases (pipeline data models)
- Complete testing of forwarding pipeline

Complementary to BBF-based BNGs
- DBNG-CP communicates with DBNG-UP-c using BBF-specified interfaces (i.e. SCI, Packet redirect & Management)
- DBNG-UP can then be split into a DBNG-UP-c that will communicate southbound with the BNG-u using the Tassen interfaces (i.e. P4 Runtime & gNMI)... similar to 5G UPF-c and UPF-u split

Alternatively native Tassen-based BNGs
- BNG-c components that support Tassen’s south bound interfaces (i.e. P4 Runtime and gNMI) talk natively through the mapper to the BNG-u
Device Management Interface

- Encompass **Inventory, Hardware configuration** and state that are not access-specific and do not pertain to VOLTHA, e.g. OLT software update, Transceiver status, Fans, Power supplies etc.
- **Common OLT device management API** across different families of devices from different vendors
- **Abstracts device complexity** from NMS/EMS of the operator by means of closed (protocol and models) to open APIs
- Support **on the box or out of the box implementation**.
- Implemented Device Management Interface based on IETF RFC-8348 and BBF TR-383
SEBA/VOLTHA Stack Model for Scaling

Horizontal Scaling
Per OLT
VOLTHA Stack
TT SEBA Architecture

Physical Architecture

- TT Central CO
  - SEBA Central

- TT CO
  - SEBA EDGE

- TT EDGE CO
  - Whitebox OLT

Logical Architecture

- NETSIA SEBA+
  - FCAPS
  - UI
  - OSS/BSS Integration

- VOLTHA
- ONOS
- Service Logic

TT Workflow Support
DT’s Access 4.0 builds

Disaggregated & Programmable Access

MVP live with 1st customer in production network since December 2020
Access 4.0 is based on the SEBA2.0 Architecture

**DISAGGREGATED PON**
Multi-vendor PON (OLT and ONU)
Supplier and technology agnostic
Northbound abstraction
Common control and management
Working through well-defined interfaces and models (no proprietary EMS)

**DT Access Workflow**
“SDN-based FTTx Access with Full Automation” as submitted to ONF and Broadband Forum

**DISAGGREGATED BNG**
Fabric design with functional separation in Service Edge and LER
Production-ready implementation with open hardware
Fabric and BNG SW from RtBrick
Further development in collaborative community OpenBNG combining strength of BBF, OCP, ONF and TIP
Evaluating DC-like BNG HAL API (ONF TASSEN project)
Target hardware design along magenta switch design proposal at OCP
Currently developing a reference platform description and RFI in TIP working group OpenBNG

DT Access workflow: https://drive.google.com/open?id=1Qt4RMH08gqSGQdwsQ6ztTgGac2dd_3m0
RD Roadmap and Useful Links

Roadmap

- FTTB
- EPON
- IPv6
- MDU
- ... driven by operators and partners

Useful Links and References

- [SEBA RD2.0](#)
- [ONF TASSEN Overview](#)
- [ONF TASSEN Repo](#) (member only)
- [DT deployment article](#)
- [TT deployment](#)
- [VOLTHA 2.7 Release Notes](#)

➢ Collaborative Effort of ONF and other communities (OCP, BBF, TIP)
Thank You

andrea@opennetworking.org
Mario.Kind@telekom.de
manuel.paul@telekom.de
burak.gorkemli@netsia.com
cemil.soylu@turktelekom.com.tr