Mini-PON:
Softwarized module-type PON architecture enhanced by SEBA

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ONF Connect @ Santa Clara, USA (5th Dec, 2018)
Today’s schedule

ONF Connect 2018

3:00pm
- XOS: The Service Composition and Management Layer for CORD and SEBA
- Implementing the Programmable Service Edge
- Stepwise Development of ONOS Controlled Open Disaggregated Transport Networks.

3:20pm
- VOLTHA OpenOMCI - Abstraction of the typical OLT-resident OMCI stack

3:30pm
- Building the Foundation: How to Deploy CORD Architectures with Open Hardware Solutions
- P4 and Stratum Use Case for New Edge Cloud
- ODTN and TIP Collaboration with Using Whitebox Transponder ‘Cassini’

3:40pm
- Adapting SEBA for Diverse Access Technologies

4:00pm
- Coffee Break

4:30pm
- Mini-PON
- Securing XOS Services on Edge Using Istio Citadel Central Authority
- Accelerating VNF Data Plane in FPGA Based P4-programmable Acceleration Card
- Partially disaggregated and ONOS-controlled transport network for 5G services demonstration.

What is it?
What is Mini-PON?

Softwarized OLT functions

- DBA: Dynamic Bandwidth Allocation
- OAM
- Multi-cast

Commodity H/W

Module-type pluggable OLT

Server (OLT-Compute)

ONU

ONU

PON
What is Mini-PON?

Softwarized OLT functions

Server (OLT-Compute)

Commodity H/W

*DBA: Dynamic Bandwidth Allocation

Module-type pluggable OLT

+ ONUs

OLT

PON
What is Mini-PON?

Module-type pluggable OLT

Softwarized OLT functions

Server (OLT-Compute)

FTTH/O

Factory LAN

Company LAN

To diverse applications

*DBA: Dynamic Bandwidth Allocation

Commodity H/W

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What is an application of Mini-PON?

- DBA switch for various service requirement

You can switch band-allocation algorithm according to the service requirement.

You can chose either Module-type or Box-type OLT if it has PON Abstraction IF.
Mini-PON DEMO

• Purpose
We demonstrate the feasibility of Mini-PON, and further, that SEBA can support various use-cases including ours.
We will show you ...
1. SDN controller can manage a pluggable module-type OLT
2. Softwarized OLT function (DBA) is successfully decoupled from H/W, and switched for satisfying different service requirements
Mini-PON DEMO

- Overall architecture
SEBA software component (ONOS/VOLTHA) controls both of the module-type OLT and softwarized OLT func (i.e. DBA func).
Mini-PON DEMO

- **PON architecture**
  DBA & PON-OAM func are implemented as software that run on a server and are separated from OLT hardware. We will demonstrate the switch of DBA func while it’s running for showing it is successfully decoupled from hardware.
Mini-PON DEMO

- PON architecture
  DBA & PON-OAM func are implemented as software that run on a server and are separated from OLT hardware. We will demonstrate the switch of DBA func while it’s running for showing it is successfully decoupled from hardware.
Mini-PON DEMO

- **Management architecture**
  SDN Controller & AN Driver (ONOS/VOLTHA) manages the OLT module and softwarized OLT functions via Module Manager in OLT-compute server.
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SDN Controller & AN Driver (ONOS/VOLTHA) manages the OLT module and softwarized OLT functions via Module Manager in OLT-compute server.
Mini-PON DEMO

- **Mini-PON workflow**

  We hope to discuss the workflow with you.

  [https://wiki.opencord.org/display/CORD/SEBA+NTT+AS+Lab+Workflow](https://wiki.opencord.org/display/CORD/SEBA+NTT+AS+Lab+Workflow)

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**Workflow for PON-provisioning**

1. **External OSS or Operator**
   - Add flow entries to ASG
   - Pre-provision & enable OLT
   - Add flow entries to pseudo switch

2. **ONOS**
   - Add flow entries
   - Configure OLT compute

3. **VOLTHA**
   - Initialize OLT compute
   - Add flow entries to OLT
   - Add flow entries to OLT

4. **ASG**
   - UpdateLogicalDeviceFlowTable

5. **OLT compute**
   - Activate DBA process

6. **OLT module**
   - PON link-up

7. **ONU**
   - User-data path is up

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FASA Project in NTT

- **FASA** (Flexible Access System Architecture) aims to modularize the function of access network equipment (e.g. OLT) for providing various services without H/W development. ※Mini-PON is a part of FASA.
FASA Project in NTT

- PON Abstraction interface (BBF TR402/WT403)

As a part of FASA, NTT-AS Lab is promoting standardization of API for OLT Time-Critical function (e.g. DBA etc..) in BBF.

DBA switch for Mobile service
FASA Project in NTT

**FASA (Flexible Access System Architecture)** aims to modularize the function of access network equipment (e.g. OLT) for providing various services without H/W development. ※Mini-PON is a part of FASA.
NTT AS Lab’s contribution for SEBA

- NTT AS Lab contributed SEBA RD draft by
  - Writing 2.3.2.10 PON section, workflow
  - Reviewing

- Further, we contributed SEBA development by
  - developing VOLTHA 2.0 (especially for VOLTHA-BBSim)
  - PoC for SEBA @ NTT R&D Forum, ONF Connect

1OLT/16ONUs emulated by BBSim
• Future development plan
We plan to complete the development of OpS for Mini-PON by the next autumn, using VOLTHA/ONOS.

For this, we will contribute to SEBA project in the following ways:
• Functional expansion for Tech. Profile for various Access Tech (especially focused on EPON support)
• ONU test function (e.g. loopback test etc...).
Summary

• NTT-AS Lab successfully implemented Mini-PON based on SEBA, and it will show you:
  1. SDN controller can manage a pluggable module-type OLT,
  2. Softwarized OLT functions can be decoupled from H/W, and switched in accordance with the service requirement.

• NTT-AS Lab will keep contributing to SEBA project.

• I’d be glad if you give us any proposal about the use-case for a module type OLT and softwarized OLT functions.