



Innovative R&D by NTT

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

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NTT Access Network Service Systems Lab (AS-Lab), Japan

ONF Connect @ Santa Clara, USA (5<sup>th</sup> Dec, 2018)



# Today's schedule

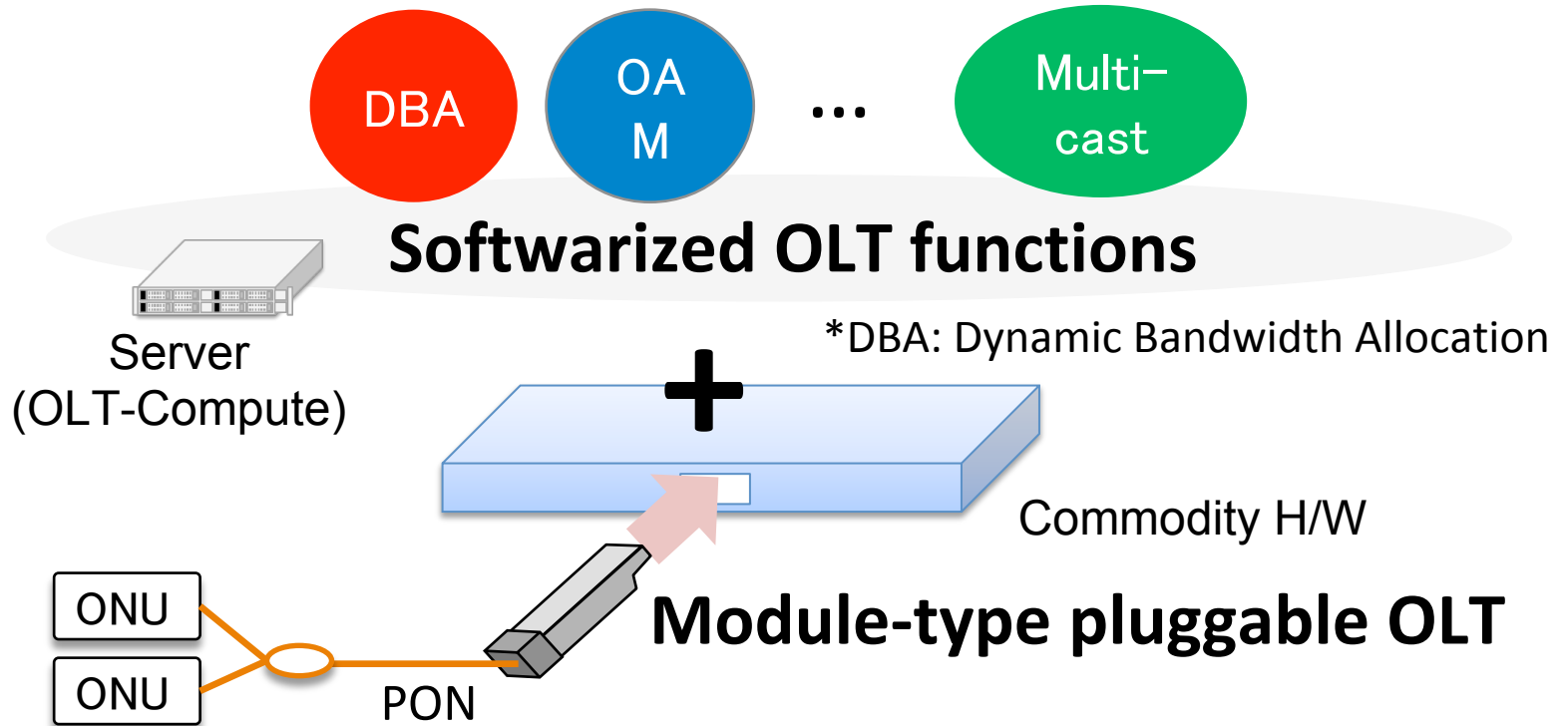


## ONF Connect 2018

- 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 ?**

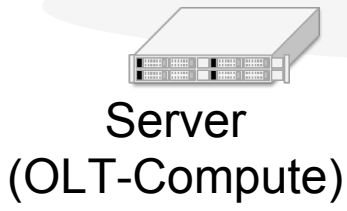
# What is Mini-PON ?



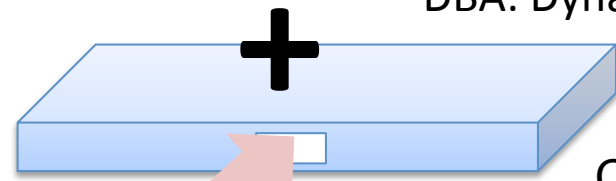
# What is Mini-PON ?



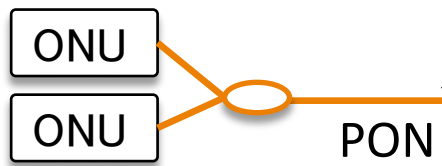
## Softwarized OLT functions



\*DBA: Dynamic Bandwidth Allocation



Commodity H/W



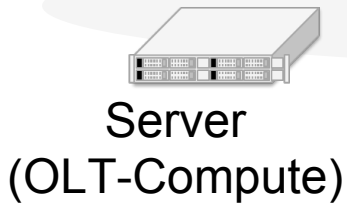
## Module-type pluggable OLT



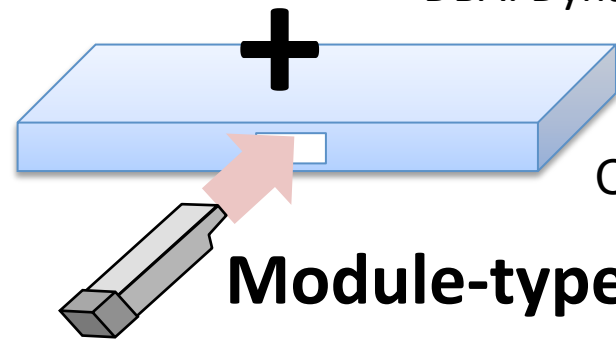
# What is Mini-PON ?



## Softwarized OLT functions

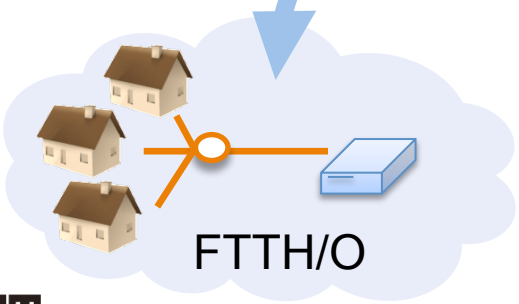


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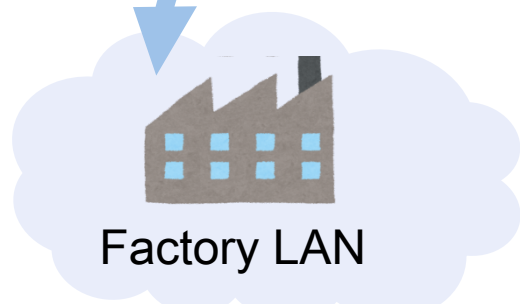


Commodity H/W

## Module-type pluggable OLT



FTTH/O



Factory LAN



Company LAN

# What is an application of Mini-PON ?

- DBA switch for various service requirement

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

Controller Server  
(ONOS/VOLTHA)



OLT-compute Server



DBA for  
Factory  
LAN

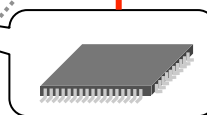
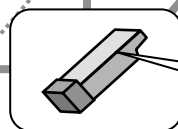
DBA for  
Company  
LAN



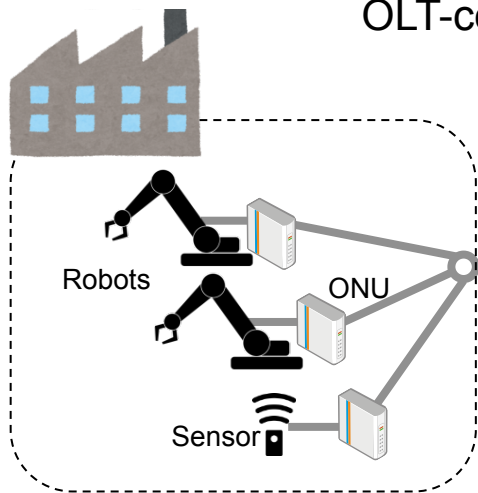
PON Abstraction IF  
(BBF TR-402/WT-403)



Module-type OLT



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



## ▪ Purpose

We demonstrate the feasibility of Mini-PON, and further, that SEBA can support various use-cases including ours.

We will show you ...

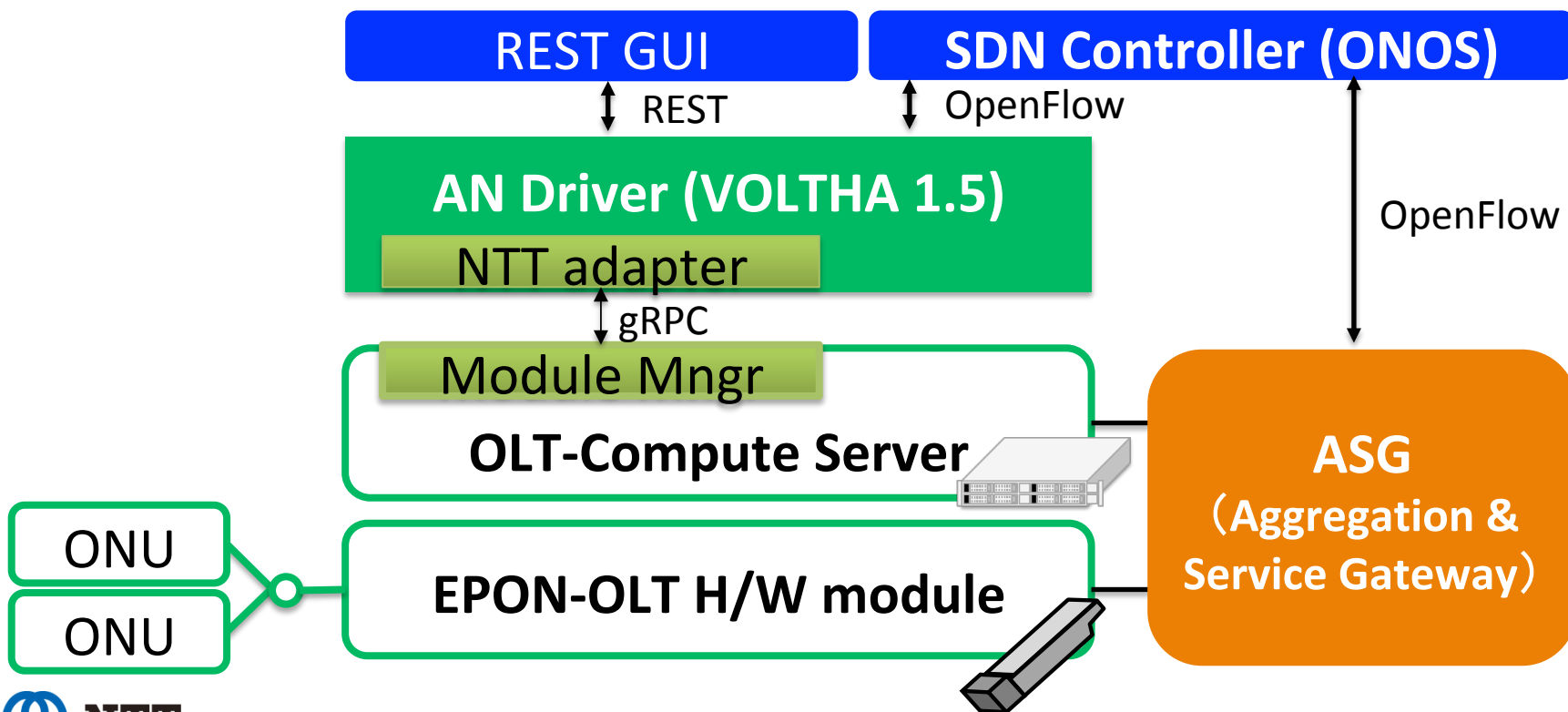
1. SDN controller can manage a pluggable module-type OLT
2. Softwarized OLT function (DBA) is successfully decoupled from H/W, and switched for satisfying different service requirements

# 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).



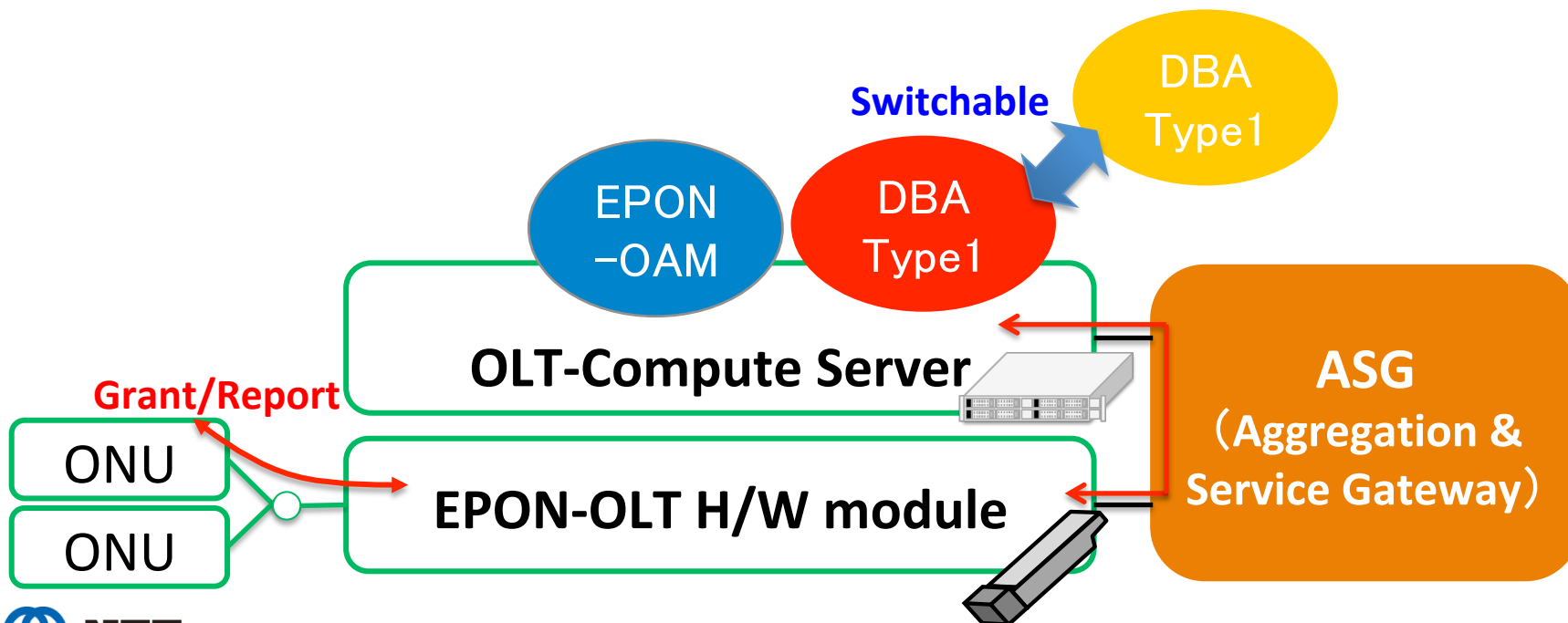


# Mini-PON DEMO



## ▪ 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.

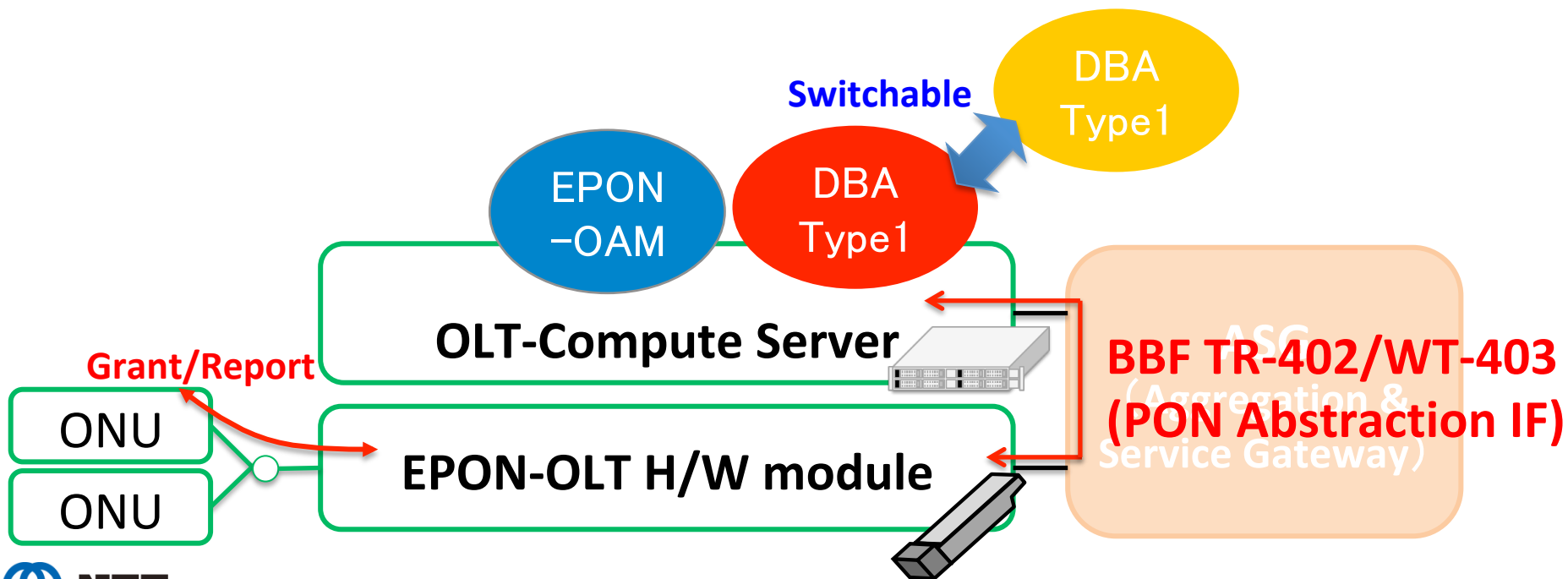


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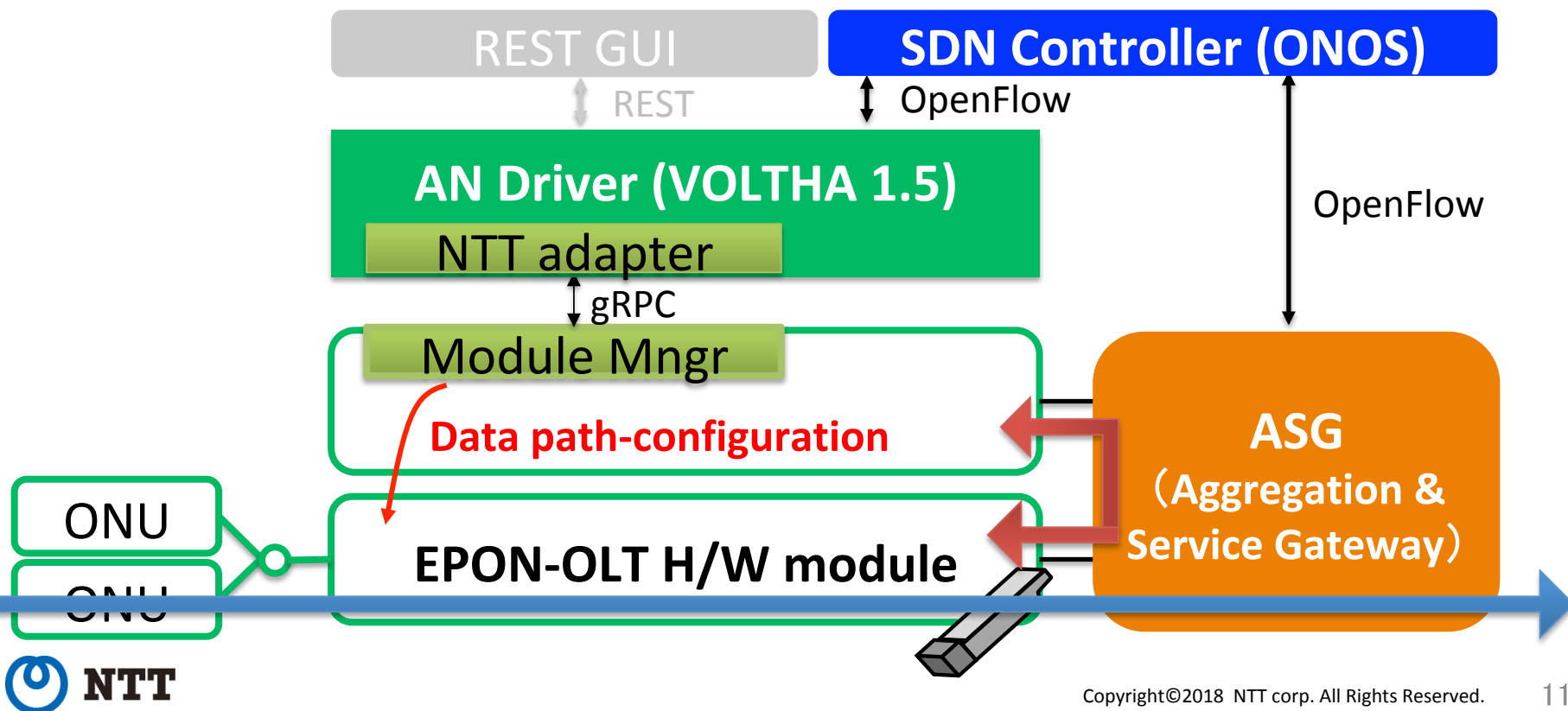


# Mini-PON DEMO



## Management architecture

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

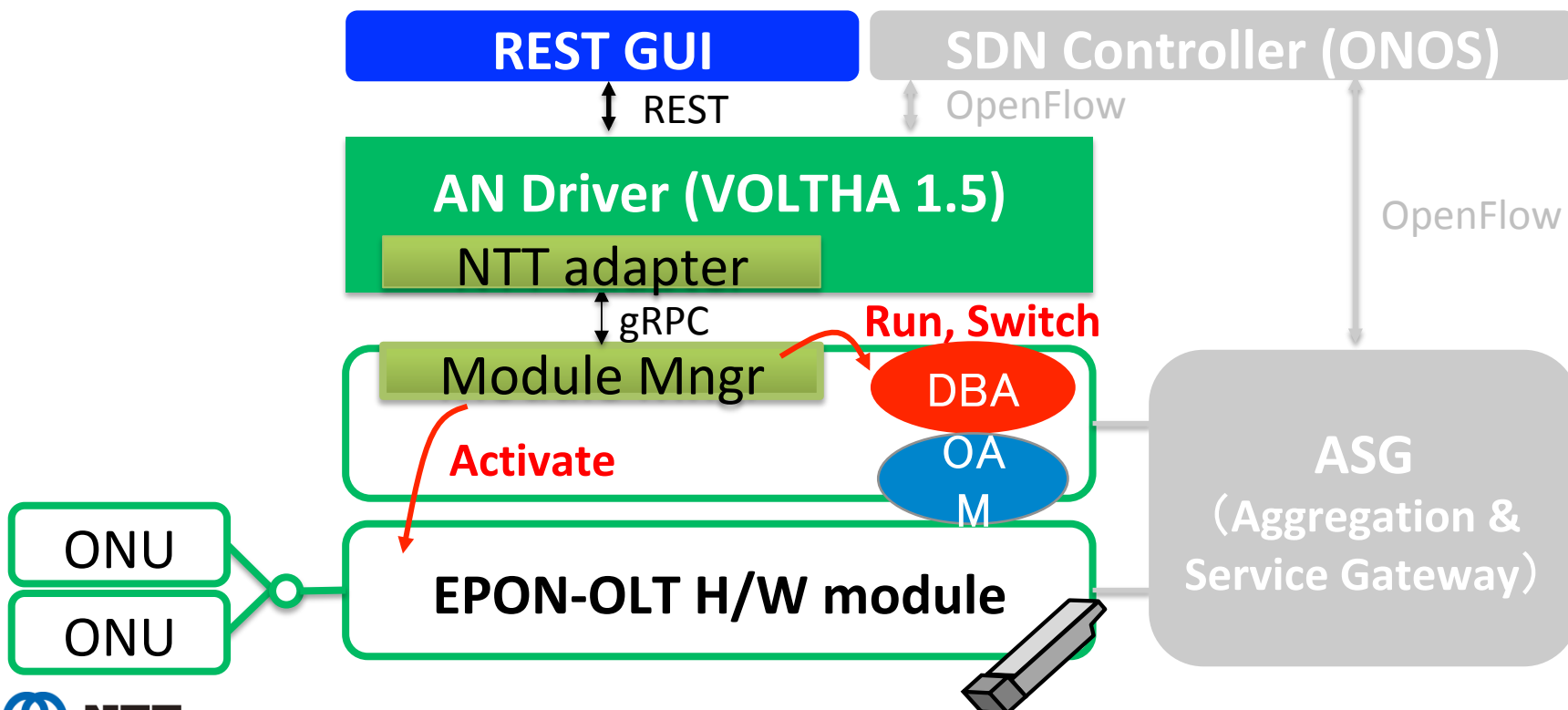


# Mini-PON DEMO



## Management architecture

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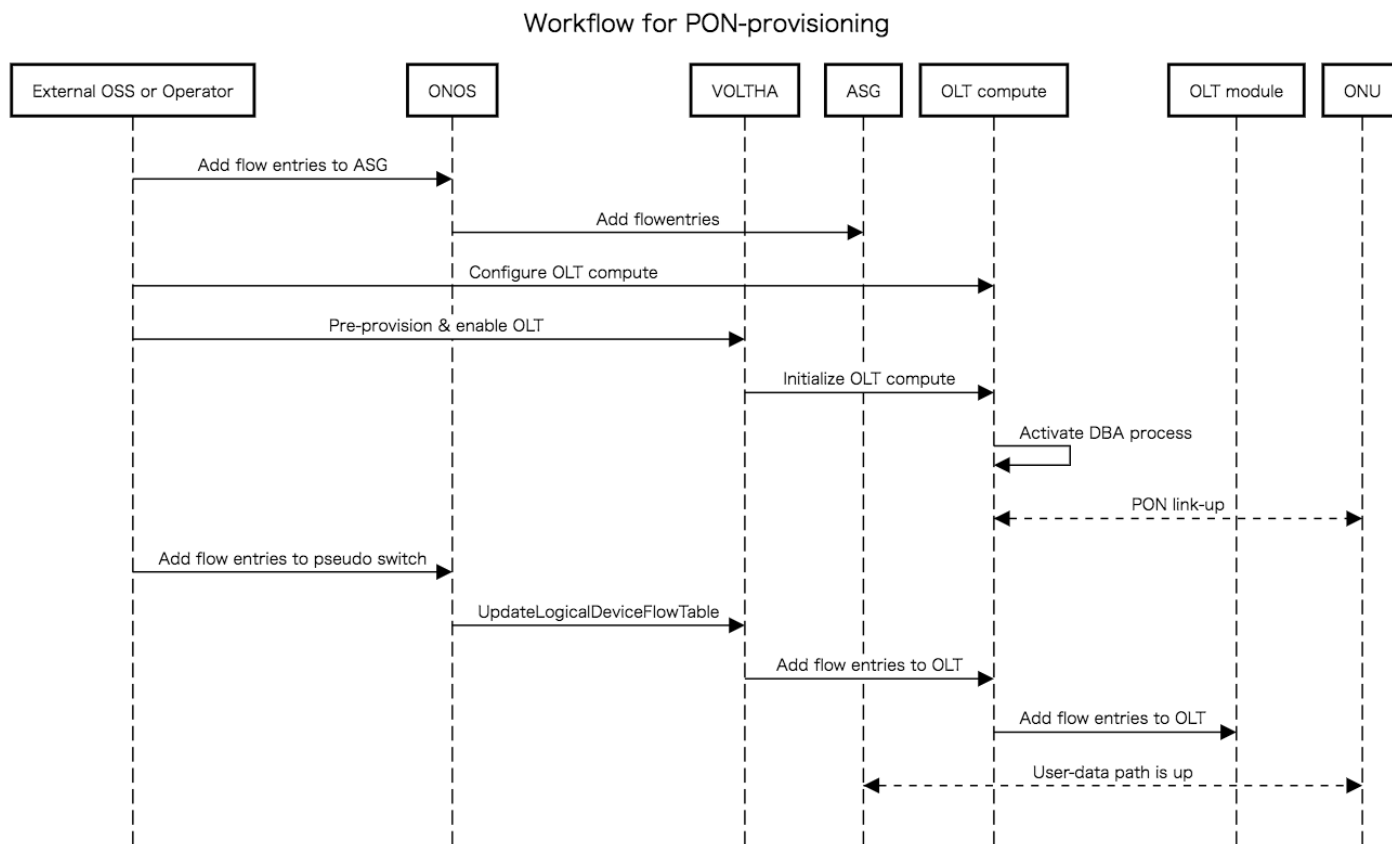
# Mini-PON DEMO



## Mini-PON workflow

We hope to discuss the workflow with you.

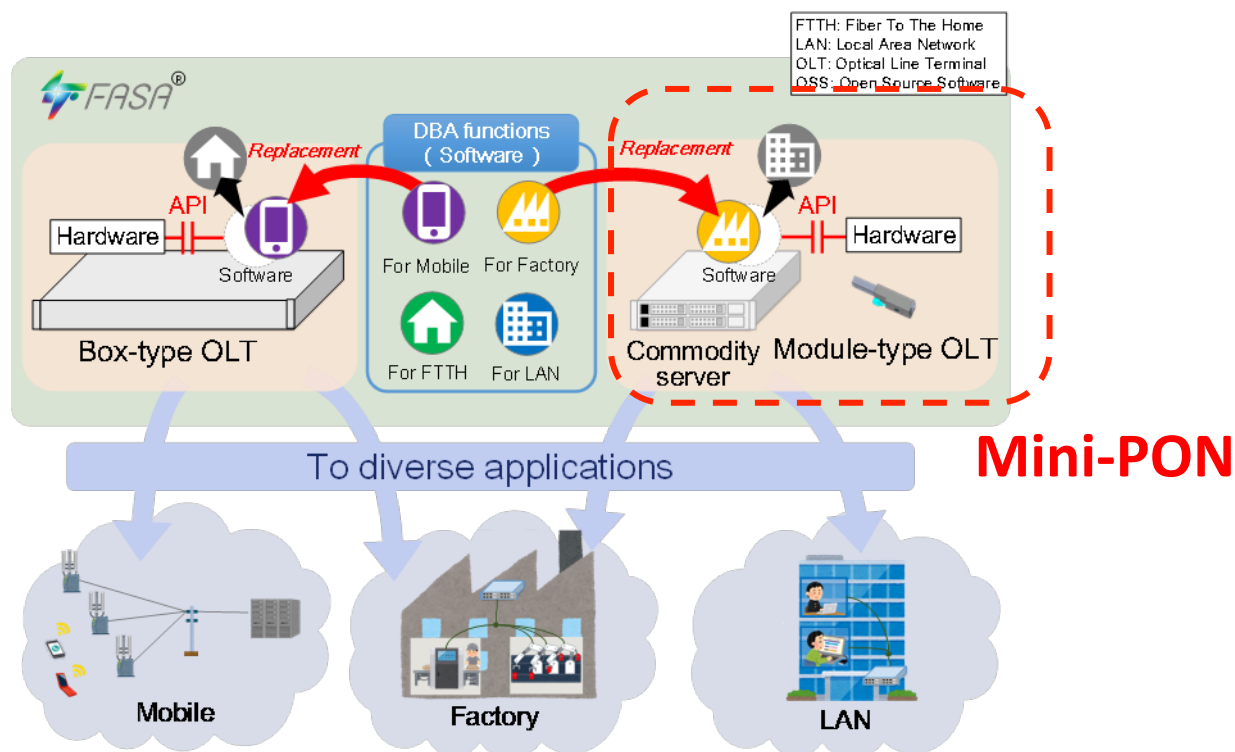
(<https://wiki.opencord.org/display/CORD/SEBA+NTT+AS+Lab+Workflow>)



# 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.

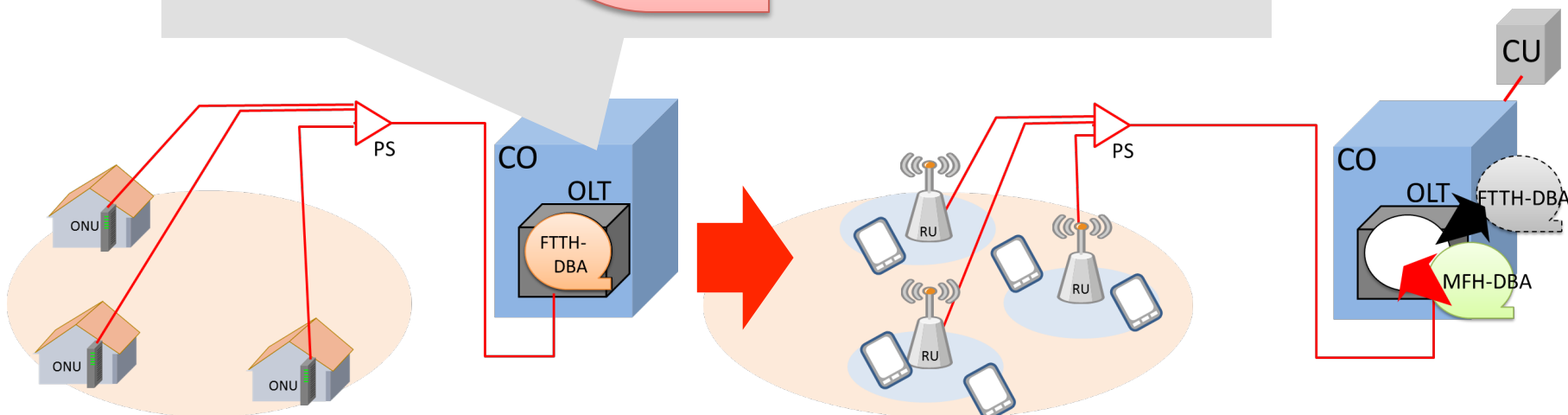
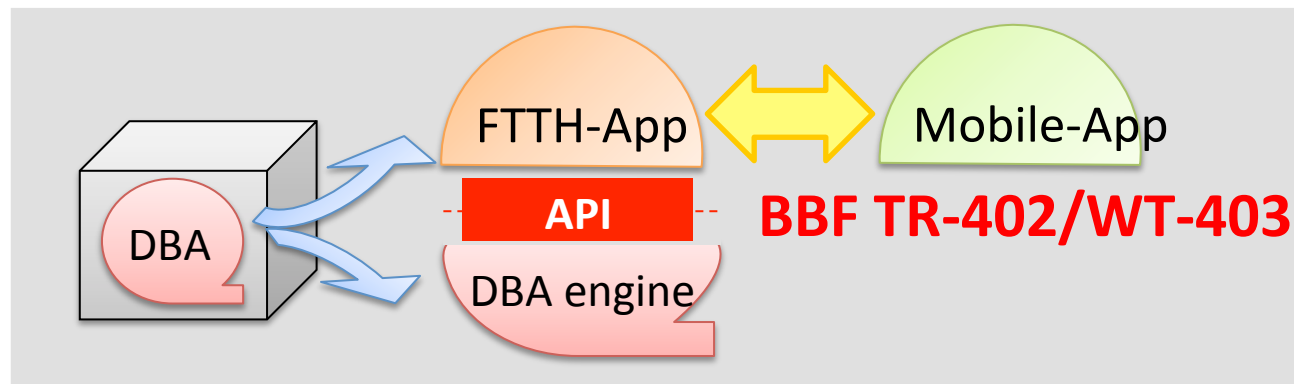


# FASA Project in NTT



## • 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.

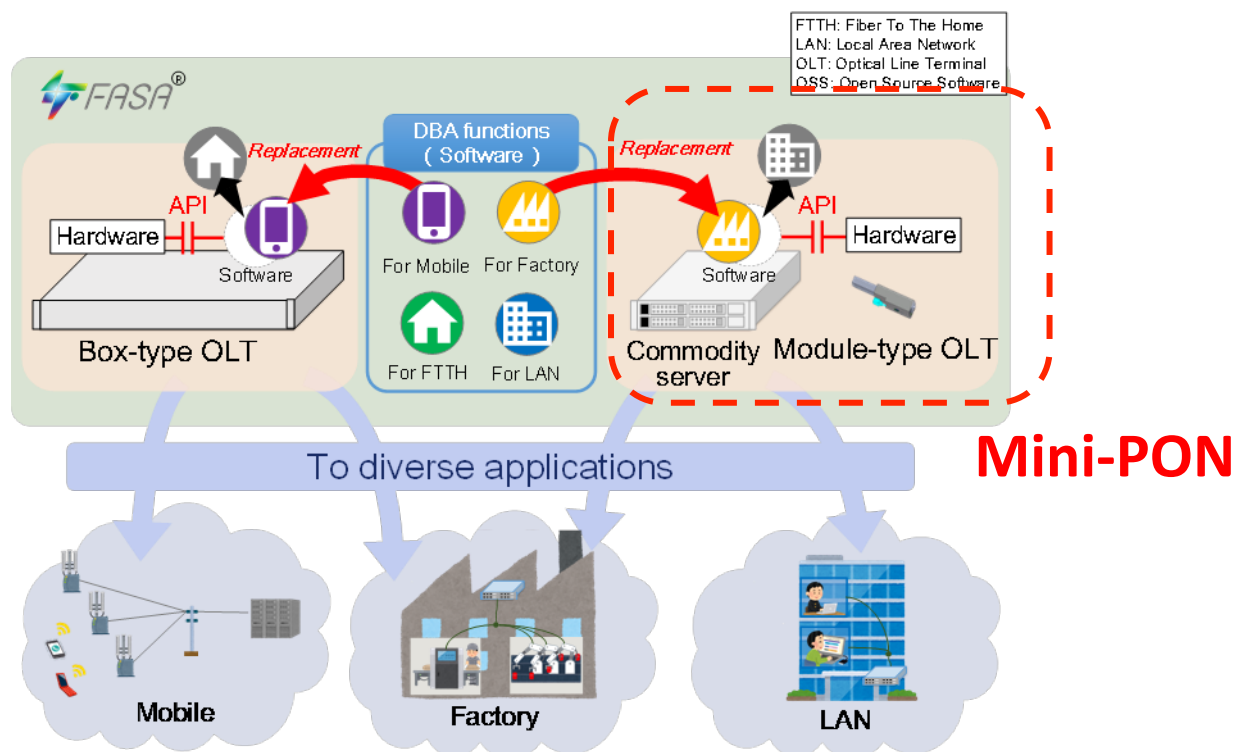


**DBA switch for Mobile service**

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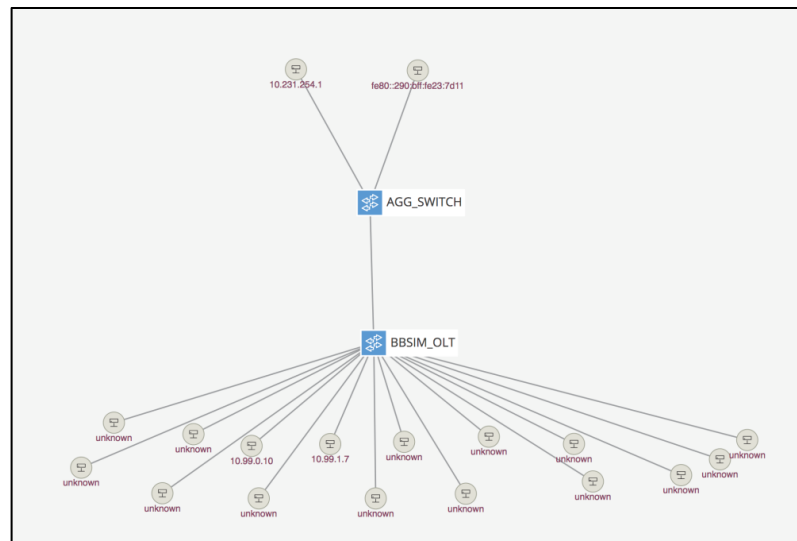




# NTT AS Lab's contribution for SEBA



- **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.

