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Nokia Contributions to R-CORD

CORD Build 2017

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In Fixed Networks CTO

Introduction

- Nokia contributions to ONOS
- Nokia contributions to VOLTHA
- Gaps and potential areas for improvement in VOLTHA

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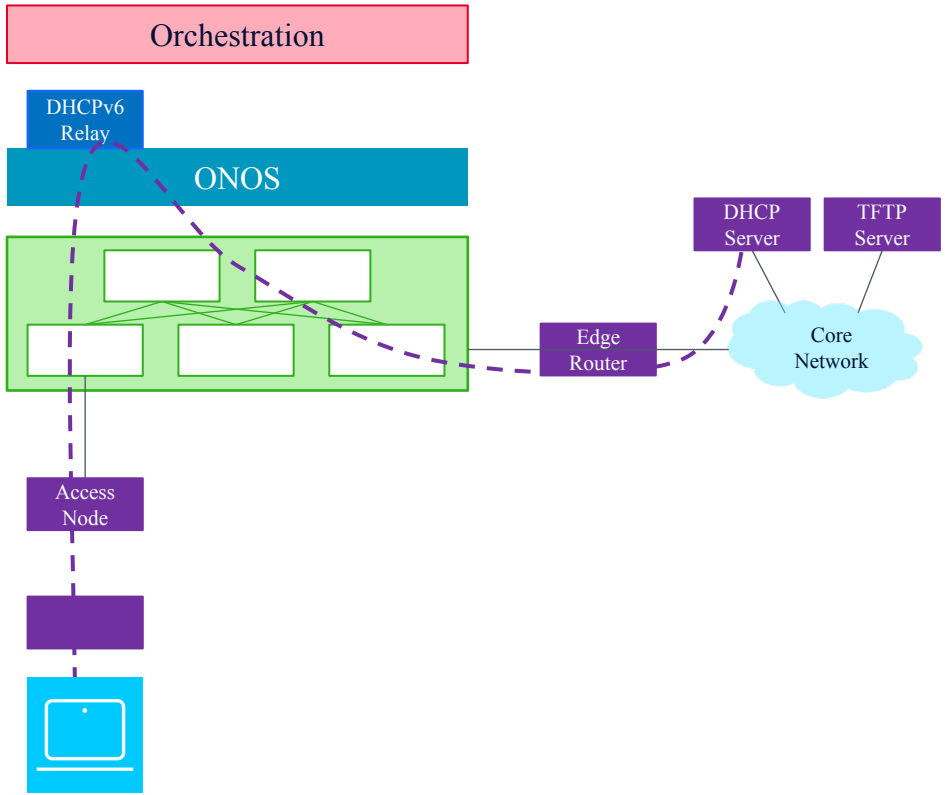
Nokia Contributions to ONOS
DHCPv6 Relay Application

- https://jira.opencord.org/browse/CORD-1430 Support DHCPv6 by DHCPRelay App
- DHCPv6 App contributed to ONOS supporting requirements for MSO's
- Support for Direct and Indirect connected hosts
- Add learned routes to ONOS
- The orchestration provisions the link address
- Document: https://wiki.opencord.org/display/CORD/DHCPv6+Relay
- https://wiki.opencord.org/display/CORD/DHCP-relay+additional+features



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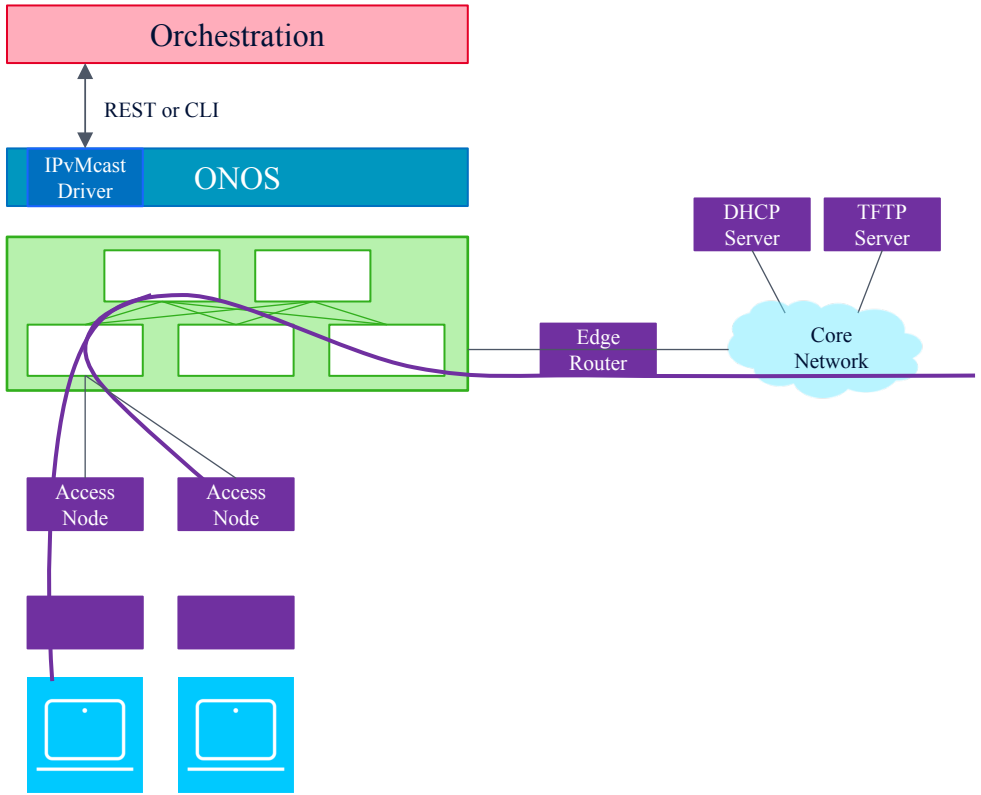
Nokia Contribution to ONOS
IPv6 Multicast Driver

- https://jira.opencord.org/browse/CORD-1622 Update McastHandler in Segment Routing to support IPv6
- https://jira.opencord.org/browse/CORD-1624 Add IPv6 multicast in McastHandler and OFDPA2.0 Drivers
- IPv6 Multicast support was added
- Orchestration will provision the static multicast streams
- Documentation:https://wiki.opencord.org/display/CORD/IPv6+Multicast



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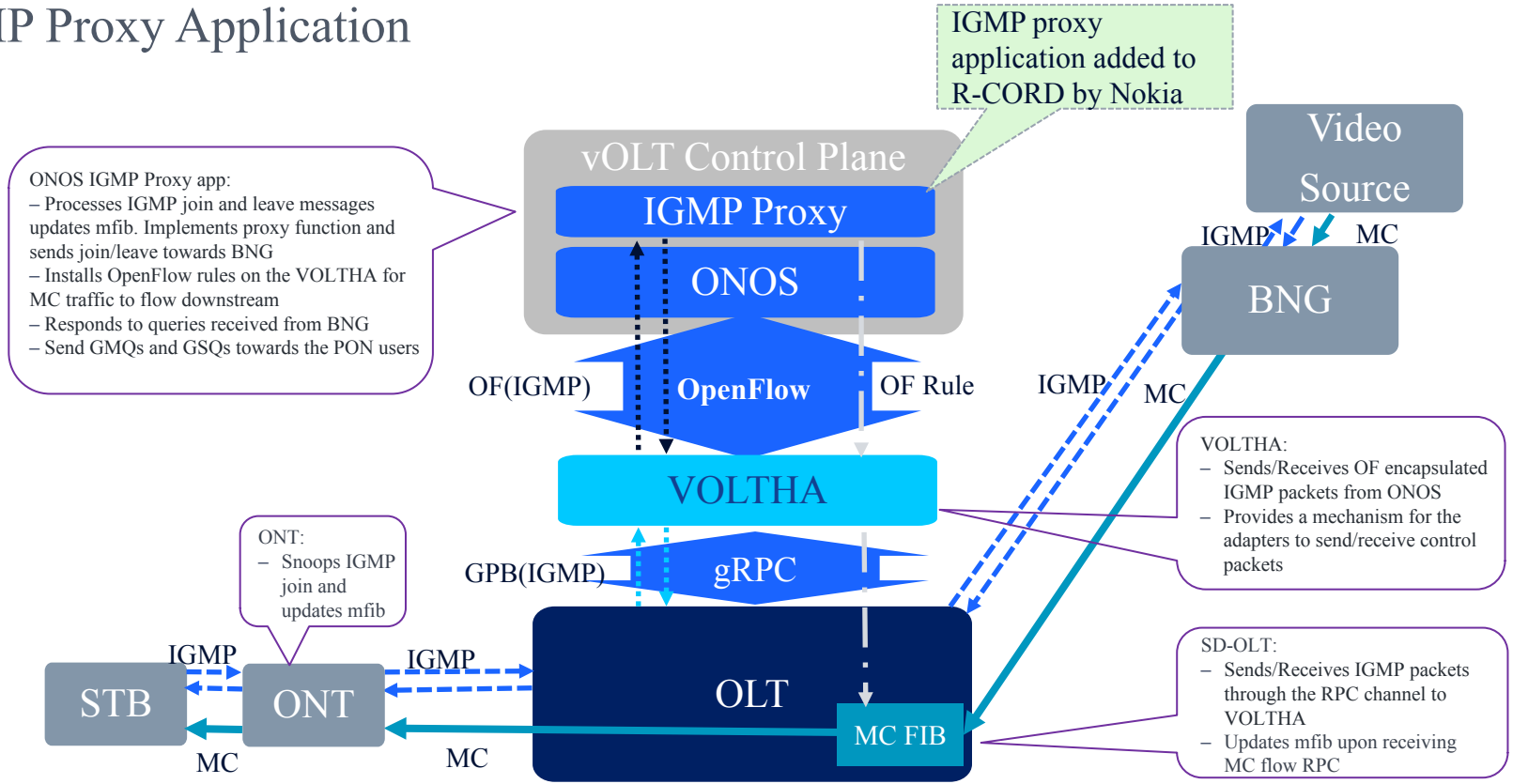
Nokia Contribution to ONOS
IGMP Proxy Application



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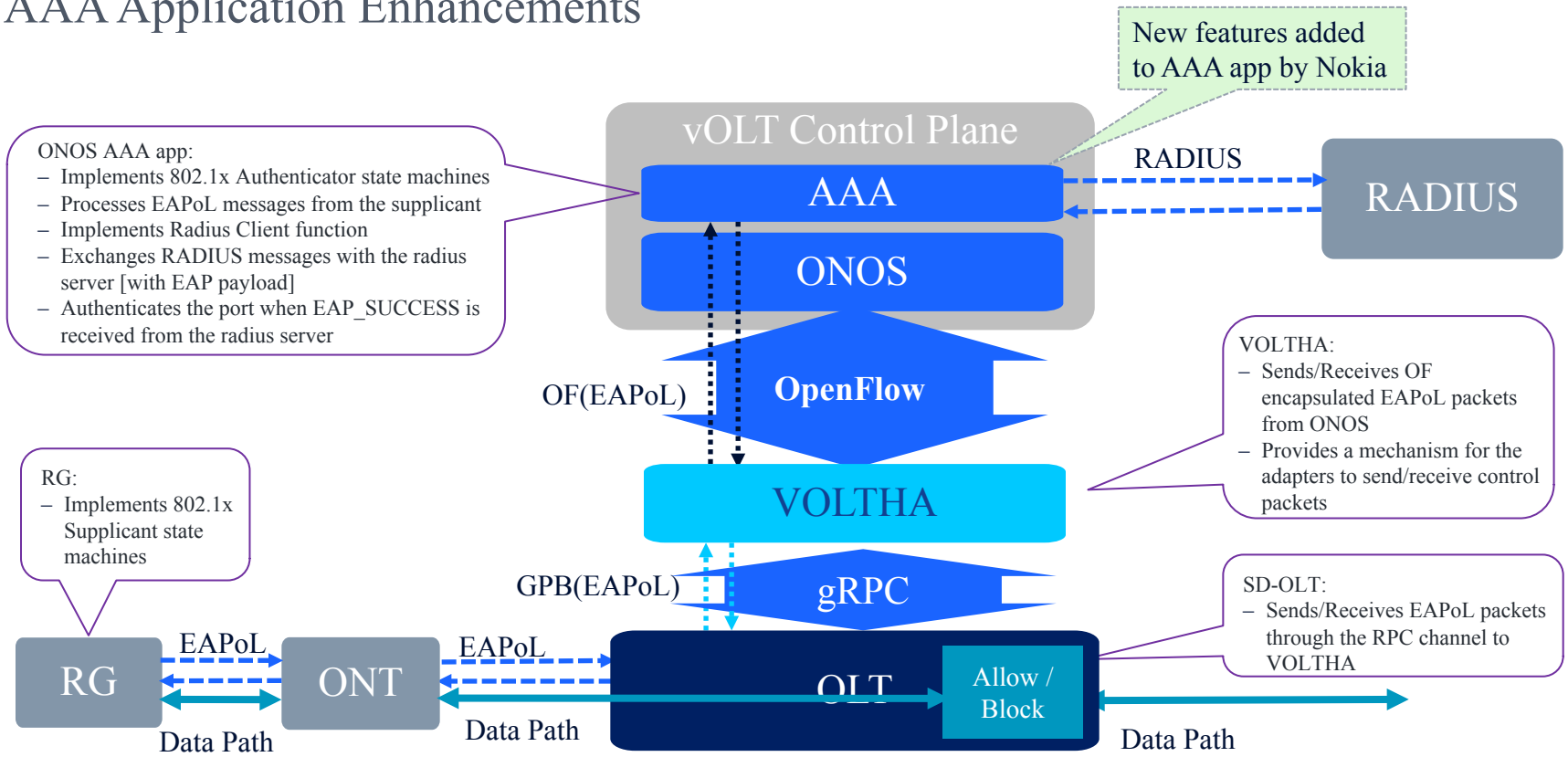
Nokia Contribution to ONOS
AAA Application Enhancements



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Other Nokia Contributions to ONOS

- Enhancements and bug-fixes to AaaManger, State machine and RADIUS
- Bug fixes in XoSIntegration impacting AAA app
- Command to show current authenticated users
- Enhancements and bug fixes to R-CORD IGMP snooping app and CORD mcast app
- Support for MCVLAN configuration in CORD mcast app
- Nokia pipeline driver in ONOS
- 802.1x packet lift installed with a higher priority than l2fwd OF rule
- Support for DHCP flow rules
- GET/GET ALL/SET ALL subscribers via REST interface in olt app
- Enhanced mcast app to clear flows and groups while multicast vlan changes
- Fixed bug in multicast app where more than one device cannot join into same group
- Added REST interface for Set/Get/Delete Qos configuration
- …

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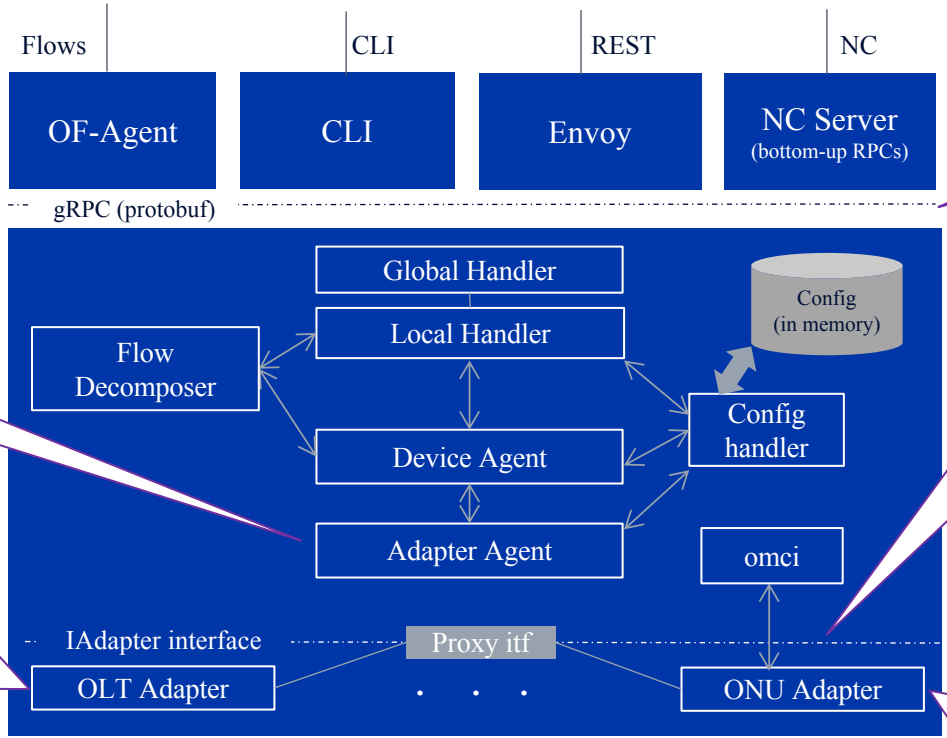
VOLTHA Architecture in June 2017

Hard-coded PON and ONU provisioning



- No support for ONU pre-provisioning from NBI
- No support for PON provisioning from NBI
- OLT device can be pre-configured
- OLT device-id is auto-generated (improvement required in future for NBI configurable ID/name)

- Use to relay OMCI messages between the ONU and OLT adapters

- Direct interface into core

- Supports configuration for flows
- No configuration support for PON related attributes
- Handles ONU-id assignment (based on a hard-coded formula
- UNI Port numbers are hard-coded
- Hardcoded GEM ports/alloc-ids

- ONU Device automatically created when ONU is detected.
- All the ONU attributes are hard-coded)
- No pre-configuration
- UNI port numbers are hard-coded
- Some ONU adapters (e.g BCM ONU) use hard-coded VLAN ids (same as in-port)

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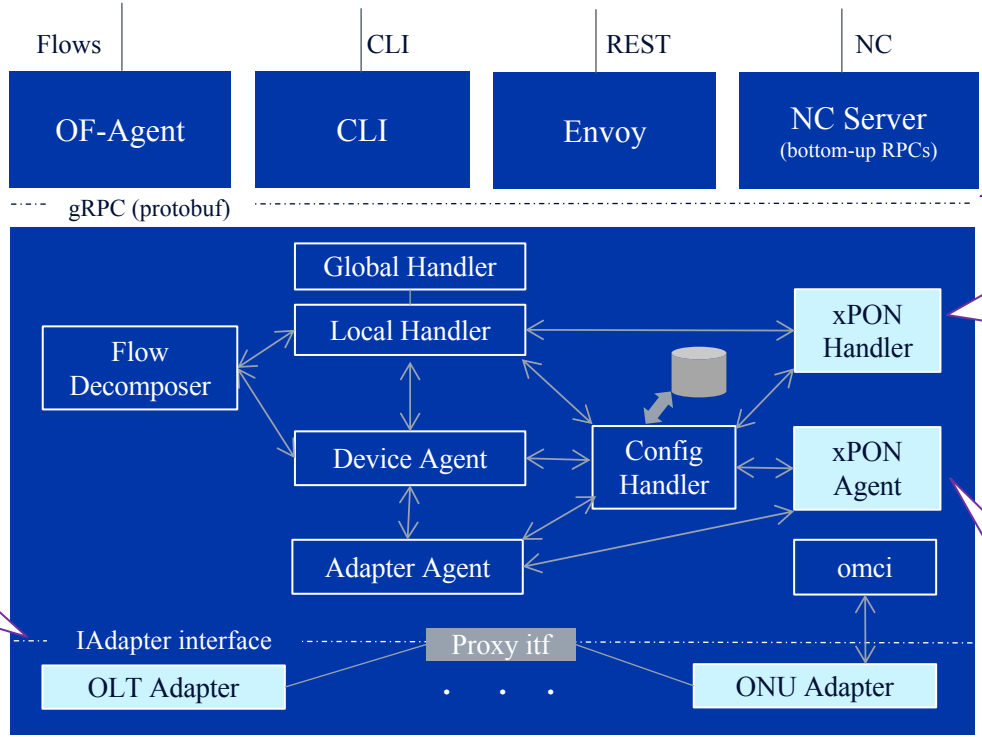
PON and ONU provisioning introduced by Nokia
Introduction of xPON Handler & xPON Agent



- Support PON and ONU provisioning via NBI
- Derive protos from WT-385 xPON models

- xPON Handler responsible for handling PON and ONU provisioning
- Responsible for validation and saving provisioning to database
- TC-Id allocation (i.e. Gem-port and Alloc-IDs)

- IAdapter interface extended for PON and ONU provisioning in a generic fashion

- xPON Agent handles all the post-processing of PON and ONU provisioning following the database save
- Responsible for sending the configuration towards the adapters

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Nokia Contributions to VOLTHA

xPON

xPON handler

- xPON Handler responsible for handling PON and ONU provisioning
- Responsible for validation and saving provisioning to database
- TC-Id allocation (i.e. Gem-port and Alloc-IDs)

xPON Agent

- Handles all the post-processing of PON and ONU provisioning following the database save
- Responsible for sending the configuration towards the adapters

gRPC Protobuf

- Support PON and ONU provisioning via NBI
- Protobuf is derived from WT-385 xPON YANG model (https://wiki.broadband-forum.org/display/BBF/Software+Release+Registry?preview=/20744764/24346720/WT-385_draft1.pdf#WT-385_draft1)

xPON CLI added for all supported xPON objects

IAdapter interface is extended for PON and ONU provisioning in a generic fashion

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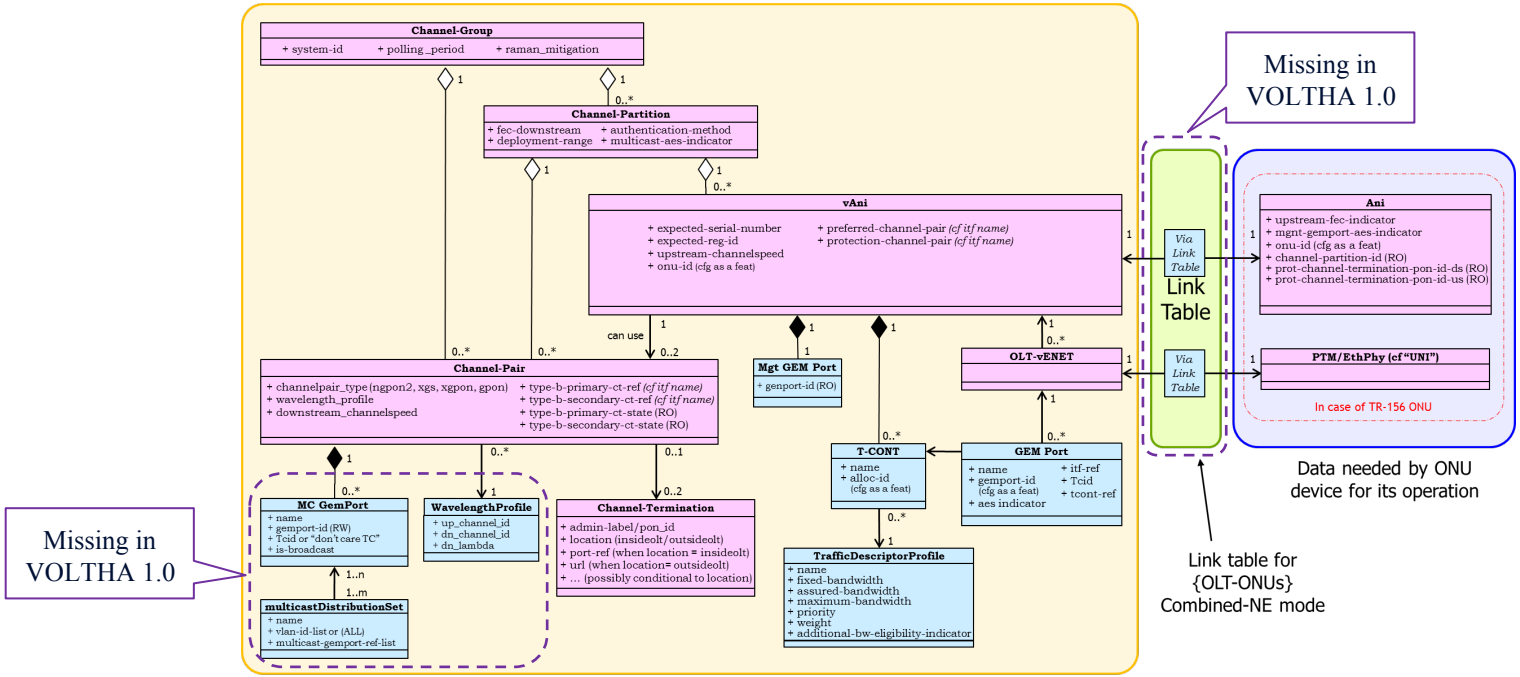
WT-385 xPON transport YANG Model

Used for protobuf between NBI <-> CORE and CORE <-> adapters



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Hardware Entity management for OLTs and ONUs

Missing in VOTLHA 1.0

OLT device can be created. However, ONU device is auto-created in VOLTHA The OLT ports are discovered and hardcoded. No provision for configuration of ONU slots/ports in VOLTHA 1.0

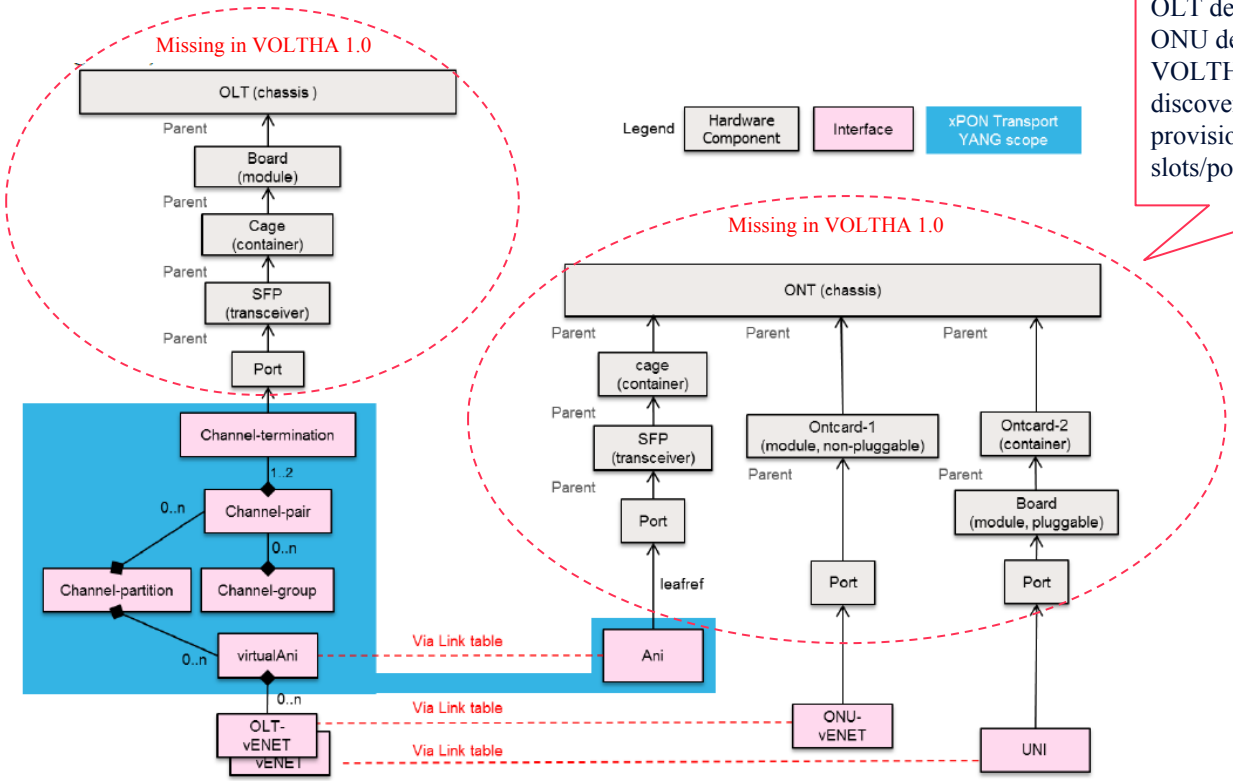

Figure 1 –Interface and Hardware Entities Relationships

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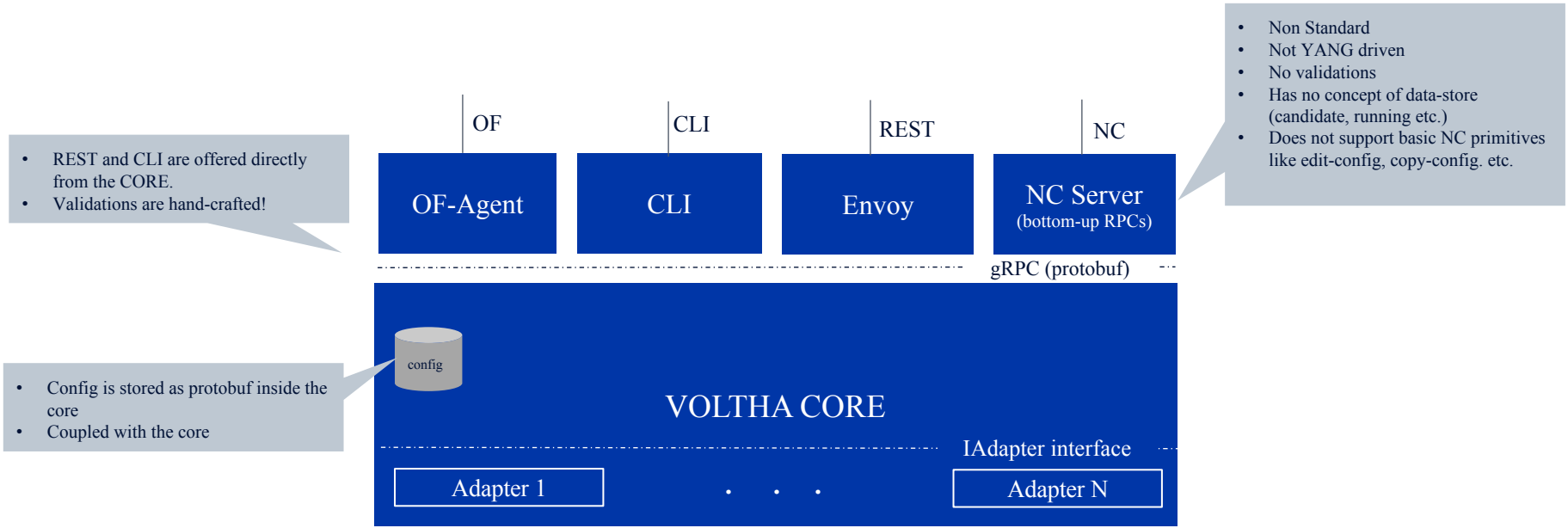
Current Architecture gaps

Lack of NC/Y framework, tightly-coupled adapters, in-memory data-store etc.



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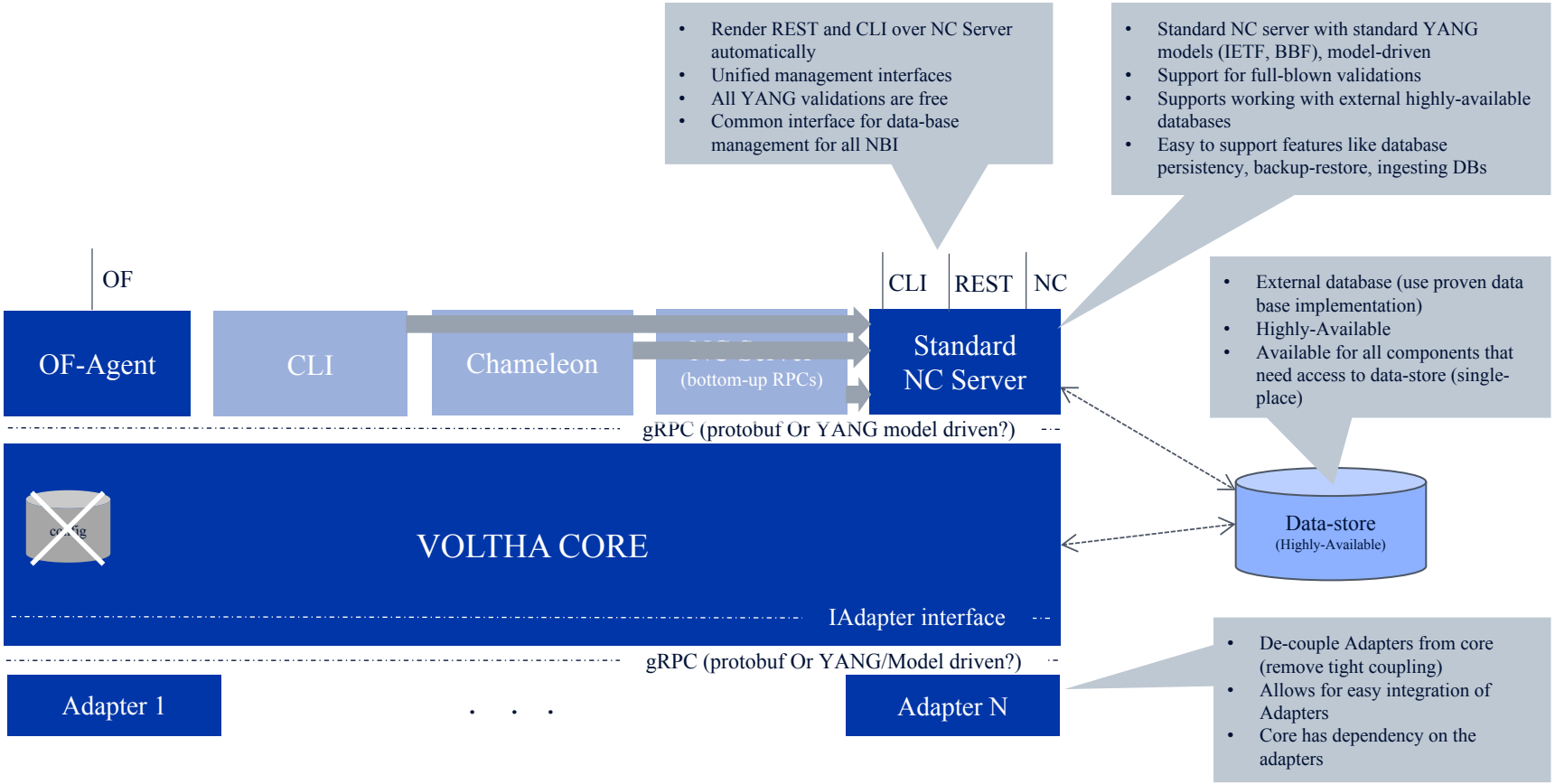
Potential for Improvement



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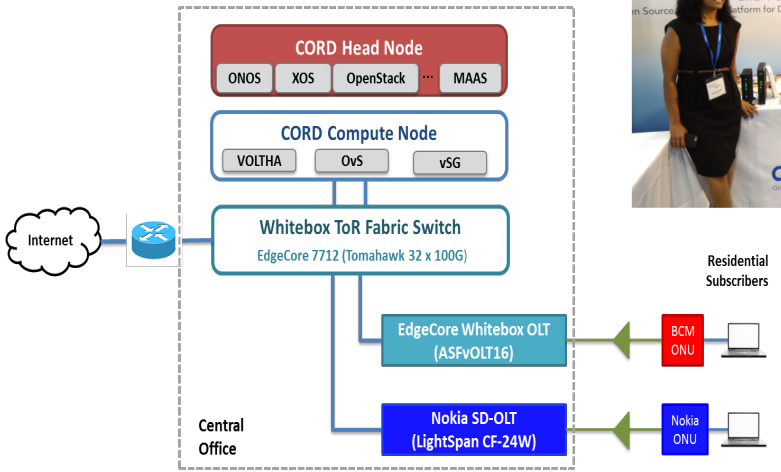
ONF Booth @ Broadband World Forum

- ONF demonstrated multivendor E2E unicast and multicast services using R-CORD & VOLTHA @ BBWF, Berlin in Oct 2017
- Link to ONF BBFW Page



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Nokia Lightspan CF-24W

Delivers industry's highest NG-PON capacity in a 1U box

Downlink ports: 24 x XGS PON (XFP)
Uplink ports: 6 x 40G/100G Uplink (QSFP28)

Features

Small and compact 1U shelf size

Modular and scalable data center practices

Full non-blocking data path architecture

240 Gb/s NG-PON capacity in single rack unit

Redundant 300 Gb/s uplink capacity to external leaf-spine switching fabric

Open and programmable interfaces and standard device models (NETCONF/YANG)

Rack mountable with front-to-back airflow for cloud central office and data center

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