Edgecore ASFvOLT16 VOLTHA Adapter and Driver

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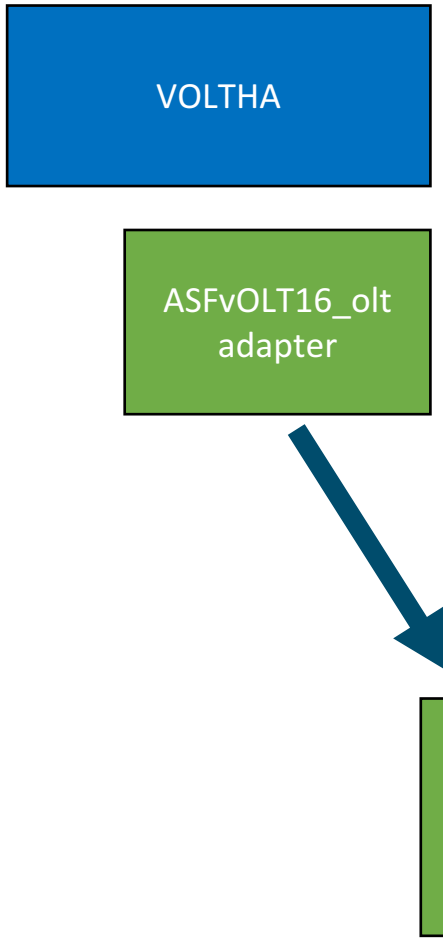
Edgecore ASFvOLT16 Whitebox OLT



- **Disaggregated OLT** means minimizing the amount of software in the device
- VOLTHA provides the vOLT control abstraction
- VOLTHA device adapter interacts with OLT hardware
- SW required in the OLT to interface to the adapter
  - But ASFvOLT16 has no existing OLT control software
  - No existing open source OLT control software

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- In-OLT software is needed for:
  - Embedded CPU operating system
  - Broadcom Maple PON MAC SoCs
  - Broadcom DNX Qumran Ethernet switch
  - Other hardware and functions
    - XFP, QSFP, Fans, Timing
    - Software update
    - Health and status

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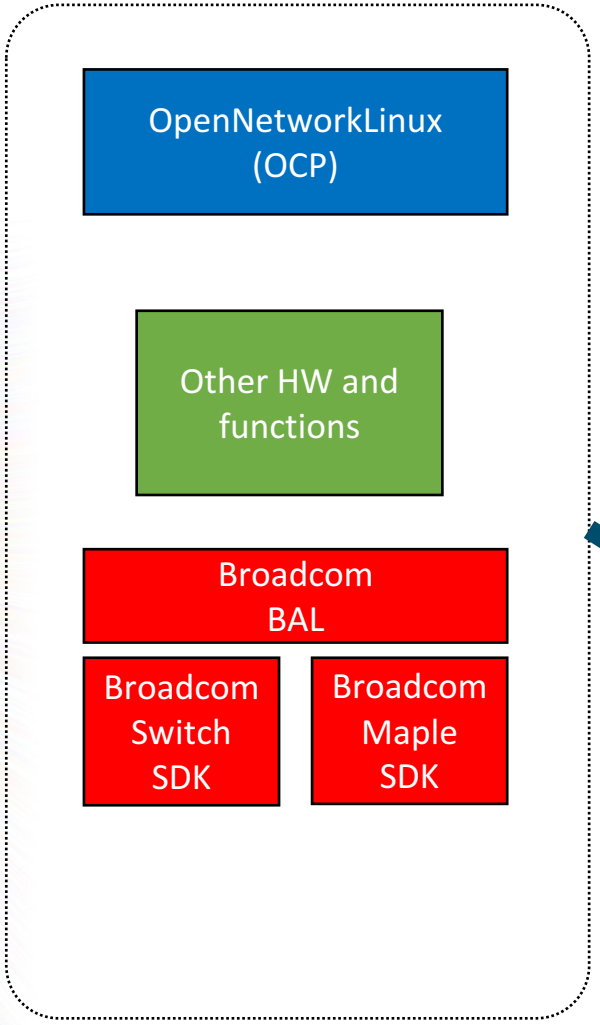

- Software solutions:
  - ONL can provide foundation for NOS
  - ONLP provides most HW peripheral support
  - Broadcom Maple SDK for PON MAC
  - Broadcom Switch SDK for Qumran switch
  - Broadcom BAL – Broadband Abstraction Layer
    - Provides abstraction to manage Maple and Qumran as an OLT system
    - Intended as foundation for OLT control FW

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- BAL provides object oriented OLT access API
- Hides details of PON MAC and switch API calls

- APIs: bcmbal_cfg_get(), bcmbal_cfg_set(), bcmbal_cfg_clear()
- Parameter: bcmbal_flow_cfg

Parameter Name	Parameter Description	Data Type	Access	Minimum	Maximum
admin_state	Administrative state	bcmbal_state	RW		
oper_status	Operational status	bcmbal_status	R		
access_int_id	The ID of the subscriber side interface; i.e. PON	bcmbal_intf_id	RW		
network_int_id	The ID of the network side interface; i.e. NNI	bcmbal_intf_id	RW		
sub_term_id	The ID of the subsccriber terminal device	bcmbal_sub_id	RW		
svc_port_id	The ID of the service port (for GPON/XGPON - GEM ID)	bcmbal_service_port_id	RW		
agg_port_id	The ID of the aggregate port (for GPON/XGPON - ALLOC ID)	bcmbal_aggregation_port_id	RW		
resolve_mac	A flag indicating if the MAC address table should be used in DS GEM resolution	bcmos_bool	RW		
base_tc_id	The base index of the TC object(s) to be used for this flow	uint16_t	RW		
classifier	The classifier for this flow	bcmbal_classifier	RW		
action	The action associated with the flow	bcmbal_action	RW		
sla	SLA parameters for this flow	bcmbal_sla	RW		
cookie	Application cookie	bcmbal_cookie	RW		
priority	Priority for this flow in case of multiple match.	uint16_t	RW	1	255
group_id	RW - The multicast group associated with this flow, valid for type MULTICAST only	bcmbal_group_id	RW		

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- The problem?
  - BAL/Maple and Qumran SDK source code is proprietary and requires source code license agreement (SLA) between equipment provider and Broadcom
  - No equivalent to the OF-DPA Community Development Package (CDP) for BAL exists from Broadcom
  - The VOLTHA community wants ASFvOLT16 to be as open source as possible
- The solution?
  - Work with Broadcom to open the BAL API (calls and object model)
  - Propose ASFvOLT16 architecture to partition closed and open source

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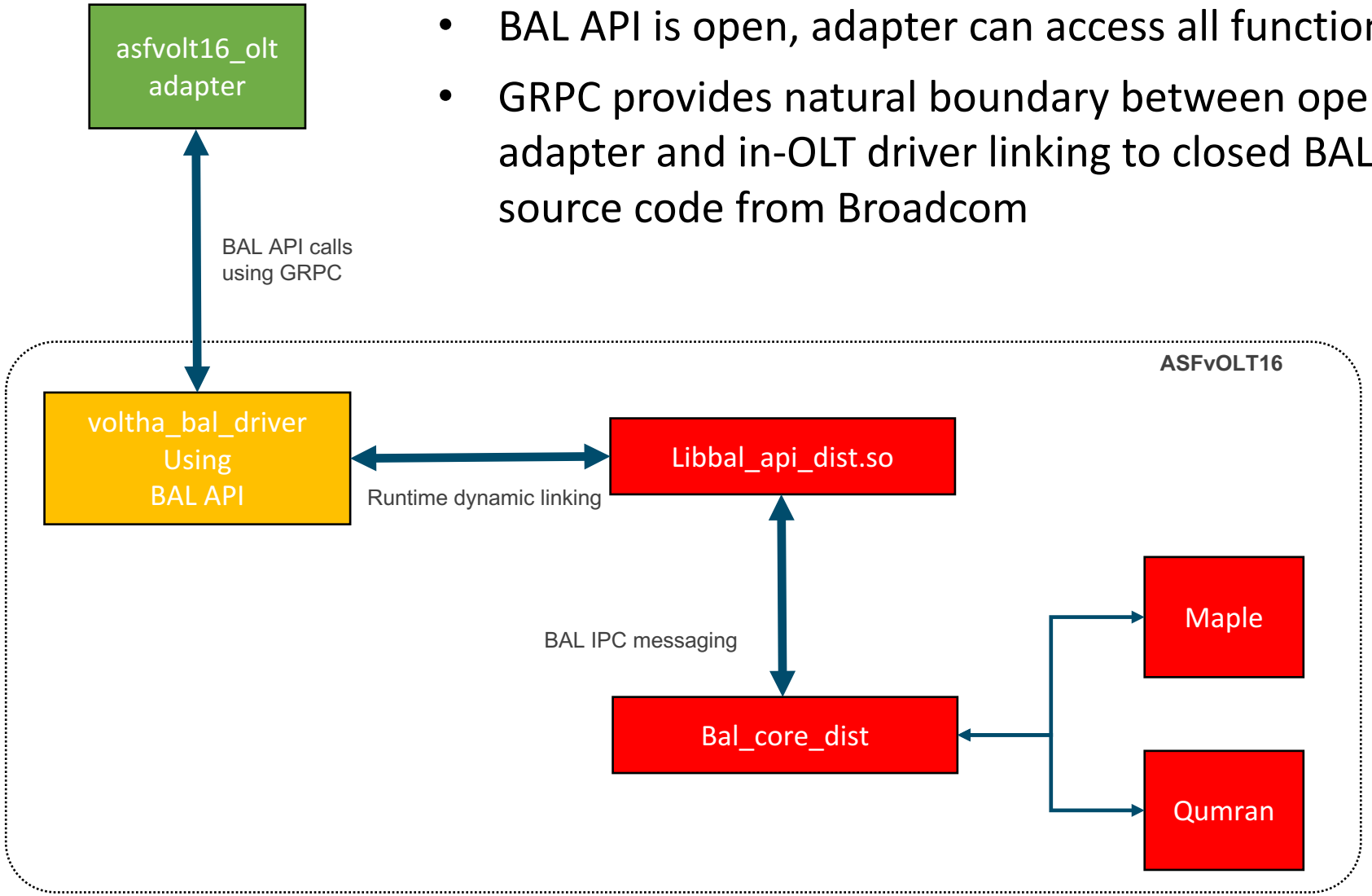
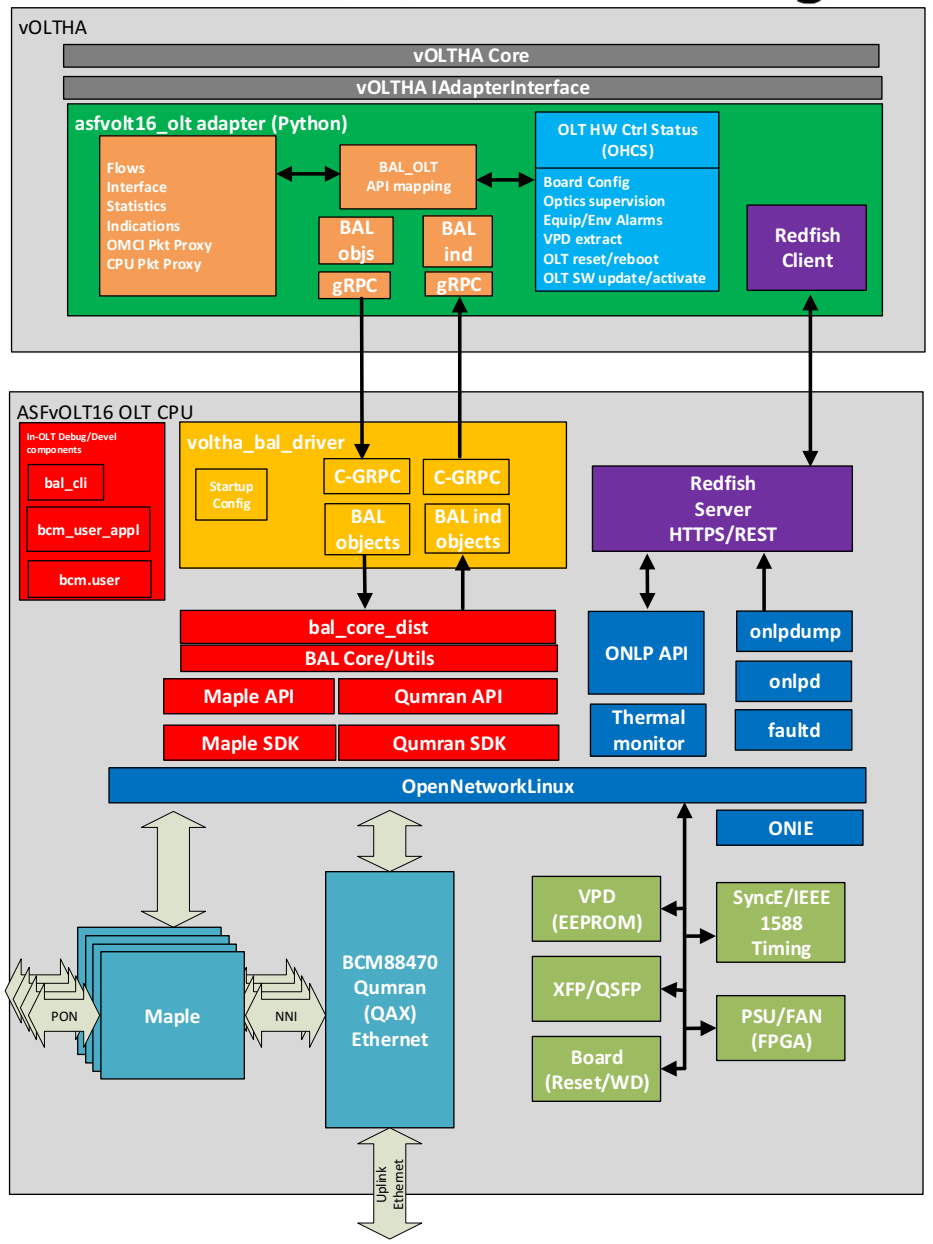


- BAL API is open, adapter can access all functionality
- GRPC provides natural boundary between open adapter and in-OLT driver linking to closed BAL API source code from Broadcom

ASFvOLT16 System Architecture Overview

- Broadcom BAL is an important building block but not a complete OLT solution
- More software is needed to manage HW not covered by BAL
  - Fan, PSU, Optical modules, etc.
  - Vital Product Data (S/N, Model, rev)
  - Software update/activate
- Anything not under control of BAL is handled by DMTF Redfish®



ASFvOLT16 Whitebox OLT

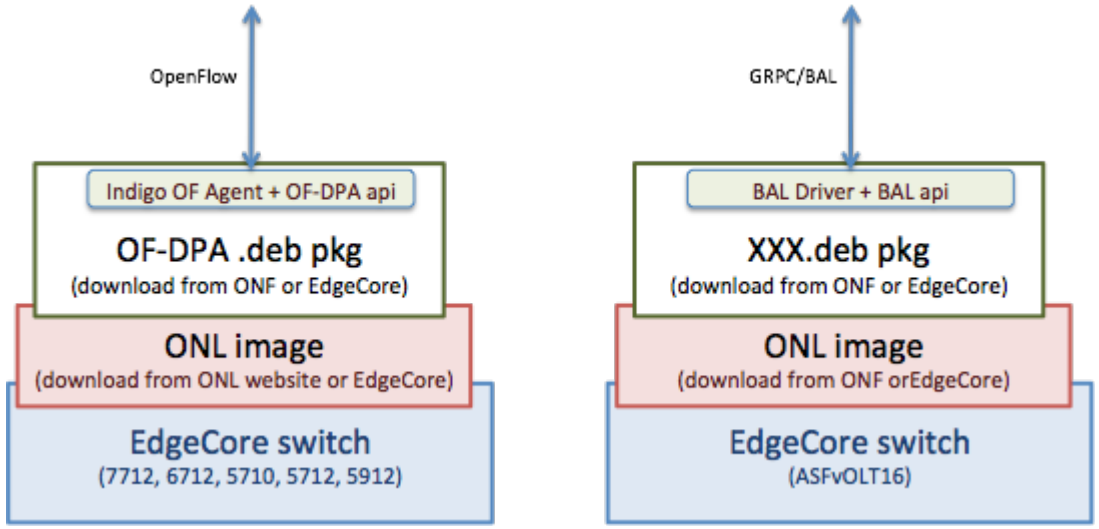
- Source code for ASFvOLT16 adapter
  - `git clone https://gerrit.opencord.org/voltha`
  - `voltha/adapters/asfvolt16_olt`
    - Interface adapter for ASFvOLT16
    - GRPC client/server connection classes
  - `voltha/adapters/asfvolt16_olt/protos`
    - Protobufs for BAL object model and API

ASFvOLT16 Whitebox OLT

- Source code for ASFvOLT16 driver (voltha_bal_driver)
  - `git clone https://gerrit.opencord.org/asfvolt16-driver`
  - See src/README.md for build instructions
  - The following components are required from Broadcom:
    - BAL/Maple SDK – version 2.4.3.6
    - Qumran SDK – version 6.5.7
    - ASFvOLT16 BAL patch – version ACCTON_BAL_2.4.3.6-V201710131639
    - Contact Dave Baron @ Broadcom reference case CS3233745
  - ONL Build environment for ASFvOLT16
    - https://wiki.opencord.org/download/attachments/2556712/ONL_Build_Environment_Installation_Guide.pdf?api=v2

Edgecore ASFvOLT16

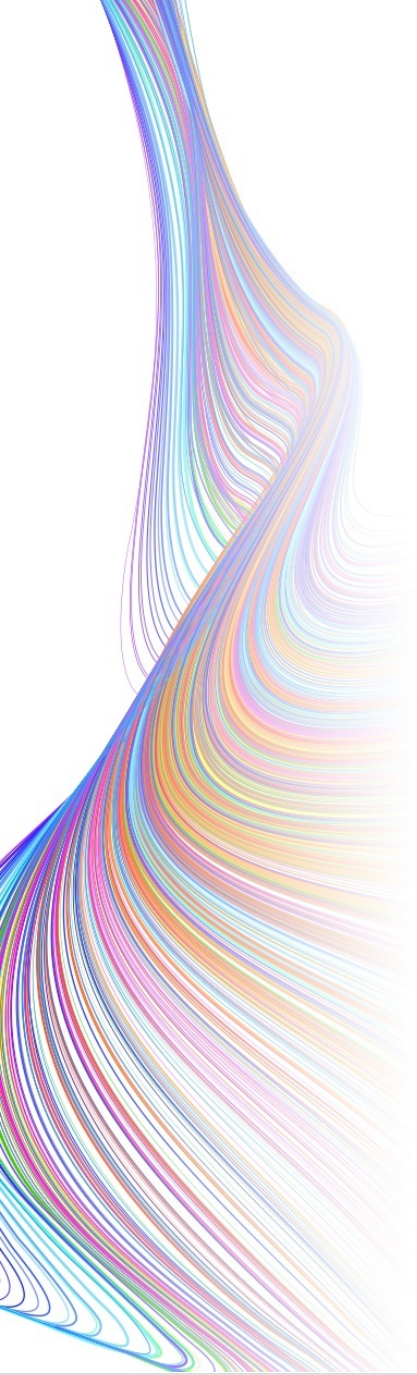
- Possible deployment scenarios
  - Similar to Edgecore OF-DPA
  - Pre-built binary package from Edgecore, ONF or SI (system integrator)



Edgecore ASFvOLT16

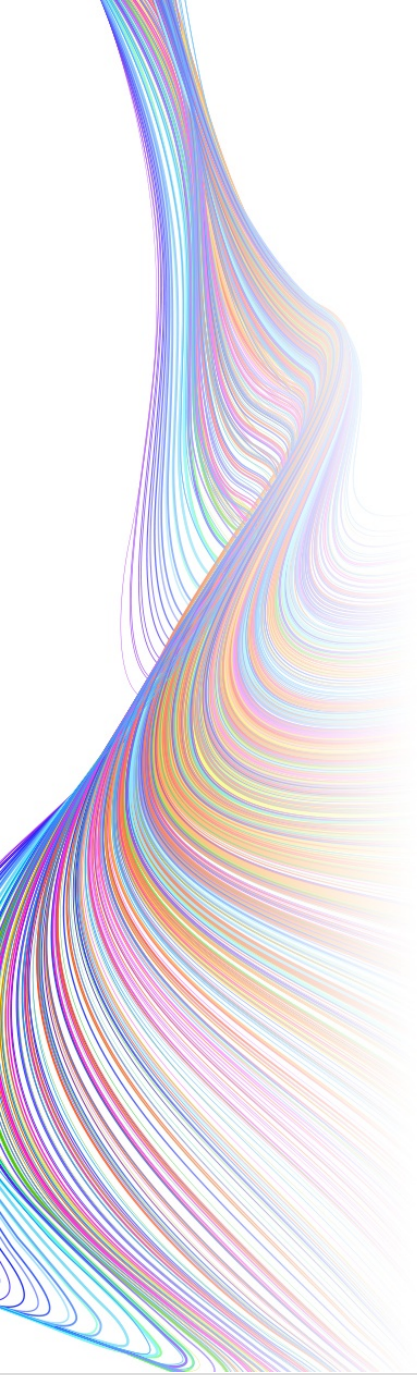
- Future work
  - C++ based voltha_bal_driver
  - Use C++ based GRPC
  - In-band management support
  - OLT auto discovery
  - Expose more Maple features though BAL
  - Expanded use of syslog by voltha_bal_driver

Community Collaborators for ASFvOLT16



- Accton/Edgecore
- ALTEN Calsoft Labs
- AT&T
- Broadcom
- Ciena
- ONF
- Radisys


radisys
Thank You



BACK UP

ASFvOLT16 Whitebox OLT

- ASFvOLT16 Device Management proposal (VOL-248 epic)
  - Create a Redfish RESTful query and control service in OLT
  - Redfish server will provide access to functions such as:
    - Firmware update and activate
    - OLT graceful reboot
    - Monitoring of fans and power supply units (PSU)
    - Monitoring of XFP/QSFP optical modules
    - Session management
    - Extraction of vital product data

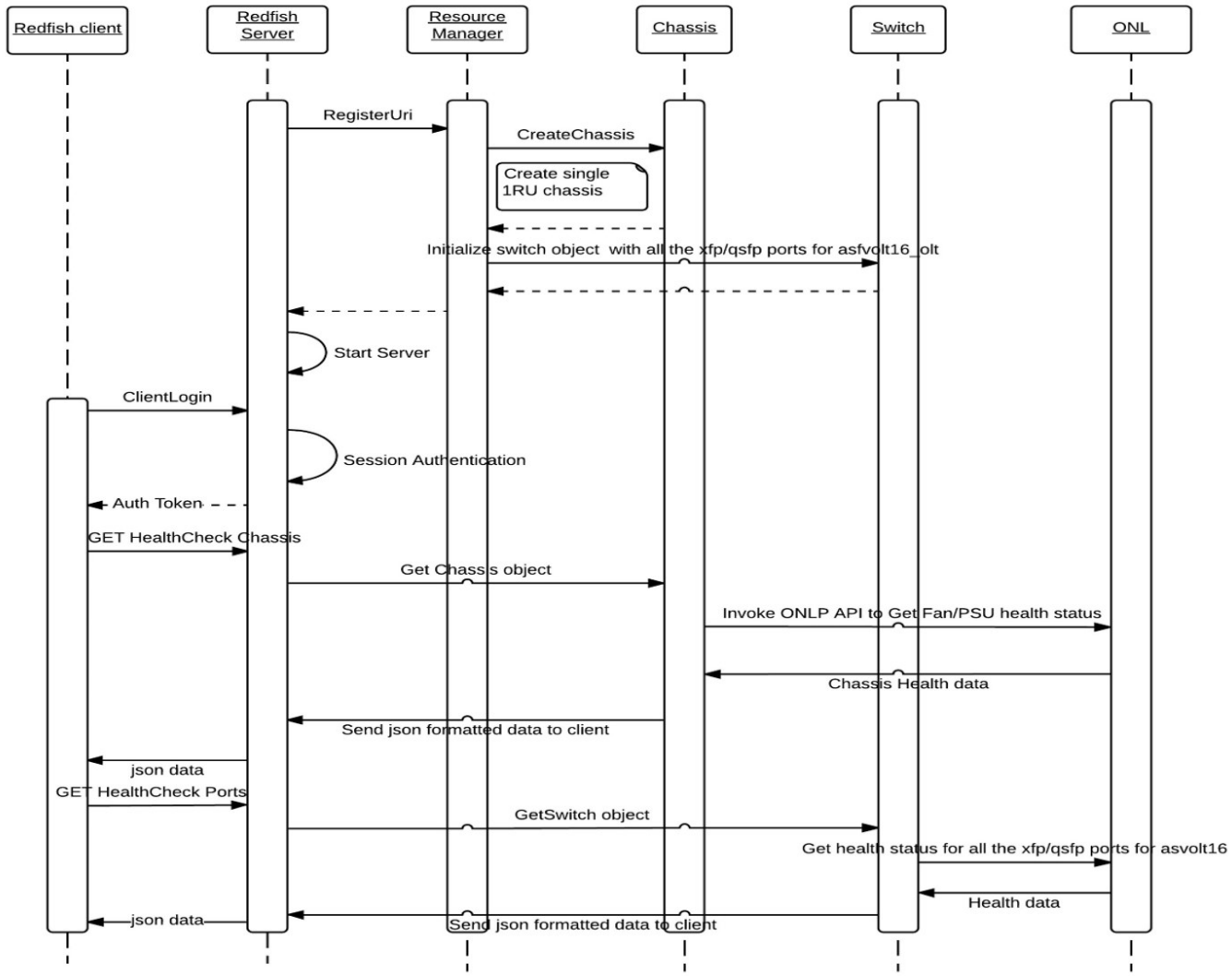
ASFvOLT16 Whitebox OLT

- ASFvOLT16 Device Management proposal (VOL-248 epic)
  - Create a Redfish client service in asfvolt16_olt adapter
  - Uses REST to access Redfish server in OLT
  - Redfish client will implement:
    - Session login
    - Get status of fans, PSUs, XFPs, QSFPs
    - Initiate and monitor firmware update and activation
    - OLT reboot
    - Submit alarms to VOLTHA
    - Configure board options (watchdog, SyncE, port modes)

ASFvOLT16 Whitebox OLT

Example:

Redfish Server Data Model for Health Status



Community Collaborators for ASFvOLT16

- **Accton/Edgecore**
  - Reliable ASFvOLT16 hardware
  - Porting Broadcom BAL/Maple/Qumran SDK to ONL kernel for x86_64 arch
  - BAL patch and patch versioning/build documentation
  - Redfish server support from OCP design
- **Broadcom**
  - Provided the open-source API for the BAL framework
  - Distributing the ASFvOLT16 BAL patch via CSP
  - Supporting PoC demos and driver development

Community Collaborators for ASFvOLT16

- **ONF**
  - Edgecore adapter project kickoff
  - Proposal for GRPC device simulator w/Juniper C-GRPC
  - BAL API .proto files
  - Asfvolt16_olt.py adapter initial framework and adapter class
- **AT&T**
  - Use case and feature set required from BAL API
- **ALTEN Calsoft Labs/Ciena**
  - Proposal for OLT device management using Redfish client/server
  - Redfish client in asfvolt16_olt adapter using REST APIs
  - Data models for management and configuration

Community Collaborators for ASFvOLT16

- **Radisys**
  - Leading community asfvolt16_olt adapter and in-OLT driver initiative
  - Developing in-OLT BAL API control driver (voltha_bal_driver)
  - Worked directly with Broadcom to:
    - Develop understanding of VOLTHA community need for open BAL API
    - Negotiate required BAL API feature set
    - Define BAL package and patch distribution model suitable for SLA
  - Worked directly with Edgecore/Accton to:
    - Transfer PoC result on Broadcom reference OLT to ASFvOLT16
    - Develop BAL acceptance test to ensure voltha_bal_driver foundation
    - Define BAL patch components and versioning method