

CommScope® FLX™

Domain Manager

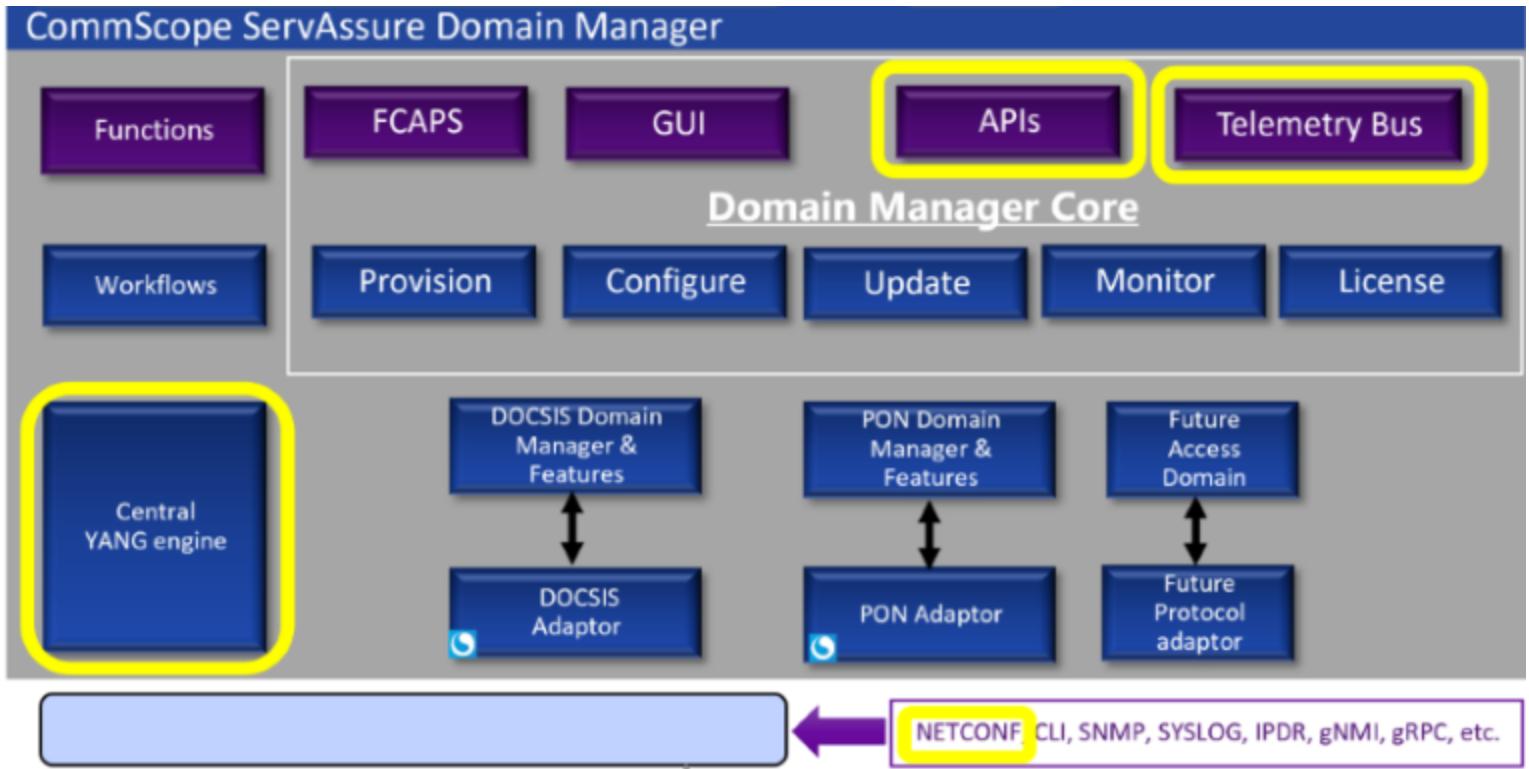
**Northbound APIs,
NETCONF/YANG &
Telemetry**

lee cowdrey

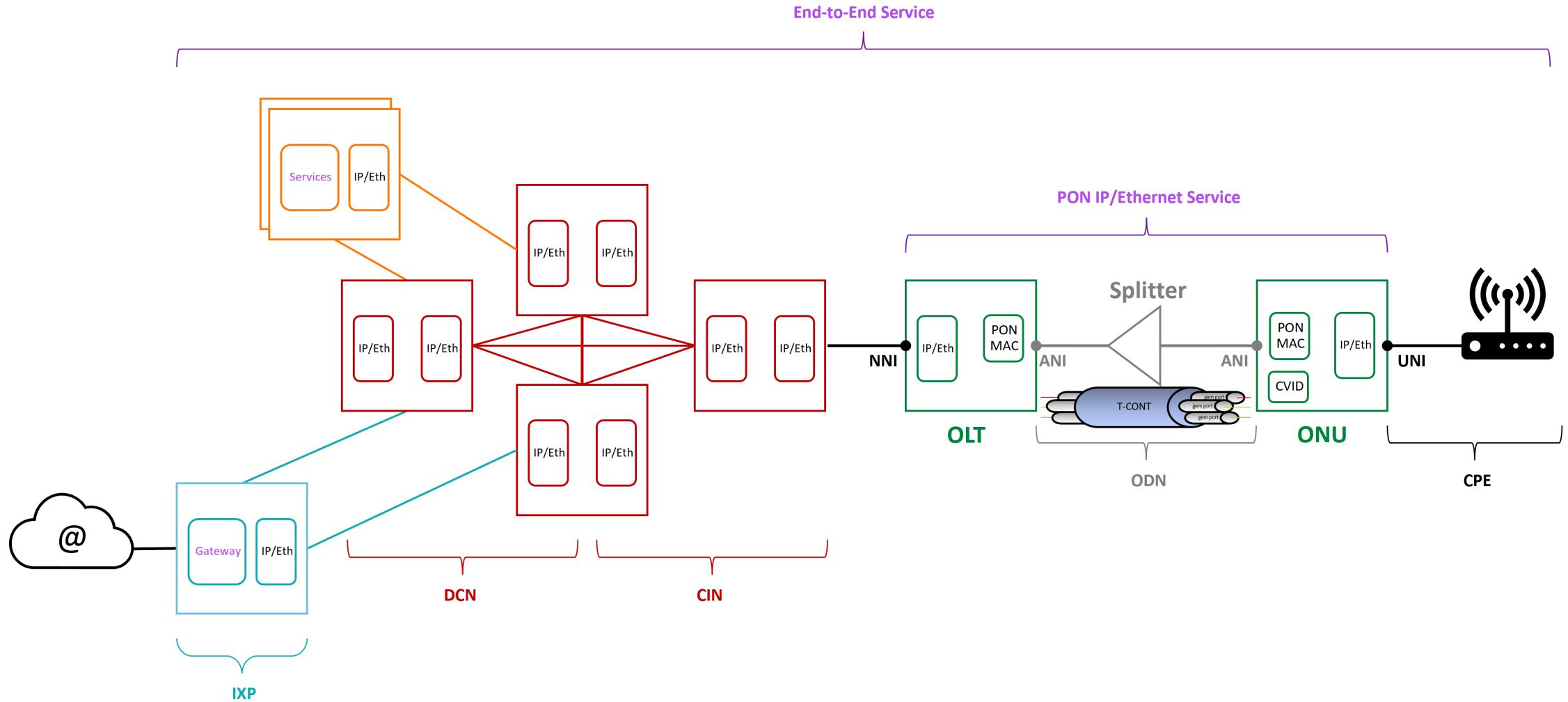


Session focus March 2023

- Northbound APIs
- NETCONF/YANG
- Telemetry

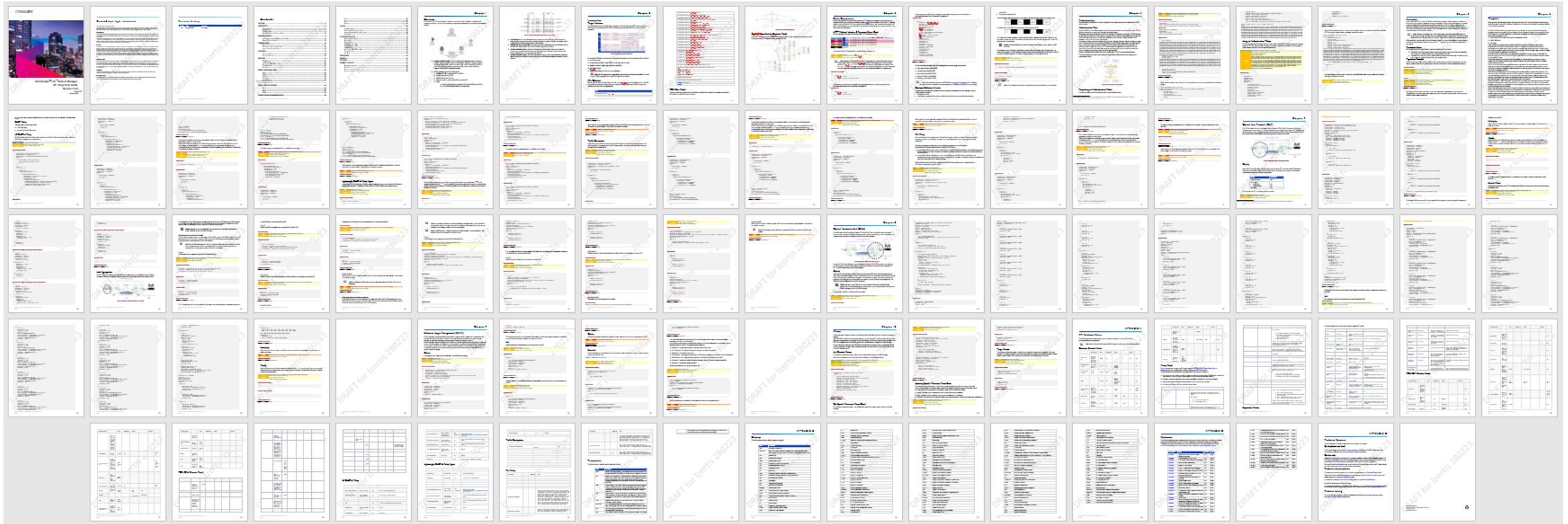


PON End-to-End



Northbound APIs

API Intergration Guide



- Draft

API Integration Guide - Contents (1)

- Guide covers typical operations
 - Authentication
 - Pagination
 - Templates
 - OLT
 - ONU
 - Software Image Management
 - (DM) Alarms
 - API Attributes/Values

Guide is human friendly version of supplied OpenAPI Specification

Domain Manager APIs - PON focused

/controller/v1/devices	/controller/v1/devices/{elementId}/ports/lags
/controller/v1/devices/{elementId}	/controller/v1/devices/{elementId}/ports/lags/{lagPortId}
/controller/v1/devices/{elementId}/actions	/controller/v1/devices/{elementId}/pon/{ponPortId}/onus/
/controller/v1/devices/{elementId}/actions/{action}	/controller/v1/devices/{elementId}/pon/{ponPortId}/onus/{onuId}
/controller/v1/devices/{elementId}/templates/{templateType}	/templates/v1/{templateType}
/controller/v1/devices/{elementId}/templates/{templateType}/{templateId}	/templates/v1/{templateType}/{templateId}
/controller/v1/devices/{elementId}/serviceFlows	/templates/v1/{templateType}/{templateId}/upload
/controller/v1/devices/{elementId}/serviceFlows/{sfId}	/templates/v2/{templateType}
/controller/v1/devices/{elementId}/metrics/v1	/templates/v2/{templateType}/{templateId}
/controller/v1/devices/{elementId}/vlans	/templates/v2/{templateType}/{templateId}/version/{version}
/controller/v1/devices/{elementId}/vlans/{svId}	/templates/v2/{templateType}/{templateId}/upload/version/{version}
/controller/v1/devices/{elementId}/{action}	/alarms/v1/operator/alarms
/ssd/v1/schedule	alarms/v1/operator/alarm/{type}/{resource}
/ssd/v1/images/{imgId}	/alarms/v1/admin/purge
/ssd/v1/images/{imgId}/upload	/version

API Integration Guide - Structure

Request Construct

GET	/path?query&pageSize={pageSize}&pageNumber={pageNumber}
HEADERS	Content-Type: application/json Accept: application/json Authorization: {access token}

Request

GET	/alarms/v1/operator/alarms?type=none&pageSize=15&pageNumber=1
HEADERS	Content-Type: application/json Accept: application/json Authorization: {access token}

Response Status Code

STATUS	200 OK
--------	--------

OpenAPI Specification (OAS)

The OpenAPI Specification, previously known as Swagger, is a specification for a machine-readable interface definition language for describing, producing, consuming and visualizing web services

- Specification (service contract) can be formatted either as:
 - JSON
 - YAML
- <https://swagger.io/specification/>
 - Domain Manager currently conforming to version 3.0.3

OpenAPI is simply machine documentation

Using OpenAPIs - Why & What

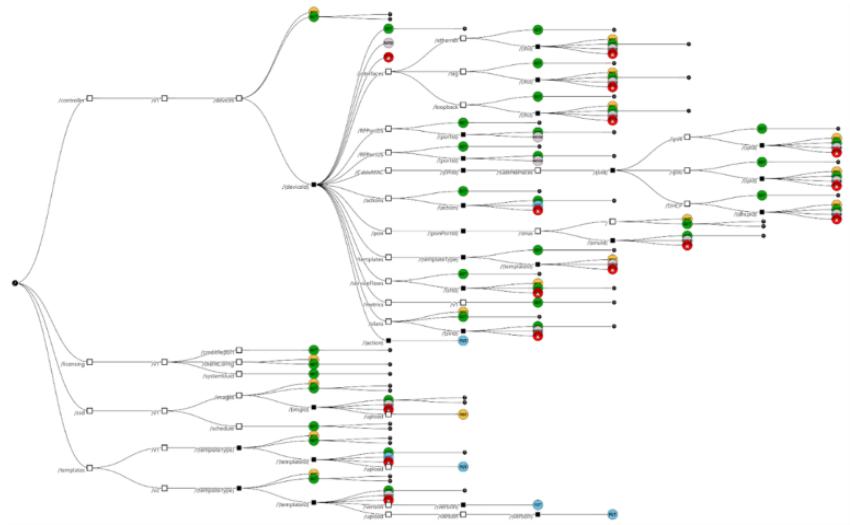
- API Gateway products can automatically digest OpenAPI definitions exposed by microservices and subsequently support their operation of (i.e. service-mesh routing, OSS/BSS service catalog and order management systems) without the need for complex integration activities
 - cloud based such as [AWS API Gateway](#)
 - data centre based such as [Kong](#) and [Apigee Edge API Proxy](#)
- Other products can generate *ready to use* code snippets from digested OpenAPI definitions for inclusion into source code, or actually generate full testing suites to verify definitions

If an API design workflow is followed, it becomes single source of truth of all APIs reducing development effort

OpenAPI Artifacts

- Generated with every release, Domain Manager OpenAPI service contract available from
<https://arris.flexnetoperations.com/control/arrs/download?element=13837527>

API Integration Guide also available via Flexera as part of Domain Manager documentation set



OpenAPI Editor (1)

- Available within Domain Manager UI
 - automatically includes OpenAPI service contract
 - URL path should contain /halodocs/#

The screenshot shows a web browser displaying the 'Halo Provisioning and Management APIs' documentation. The URL in the address bar is https://212.258.153.243/halodocs/#/PON Configuration/createONU/Device. The page has a dark header with the title and a light gray background. At the top right, there is an 'Authorize' button with a lock icon. On the left, there's a 'Servers' dropdown set to https://10.175.120.17 and a 'Halodocs.yaml' link. The main content area is organized into sections: 'Device Management' (General Device Management and Provisioning APIs), 'RMD Configuration' (RMD Device Management, Configuration and Provisioning APIs), and 'PON Configuration' (PON Device Management, Configuration and Provisioning APIs). The 'PON Configuration' section is expanded, showing a 'POST /controller/v1/devices/{deviceId}/pon/{ponPortId}/onu/' endpoint for creating a new ONU device. The 'Parameters' table lists two required parameters: 'deviceId' (string) and 'ponPortId' (string). The 'deviceId' row has a note: 'The resource id of the device to which the action will be applied.' A 'Try it out' button is visible at the bottom right of the modal window.

OpenAPI Editor (2)

- Available externally at <https://editor-next.swagger.io/>
 - requires manually loading of OpenAPI service contract

The screenshot shows the Swagger Editor interface with the URL <https://editor-next.swagger.io/> in the address bar. The left panel displays the OpenAPI specification code:

```
openapi: 3.0.3
info:
  title: CommScope® FLX™ Domain Manager APIs
  description: |
    CommScope® **FLX™ Domain Manager** provides a single Interface to provision, monitor, and manage network elements deployed across a broadband network.
  contact:
    name: CommScope
    x-name-full: 'CommScope, Inc.'
    x-name-location: Hickory - North Carolina - 28662 - USA
    x-name-phone: +1-828-324-2280
    x-combined-contact: 'https://www.commscope.com/globalassets/digitize/294837-arris-combined-contact-information-phone.pdf'
    url: 'https://www.commscope.com/'
    email: TACHelpdesk@commscope.com
    x-email-europe: TechSupport.Europe@commscope.com
    x-email-cala: TechSupport.CALA@commscope.com
    x-email-asia: TechSupport.Asia@commscope.com
  license:
    name: Proprietary License
    url: 'https://www.commscope.com/'
  version: 2.1.0
  externalDocs:
    description: Download Center (Product & Documentation) Portal
    url: 'https://arris.flexnetoperations.com/control/arris/download?element=13B1522'
  servers:
    - url: /
  paths:
    /controller/v1/devices:
      post:
        summary: Create a new device
        description: 'Creates a new 1st order device, of a specific type, within the device inventory.'
        tags:
          - Device Management
        operationId: controllerV1DevicesPost
```

The right panel displays the API documentation for the CommScope FLX Domain Manager APIs, version 2.1.0 (GA3). It includes the title, description, contact information, license, and a summary of the Device Management API endpoints:

Device Management General Device Management and Provisioning APIs

Method	Path	Description	Auth
POST	/controller/v1/devices	Create a new device	🔒
GET	/controller/v1/devices	Retrieve a list of devices	🔒
GET	/controller/v1/devices/{deviceId}	Retrieve device details	🔒
PATCH	/controller/v1/devices/{deviceId}	Update a device	🔒

Expected to be used by system integrators

RESTful API Tooling

- Many tools/extensions available at zero cost for Linux, Windows and macOS platforms:
 - [Postman](#)
 - [Thunder Client](#)
 - requires Microsoft [Visual Studio Code](#)
 - [CURL CLI utility](#)

Postman

My Workspace New Import + ⚙️ No Environment 🌐

Collections + ⚙️ ⚙️

- > CombinedNE (Roger) - Broken
- > csdm-sdn-restconf-api
- DM M2M Intergration
 - POST 10-login
 - 10-login
 - > GET 20-Get DHCPv4 Relay
 - > GET 30-Get LDRA
 - > GET 40-Get Traffic Descriptors
 - > GET 50-Get Pbit
 - > GET 50-Get Pbit Copy
 - > GET 60-Get Existing OLT Invent...
 - > GET 65-Get Known ONUs Per O...
 - GET 67-Get All ONUs
 - 67-Get All ONUs
 - > GET 70-Get Unknown ONUs (Al...
 - > GET 990-logout

APIs ⚙️

Environments ⚙️

Mock Servers ⚙️

Monitors ⚙️

Flows ⚙️

History ⚙️

POST 10-login + ⚙️ No Environment 🌐

DM M2M Intergration / 10-login Save ⚙️ 🖊️ 📄

POST https://{{dm-host}}:{{dm-port}}/auth/realms/halo/protocol/openid-connect/token Send

Params Authorization Headers (11) Body Pre-request Script Tests Settings Cookies

Body (x-www-form-urlencoded)

Key	Value	Description	Bulk Edit
<input checked="" type="checkbox"/> client_id	{{{dm-client-id}}}		
<input checked="" type="checkbox"/> grant_type	client_credentials		
<input checked="" type="checkbox"/> client_secret	{{{dm-client-secret}}}		
Key	Value	Description	

Response



Online Find and Replace Console Cookies Capture requests Runner Trash ?

Thunder Client

The screenshot shows the Thunder Client application window. On the left is a sidebar with various icons for file operations, collections, environments, and API management. The main area has a header bar with 'File', 'Edit', 'Selection', 'View', 'Go', 'Run', etc., and tabs for 'SE.md' and 'TC 10-login'. Below the header is a navigation bar with 'New Request', 'Activity', 'Collections' (which is selected), and 'Env'. A search bar says 'filter collections'. A tree view under 'DM M2M Intergration' lists several requests:

- POST 10-login** (17 days ago)
- GET 20-Get DHCPv4 Relay** (18 days ago)
- GET 30-Get LDRA** (18 days ago)
- GET 40-Get Traffic Descriptors** (18 days ago)
- GET 50-Get Pbit** (18 days ago)
- GET 60-Get Existing OLT Inventory** (18 days ago)
- GET 65-Get Known ONUs Per OLT** (18 days ago)
- GET 67-Get All ONUs** (18 days ago)
- GET 70-Get Unknown ONUs (Alarm)**

The right side of the interface shows a detailed view of the '10-login' POST request. It includes fields for 'Query', 'Headers', 'Auth', 'Body' (selected), 'Tests', and 'Pre Run'. The 'Body' tab is set to 'Form-encode' and contains three fields with checked checkboxes:

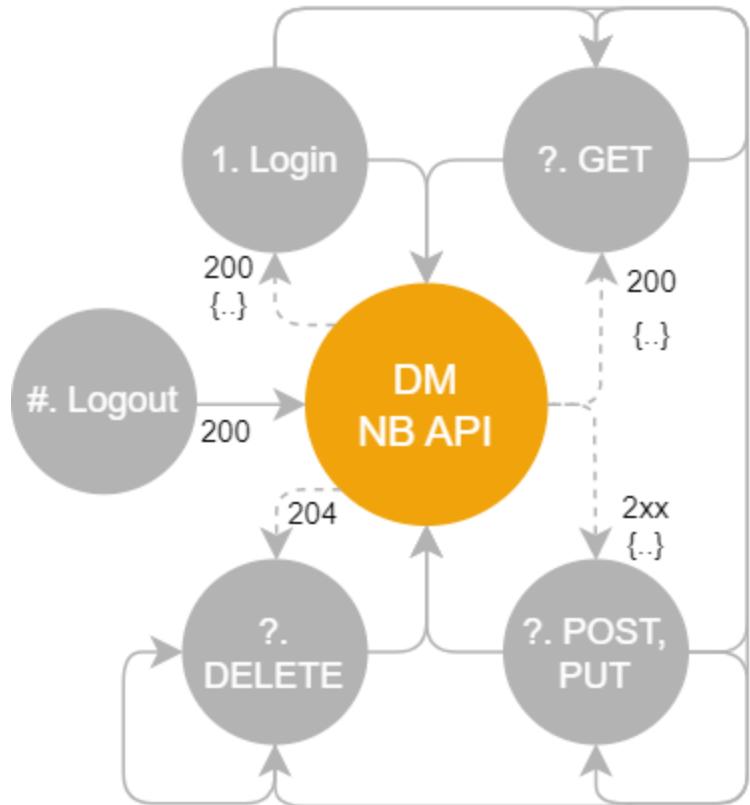
- client_id: {{dm-client-id}}
- grant_type: client_credentials
- client_secret: {{dm-client-secret}}

Below the body fields are status, size, and time indicators. At the bottom, there are tabs for 'Response', 'Headers', 'Cookies', 'Results', and 'Docs'. A note at the bottom says 'Thunder Client CLI' with a 'New' link.

Domain Manager API Usage

- Connect (Login)
- Perform required operation
 - Repeat as necessary
- Disconnect (Logout)

Authentication `access_token` automatically
expires `expires_in`



Domain Manager API Login Credentials

- Default
 - `client_id` : `test-client`
 - `client_secret` : `halo-test-client-secret`
 - `grant_type` : `client_credentials`
- New/deployment specific credentials can be created via KeyCloak Admin portal or
`kc_createClient.sh` utility script

Domain Manager API Login

- Method: POST
- URL: https://{{dm-host}}:{{dm-port}}/auth/realms/halo/protocol/openid-connect/token
- Request Body: x-www-form-urlencoded with client_id={{u}}, client_secret={{p}}, grant_type={{t}}
- Headers: Accept: application/json Cache-Control: no-cache
- Response Status code: 200 ok
- Response Body

```
{ "access_token": "eyJhbGciOiJS...SMdxw", "expires_in": 300, "refresh_expires_in": 0, "token_type": "Bearer", "not-before-policy": 0, "scope": "email profile" }
```

Domain Manager API Login - Postman Example

The screenshot shows a Postman collection named "10-login" with one item "DM M2M Intergration / 10-login". The request is a POST to <https://{{dm-host}}:{{dm-port}}/auth/realm/halo/protocol/openid-connect/token>. The "Body" tab is selected, showing form-data parameters:

Key	Value	Description	... Bulk Edit
client_id	{{dm-client-id}}		
grant_type	client_credentials		
client_secret	{{dm-client-secret}}		

The response status is 200 OK, time 194 ms, size 1.84 KB. The response body is a JSON access token:

```
1  "access_token": "eyJhbGciOiJSUzIiNiIsInR5cCIgOiAiSldUIiwia2lkIiA6ICJ0TXpERnUyVl9PUmw2RkhVXNwZVI2VEDua3JHZGxoXzdVSWtcDJfQ3AwIn0.
2   eyJleHAiOjE2ODAxNzQ2MDEsImlhdCI6MTY4MDE3NDMwMSwianRpIjoiNWI3ZGFhNjgtOTE4Mi000DIzLThkZGYtNTA0MDNmZjJiNWEwIiwigXNzIjoiaHR0cHM6Ly8xMC4xNzMuMjU1
LjY4L2F1dGgvcmVhbG1zL2hhbG8iLCJhdWQoijhY2NvdW50Iiwic3ViIjoiYmVjNGIzZTItM2NkNC00MGM1LWEyYmYtZDc2NDVhOGU3MGY1IiwidHlwIjoiQmVhcmVyIiwiYXpwIjoi
dGVzdC1jbGllbnQiLCJhY3Ii0iIxIiwicmVhbG1fYWNjZXNzIjp7InJvbGVzIjpbIm9mZmxpbmVfYWNjZXNzIiwidW1hX2F1dGhvcml6YXRpb24iLCJkZWZhdWx0LXJvbGVzLwhhbG8i
XX0sInJlc291cmNx2FjY2VzcyI6eyJhY2NvdW50Ijp7InJvbGVzIjpbIm1hbmfNzS1hY2NvdW50IiwiwFwUYWdlLWFjY291bnQtbgLu3MILCJ2aW3LXByb2ZpbGUixXX19LCJzY29w
ZSI6ImVtYwlsIHByb2ZpbGUilCJjbGllbnRJZCI6InRlc3QtY2xpZW50IiwiZWh1haWxfdmVyaWZpZWQio0MzbHNLLCJjbGllbnRIB3N0IjoiMTAuMS41MS4xIiwichJlZmVycmVkJ3Vz
ZXJuYw1Ijoiic2VydmljZS1hY2NvdW50LXR1c3QtY2xpZW50QWRkcmVzcyI6IjEwLjEuNTEuMSJ9.
pknotfG1nvH1M8j0ZvtzFbl4k6v-htzvSnFB__@oQ-4TbNDhQqh6v7BT4xtm7g8uaTnQBKnRjcgxoiBb0mCoy0Av6VnY3xPeazH0Z43-20LJjd0D3GYZbUe9Edm1Z40ASyUg2HraJfY
P0o2SVNpodvJy3eV0fA8fnh7cz8kh2GdcwxSj__jXrzzSOxv8Fu8ERRBBjV7kow@a2T@061661Pxtv30vJ8C4SSR_yBk1DxQKbrzxaDD112Fk20P8xk-UnOIZ_eNbCrkiuz9hHqAPpI_E
KmSgTNB5HSND7BdKbsH8BVY1SFpkAas-YLKJytduXzAmgowAoPqp_8q9v9jJDg",
```

Domain Manager API Login - CURL Example

```
$ export JWT_TMP=$(mktemp --quiet --suffix=.json --tmpdir=/tmp XXXXXXXX)
$ curl --insecure \
  -o ${JWT_TMP} \
  --connect-timeout 20 \
  --max-time 60 \
  --user-agent "halo-test/1.0" \
  --request POST \
  --header "Content-Type: application/x-www-form-urlencoded" \
  --header "Accept: application/json" \
  --header "Cache-control: no-cache" \
  --data "client_id=test-client" \
  --data "grant_type=client_credentials" \
  --data "client_secret=halo-test-client-secret" \
  "https://212.250.153.243/auth/realms/halo/protocol/openid-connect/token"
$ export JWT=$(jq -r ".token_type+" "+.access_token" ${JWT_TMP}) && rm -f ${JWT_TMP}
```

Domain Manager API Operational

- Method: GET | POST | PUT | DELETE | PATCH
- URL: https://{{dm-host}}:{{dm-port}}/...
- Request Body: raw { ... }
- Headers: Authorization: Bearer {{access_token from login}} Accept: application/json Content-Type: application/json Cache-Control: no-cache
- Response Status code: 2xx
- Response Body: { ... }

available APIs as stated in Domain Manager API usage

Domain Manager API Operational - Postman Example

The screenshot shows the Postman application interface. On the left is a sidebar with a tree view of API collections and items. The main area displays a POST request for '10-login' and a selected GET request for '20-Get DHCPv4 Relay'. The GET request details are shown in the center, including the method, URL template, and various configuration tabs like Headers, Body, and Tests. The Headers tab is active, showing several key-value pairs. Below the headers, the response body is displayed in JSON format.

Request URL: https://{{dm-host}}:{{dm-port}}//templates/v2/dhcpRelay

Headers (10)

Key	Value	Description
User-Agent	PostmanRuntime/7.31.3	
Accept	/*	
Accept-Encoding	gzip, deflate, br	
Connection	keep-alive	
Cache-Control	no-cache	
Content-Type	application/json	

Body

```
1 {  
2   "type": "dhcpRelay",  
3   "name": "DHCP Relay for GPON",  
4   "default": false,  
5   "vendor": "Commscope",  
6   "family": "PON-OLT",  
7   "description": "only for GPON",  
8   "models": [  
9     {  
10       "model": "XP6164S",  
11       "..."  
12     }  
13   ]  
14 }
```

Domain Manager API Operational - Thunder Client Example

The screenshot shows the Thunder Client application interface. On the left, there's a sidebar with various icons and a list of recent API requests under 'DM M2M Intergration'. The main area has tabs for 'SE.md' (selected), 'TC 20-Get DHCPv4 Relay' (current request), and 'SE-original.md'. The 'TC 20-Get DHCPv4 Relay' tab shows a GET request to `https://{{dm-host}}:{{dm-port}}//templates/v2/dhcpRelay`. The 'Headers' tab is selected, showing 'Accept: application/json' and 'Cache-Control: no-cache'. Below that is a 'Response' tab displaying the JSON API response:

```
1 [  
2 {  
3   "type": "dhcpRelay",  
4   "name": "DHCP Relay for GPON",  
5   "default": false,  
6   "vendor": "Commscope",  
7   "family": "PON-OLT",  
8   "description": "only for GPON",  
9   "models": [  
10    {  
11      "model": "XP6164S",  
12      "v1": [  
13        "v1"  
14      ],  
15      "v2": [  
16        "v2"  
17      ]  
18    },  
19    {  
20      "model": "XP6168S",  
21      "v1": [  
22        "v1"  
23      ],  
24      "v2": [  
25        "v2"  
26      ]  
27  ]  
]
```

Domain Manager API Operational - CURL Example

```
$ export GET_TMP=$(mktemp --quiet --suffix=.json --tmpdir=/tmp XXXXXXXX)
$ curl --insecure \
    -o ${GET_TMP} \
    --connect-timeout 20 \
    --max-time 60 \
    --user-agent "halo-test/1.0" \
    --request GET \
    --header "Accept: application/json" \
    --header "Cache-control: no-cache" \
    --header "Authorization: ${JWT}" \
    "https://212.250.153.243/controller/v1/devices?elementFamily=PON-OLT"
$ cat ${GET_TMP}|jq|head
{
  "numElements": 1,  "pageElements": 1,  "pageSize": 1000,  "pageNumber": 1,
  "devices": [
    {
      "elementName": "belf-dmz-olt", "groupId": "Default", "description": "",
```

Domain Manager API Logout

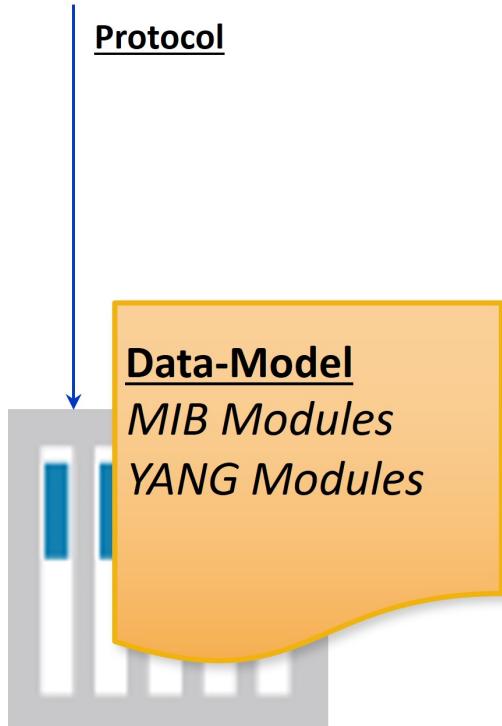
- Method: GET
- URL: https://{{dm-host}}:{{dm-port}}/auth/realms/halo/protocol/openid-connect/logout
- Request Body: none
- Headers: Authorization: Bearer {{access_token from login}} Accept: */*
Cache-Control: no-cache
- Response Status code: 200 ok

Domain Manager API Logout - CURL Example

```
$ curl \  
  --insecure \  
  -o /dev/null \  
  --connect-timeout 20 \  
  --max-time 60 \  
  --user-agent "halo-test/1.0" \  
  --request GET \  
  --header "Accept: */*" \  
  --header "Cache-control: no-cache" \  
  --header "Authorization: ${JWT}" \  
  "https://212.250.153.243/auth/realm/halo/protocol/openid-connect/logout"
```

NETCONF/YANG

What is Data Model?



- A data-model determines the structure, syntax and semantics of the data...
 - that is externally visible
 - Consistent and complete
- Protocol
 - Remote primitives to view and manipulate the data
 - Encoding of the data as defined by the data-model

What is YANG (1)

- **YANG** is a **data modeling language** used to model configuration and state data manipulated by the **Network Configuration Protocol** (NETCONF), NETCONF remote procedure calls, and NETCONF notifications.
- **YANG 1.0** is defined in **RFC6020**.
 - Describe syntax and semantics of the YANG language
 - Also describe how a data model defined in a YANG module is encoded in the Extensible Markup Language (XML) and how NETCONF operations are used to manipulate the data
- **YANG 1.1** is defined in **RFC7950**
 - Describe syntax and semantics of version 1.1 of the YANG language
 - It is a maintenance release of the YANG language, addressing defects in the original specification - it does not obsolete RFC6020

What is YANG (2)

- YANG modules can be translated into an equivalent XML syntax called YANG Independent Notation (YIN), allowing applications using XML parsers and Extensible Stylesheet Language Transformations (XSLT) scripts to operate on the models.
- YANG maintains compatibility with the Simple Network Management Protocol's (SNMP's) SMIv2. SMIv2-based MIB modules can be automatically translated into YANG modules for read-only access
- The YANG language was developed by the IETF NETCONF Data Modelling Language Working Group [NETMOD](#)

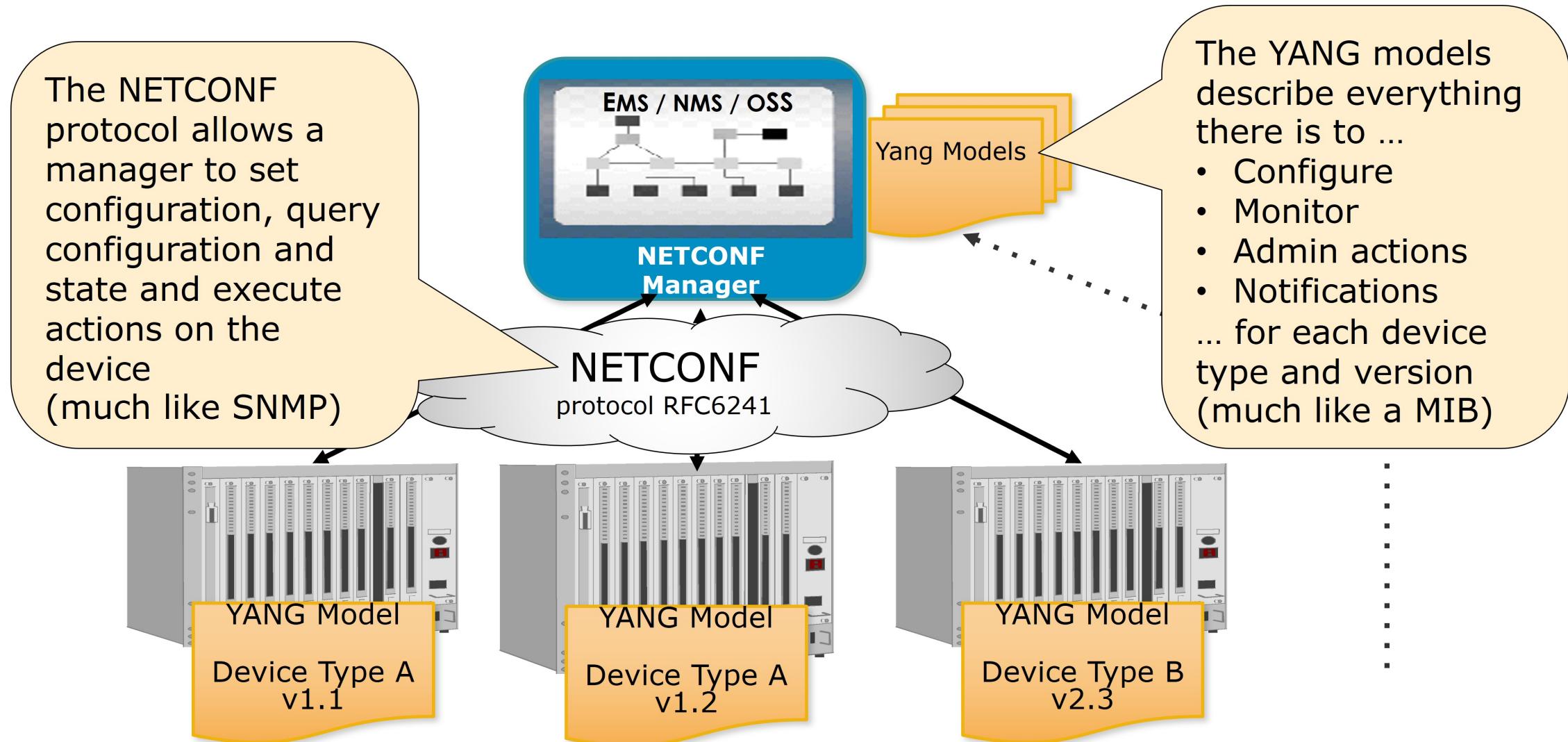
Relationship between NETCONF and YANG

- The **NETCONF protocol** is a formal application programming interface (API) that allows configuration data information to be retrieved and manipulated
- The **YANG data modeling language** is used to model configuration and state data manipulated by NETCONF
- NETCONF is **not replacing** CORBA/SOAP/REST; it provides full set of semantics for configuration management
- YANG is **not replacing** XSD/RelaxNG/WSDL; it provides many features specific to configuration management

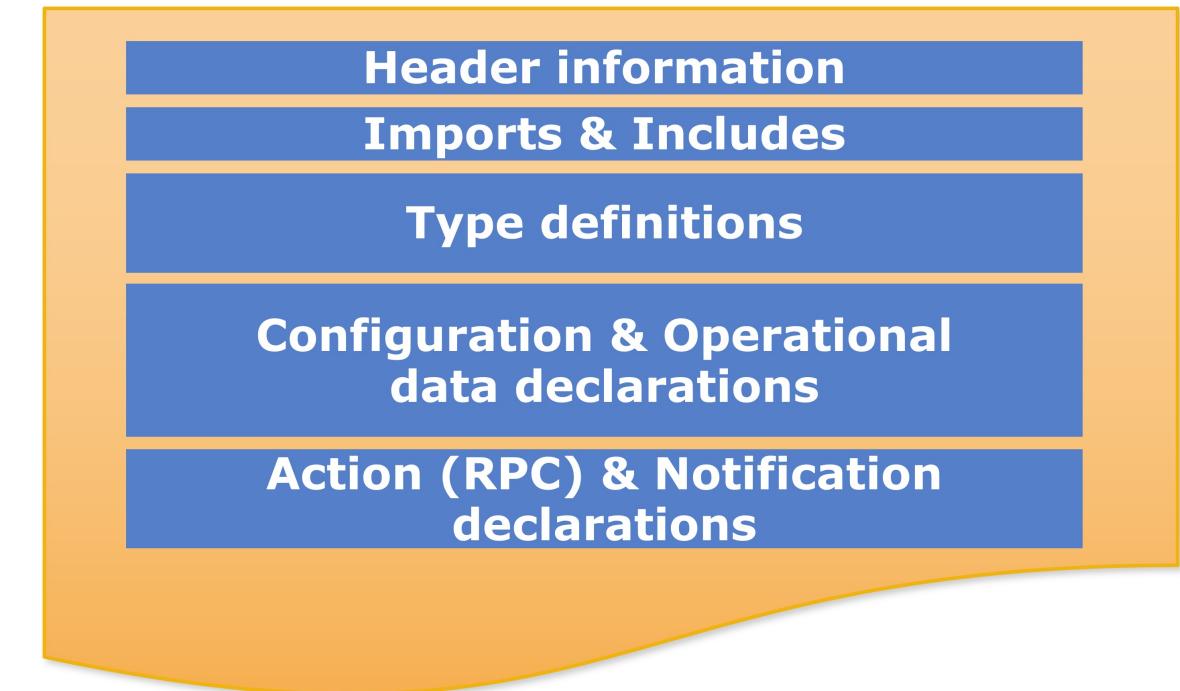
SNMP vs. NETCONF

	SNMP	NETCONF
Standard	IETF	IETF
Resources	OIDs	Paths
Data Models	Defined in MIBs	YANG Core Models
Data Modelling Language	SMI	YANG
Management Operations	SNMP	NETCONF
Encoding	BER	XML
Transport Stack	UDP	SSH, TCP

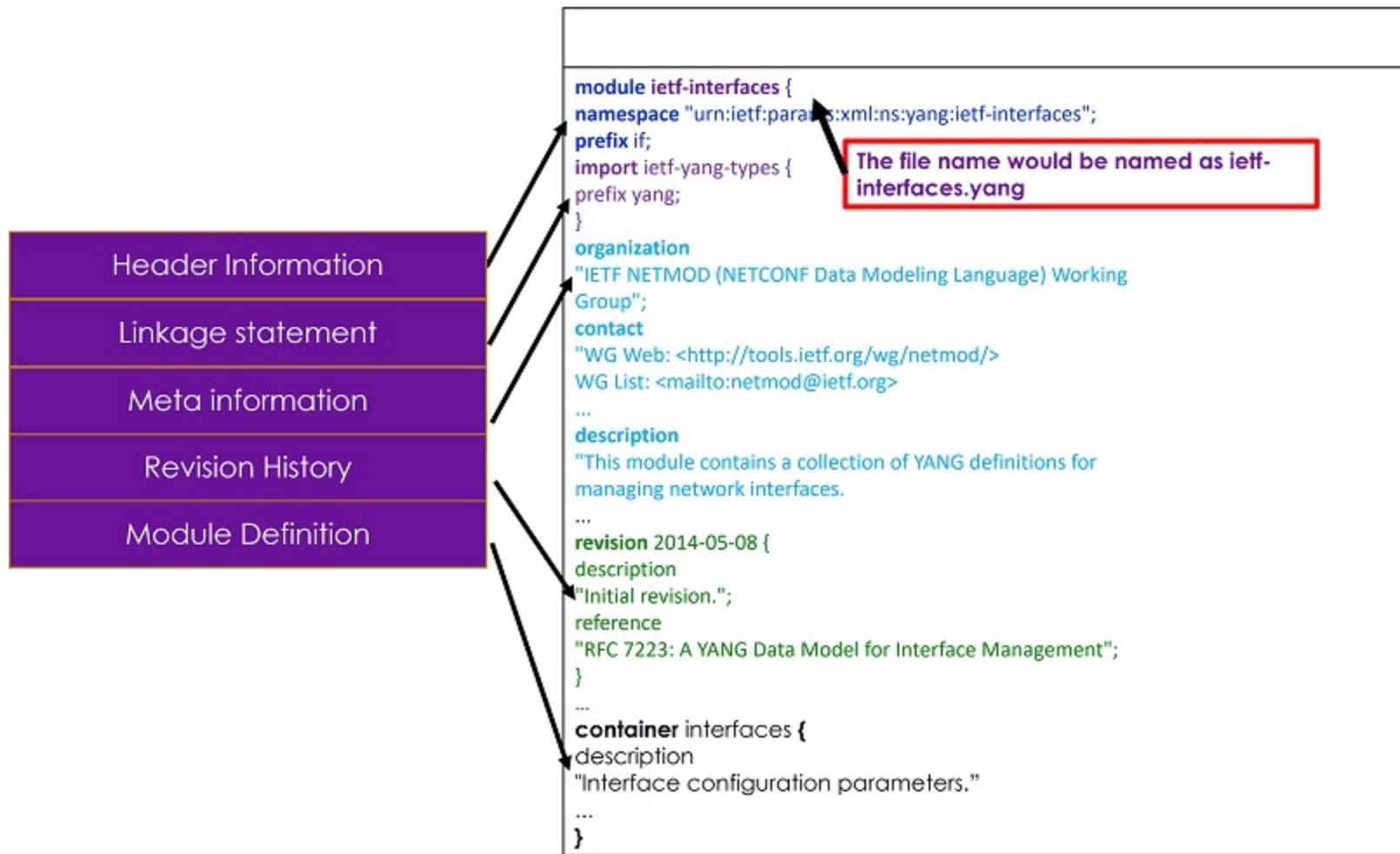
NETCONF and YANG in Context



YANG Module Contents



YANG Module



XGS-PON YANG for Shelf OLT

<code>bbf-alarm-types.yang</code>	<code>bbf-l2-forwarding-mac-learning.yang</code>	<code>bbf-qos-policies.yang</code>	<code>bbf-xpon-onu-state.yang</code>	<code>ietf-inet-types@2021-02-22.yang</code>
<code>bbf-availability.yang</code>	<code>bbf-l2-forwarding-shared-fdb.yang</code>	<code>bbf-qos-policing-state.yang</code>	<code>bbf-xpon-onu-types.yang</code>	<code>ietf-interfaces@2018-02-20.yang</code>
<code>bbf-baa-pan.yang</code>	<code>bbf-l2-forwarding-split-horizon-profiles.yang</code>	<code>bbf-qos-policing-types.yang</code>	<code>bbf-xpon-performance-management.yang</code>	<code>ietf-ip@2018-02-22.yang</code>
<code>bbf-contact.yang</code>	<code>bbf-l2-forwarding.yang</code>	<code>bbf-qos-policing.yang</code>	<code>bbf-xpon-power-management.yang</code>	<code>ietf-keystore@2021-05-18.yang</code>
<code>bbf-device-types.yang</code>	<code>bbf-l2-terminations.yang</code>	<code>bbf-qos-rate-control.yang</code>	<code>bbf-xpon-types.yang</code>	<code>ietf-netconf@2011-06-01.yang</code>
<code>bbf-device.yang</code>	<code>bbf-ldra.yang</code>	<code>bbf-qos-shaping.yang</code>	<code>bbf-xponvani-base.yang</code>	<code>ietf-netconf-acm@2018-02-14.yang</code>
<code>bbf-dot1q-cfm-alarm-types.yang</code>	<code>bbf-link-table.yang</code>	<code>bbf-qos-traffic-mngt-state.yang</code>	<code>bbf-xponvani-power-management.yang</code>	<code>ietf-netconf-monitoring@2010-10-04.yang</code>
<code>bbf-dot1q-cfm-interfaces-state.yang</code>	<code>bbf-location-types.yang</code>	<code>bbf-qos-traffic-mngt.yang</code>	<code>bbf-xponvani-v-ani-body.yang</code>	<code>ietf-netconf-nmda@2019-01-07.yang</code>
<code>bbf-dot1q-cfm-interfaces.yang</code>	<code>bbf-location.yang</code>	<code>bbf-qos-types.yang</code>	<code>bbf-xponvani-v-enet-body.yang</code>	<code>ietf-netconf-notifications@2012-02-06.yang</code>
<code>bbf-dot1q-cfm-12-forwarding.yang</code>	<code>bbf-mgmd-configuration-interface-to-host.yang</code>	<code>bbf-software-management-voice.yang</code>	<code>bbf-xpon-wavelength-profile-body.yang</code>	<code>ietf-netconf-partial-lock@2009-10-19.yang</code>
<code>bbf-dot1q-cfm.yang</code>	<code>bbf-mgmd-configuration-interface-to-router.yang</code>	<code>bbf-software-management.yang</code>	<code>bbf-xpon.yang</code>	<code>ietf-netconf-with-defaults@2011-06-01.yang</code>
<code>bbf-dot1q-types.yang</code>	<code>bbf-mgmd-configuration-multicast-snoop.yang</code>	<code>bbf-sub-interfaces.yang</code>	<code>bbf-yang-types.yang</code>	<code>ietf-network@2018-02-26.yang</code>
<code>bbf-end-user.yang</code>	<code>bbf-mgmd-mrd.yang</code>	<code>bbf-sub-interface-tagging.yang</code>	<code>iana-crypt-hash@2014-08-06.yang</code>	<code>ietf-network-bridge@2021-02-17.yang</code>
<code>bbf-equipment-inventory.yang</code>	<code>bbf-mgmd-operational-interface-to-host.yang</code>	<code>bbf-subscriber-profiles.yang</code>	<code>iana-hardware@2018-03-13.yang</code>	<code>ietf-network-instance@2019-01-21.yang</code>
<code>bbf-ethernet-performance-management.yang</code>	<code>bbf-mgmd-operational-interface-to-router.yang</code>	<code>bbf-subscriber-types.yang</code>	<code>iana-if-type@2021-06-21.yang</code>	<code>ietf-network-topology@2018-02-26.yang</code>
<code>bbf-frame-classification.yang</code>	<code>bbf-mgmd-types.yang</code>	<code>bbf-vomci-common.yang</code>	<code>iana-routing-types@2022-02-11.yang</code>	<code>ietf-ntp@2022-02-10.yang</code>
<code>bbf-frame-processing-profiles.yang</code>	<code>bbf-mgmd.yang</code>	<code>bbf-vomci-types.yang</code>	<code>iana-ssh-encryption-algs@2021-06-01.yang</code>	<code>ietf-origin@2018-02-14.yang</code>
<code>bbf-grpc-client.yang</code>	<code>bbf-network-function-client.yang</code>	<code>bbf-xponani-ani-body.yang</code>	<code>iana-ssh-key-exchange-algs@2021-06-01.yang</code>	<code>ietf-packet-fields@2019-03-04.yang</code>
<code>bbf-grpc-server.yang</code>	<code>bbf-network-function-server.yang</code>	<code>bbf-xponani-base.yang</code>	<code>iana-ssh-mac-algs@2021-06-01.yang</code>	<code>ietf-restconf@2017-01-26.yang</code>
<code>bbf-hardware-cpu.yang</code>	<code>bbf-network-function-types.yang</code>	<code>bbf-xponani-power-management.yang</code>	<code>iana-ssh-public-key-algs@2021-06-01.yang</code>	<code>ietf-routing@2018-03-13.yang</code>
<code>bbf-hardware-storage-drives.yang</code>	<code>bbf-network-function.yang</code>	<code>bbf-xponani-v-enet-body.yang</code>	<code>iana-symmetric-algs@2020-03-08.yang</code>	<code>ietf-routing-types@2017-12-04.yang</code>
<code>bbf-hardware-transceiver-alarm-types.yang</code>	<code>bbf-network-map.yang</code>	<code>bbf-xponani.yang</code>	<code>iana-tls-cipher-suite-algs@2021-06-02.yang</code>	<code>ietf-subscribed-notifications@2019-09-09.yang</code>
<code>bbf-hardware-transceivers-xpon.yang</code>	<code>bbf-network-types.yang</code>	<code>bbf-xpon-base.yang</code>	<code>iana-tls-profile@2020-11-02.yang</code>	<code>ietf-subscribed-notif-receivers@2021-10-24.yang</code>
<code>bbf-hardware-transceivers.yang</code>	<code>bbf-node-types.yang</code>	<code>bbf-xpon-burst-profile.yang</code>	<code>ieee802-dot1ax.yang</code>	<code>ietf-syslog-types@2017-02-14.yang</code>
<code>bbf-hardware-types.yang</code>	<code>bbf-olt-vomci-grpc-client.yang</code>	<code>bbf-xpon-channel-group-body.yang</code>	<code>ieee802-dot1q-cfm@2020-06-04.yang</code>	<code>ietf-system@2014-08-06.yang</code>
<code>bbf-hardware.yang</code>	<code>bbf-olt-vomci-grpc-server.yang</code>	<code>bbf-xpon-channel-pair-body.yang</code>	<code>ieee802-dot1q-cfm-types@2020-06-04.yang</code>	<code>ietf-system-aaa@2019-03-06.yang</code>
<code>bbf-if-type.yang</code>	<code>bbf-olt-vomci-state.yang</code>	<code>bbf-xpon-channel-partition-body.yang</code>	<code>ieee802-dot1q-types@2020-06-04.yang</code>	<code>ietf-system-capabilities@2021-10-12.yang</code>
<code>bbf-inet-types.yang</code>	<code>bbf-olt-vomci.yang</code>	<code>bbf-xpon-channel-termination-body.yang</code>	<code>ieee802-ethernet-interface.yang</code>	<code>ietf-system-dns-resolver@2016-09-23.yang</code>
<code>bbf-interfaces-performance-management.yang</code>	<code>bbf-omci-message-retransmission.yang</code>	<code>bbf-xpon-defects.yang</code>	<code>ieee802-types@2020-06-04.yang</code>	<code>ietf-system-tacacs-plus@2021-08-05.yang</code>
<code>bbf-interfaces-remote-hardware-state.yang</code>	<code>bbf-pppoe-intermediate-agent.yang</code>	<code>bbf-xpongemtcont-base.yang</code>	<code>ietf-access-control-list@2019-03-04.yang</code>	<code>ietf-truststore@2020-08-20.yang</code>
<code>bbf-interfaces-statistics-management.yang</code>	<code>bbf-qos-classifiers.yang</code>	<code>bbf-xpongemtcont-gemport-body.yang</code>	<code>ietf-alarms@2019-09-11.yang</code>	<code>ietf-x509-cert-to-name@2014-12-10.yang</code>
<code>bbf-interface-usage.yang</code>	<code>bbf-qos-composite-filters.yang</code>	<code>bbf-xpongemtcont-gemport-performance-management.yang</code>	<code>ietf-alarms-x73@2019-09-11.yang</code>	<code>ietf-yang-library@2019-01-04.yang</code>
<code>bbf-l2-dhcpv4-relay-forwarding.yang</code>	<code>bbf-qos-enhanced-scheduling-state.yang</code>	<code>bbf-xpongemtcont-qos.yang</code>	<code>ietf-crypto-types@2021-09-14.yang</code>	<code>ietf-yang-metadata@2016-08-05.yang</code>
<code>bbf-l2-dhcpv4-relay.yang</code>	<code>bbf-qos-enhanced-scheduling.yang</code>	<code>bbf-xpongemtcont-tcont-body.yang</code>	<code>ietf-datastores@2018-02-14.yang</code>	<code>ietf-yang-schema-mount@2019-01-14.yang</code>
<code>bbf-l2-forwarding-base.yang</code>	<code>bbf-qos-filters.yang</code>	<code>bbf-xpongemtcont-traffic-descriptor-profile-body.yang</code>	<code>ietf-dhcp@2018-10-11.yang</code>	<code>ietf-yang-types@2022-02-03.yang</code>
<code>bbf-l2-forwarding-flooding-policies.yang</code>	<code>bbf-qos-policen-envelope-profiles.yang</code>	<code>bbf-xpongemtcont.yang</code>	<code>ietf-etheratypes@2019-03-04.yang</code>	<code>nc-notifications.yang</code>
<code>bbf-l2-forwarding-forwarders.yang</code>	<code>bbf-qos-policies-state.yang</code>	<code>bbf-xpon-if-type.yang</code>	<code>ietf-hardware@2018-03-13.yang</code>	
<code>bbf-l2-forwarding-forwarding-databases.yang</code>	<code>bbf-qos-policies-sub-interface-rewrite.yang</code>	<code>bbf-xpon-multicast-distribution-set-body.yang</code>	<code>ietf-hardware-state@2018-03-13.yang</code>	
<code>bbf-l2-forwarding-mac-learning-control.yang</code>	<code>bbf-qos-policies-sub-interfaces.yang</code>	<code>bbf-xpon-multicast-gemport-body.yang</code>		

XGS-PON Configuration for Shelf OLT

L2 DHCP Relay Profiles	Traffic Profiles
Forwarding	XPON (VLAN etc.)
DHCPv6 LDRA Profiles	GEM Ports / T-Conts
Link Table	LAG Definitions
Multicast	Hardware/Interfaces/Ports
PPPoE Profiles	Access Control (NACM)
Classifiers	SSL Keystore
Policies	NETCONF Server

```
1  <rpc-reply xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="get-running-10">
2    <data>
3      <l2-dhcpv4-relay-profiles xmlns="urn:bbf:yang:bbf-l2-dhcpv4-relay">...
4      </l2-dhcpv4-relay-profiles>
5      <forwarding xmlns="urn:bbf:yang:bbf-forwarding">...
6      </forwarding>
7      <dhcpv6-ldra-profiles xmlns="urn:bbf:yang:bbf-dhcpv6-ldra">...
8      </dhcpv6-ldra-profiles>
9      <link-table xmlns="urn:bbf:yang:bbf-link-table">...
10     </link-table>
11     <multicast xmlns="urn:bbf:yang:bbf-mgmd">...
12     </multicast>
13     <pppoe-profiles xmlns="urn:bbf:yang:bbf-pppoe-intermediate-agent">...
14     </pppoe-profiles>
15     <classifiers xmlns="urn:bbf:yang:bbf-qos-classifiers">...
16     </classifiers>
17     <policies xmlns="urn:bbf:yang:bbf-qos-policies">...
18     </policies>
19     <qos-policy-profiles xmlns="urn:bbf:yang:bbf-qos-policies">...
20     </qos-policy-profiles>
21     <tm-profiles xmlns="urn:bbf:yang:bbf-qos-traffic-mngt">...
22     </tm-profiles>
23     <xpon xmlns="urn:bbf:yang:bbf-xpon">...
24     </xpon>
25     <xpongemtcont xmlns="urn:bbf:yang:bbf-xpongemtcont">...
26     </xpongemtcont>
27     <lag-system xmlns="urn:ieee:std:802.1AX:yang:ieee802-dot1ax">...
28     </lag-system>
29     <hardware xmlns="urn:ietf:params:xml:ns:yang:ietf-hardware">...
30     </hardware>
31     <interfaces xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces">...
32     </interfaces>
33     <keystore xmlns="urn:ietf:params:xml:ns:yang:ietf-keystore">...
34     </keystore>
35     <nacm xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-acm">...
36     </nacm>
37     <netconf-server xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-server">...
38     </netconf-server>
39   </data>
40 </rpc-reply>
```

4 Hours of NETCONF/YANG Training

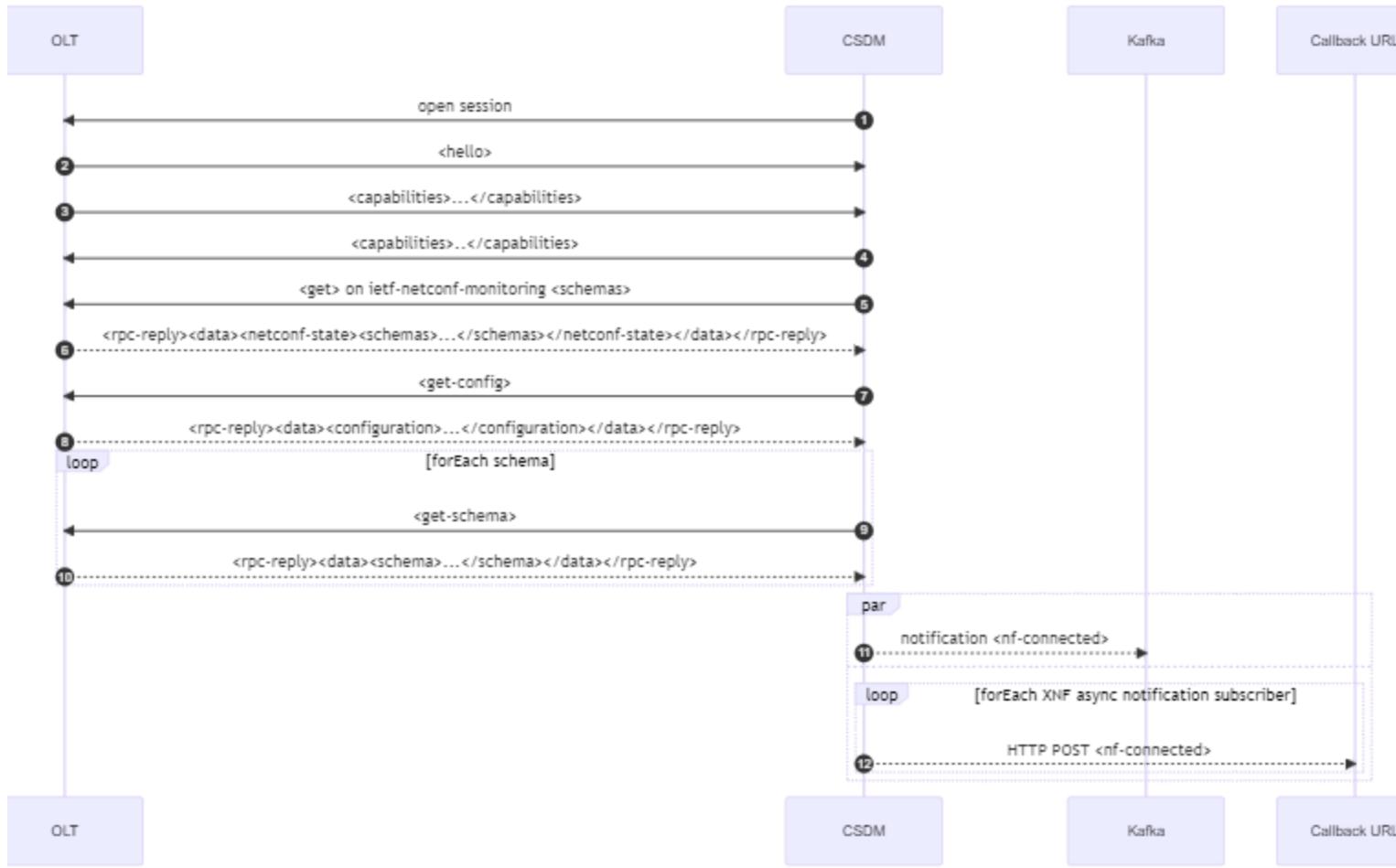
- [Part 1](#)
- [Part 2](#)
- [ietf-interfaces@2018-02-20.yang](#)
- [ietf-yang-types@2013-07-15.yang](#)
- [YANG_Cheat_Sheet.pdf](#)
- [yangPrimer.pdf](#)

CommScope Domain Manager (CSDM)

with NETCONF & OLT Operations

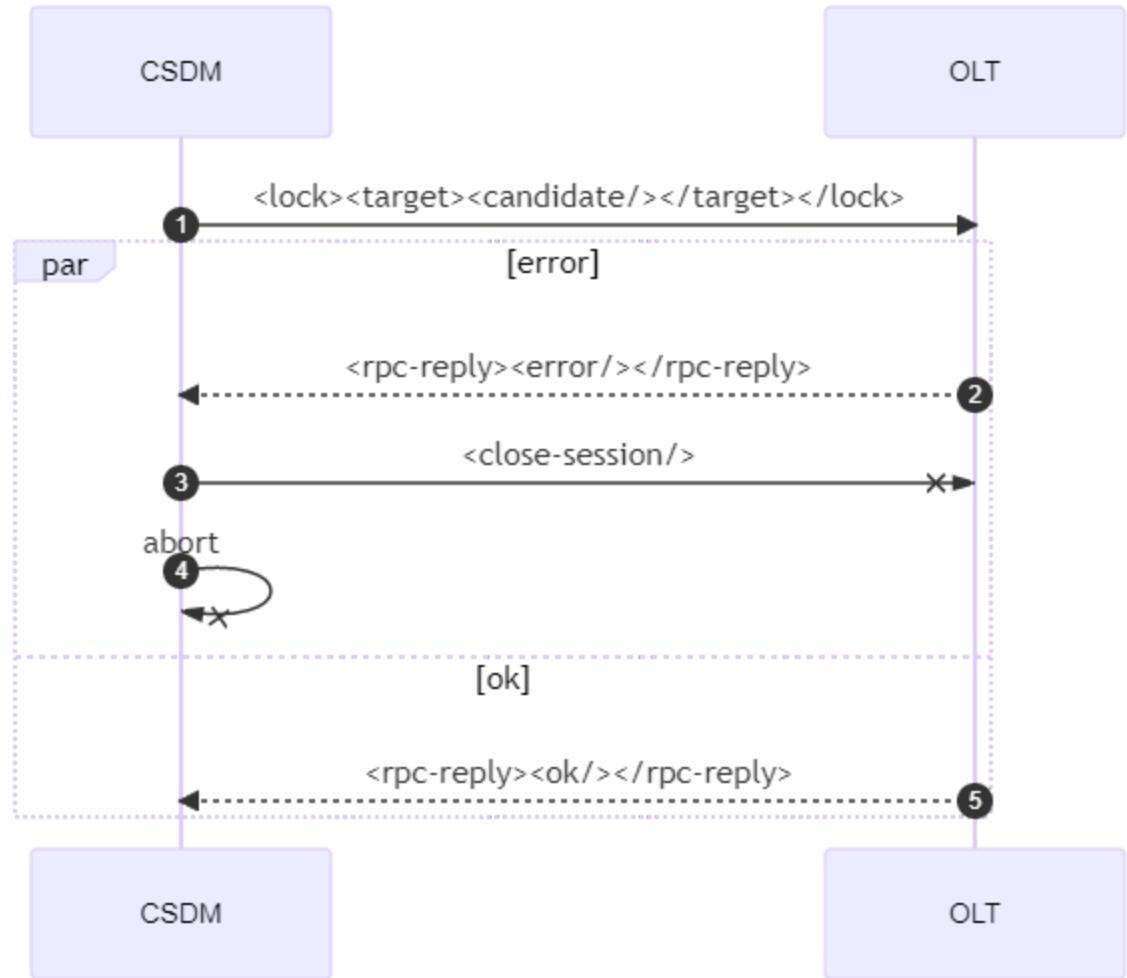
OLT - NETCONF Mount Operation

- NETCONF hello handshake
- Exchange capabilities
- Retrieve current configuration
- Retrieve unknown YANG
- Subscribe to all available notifications



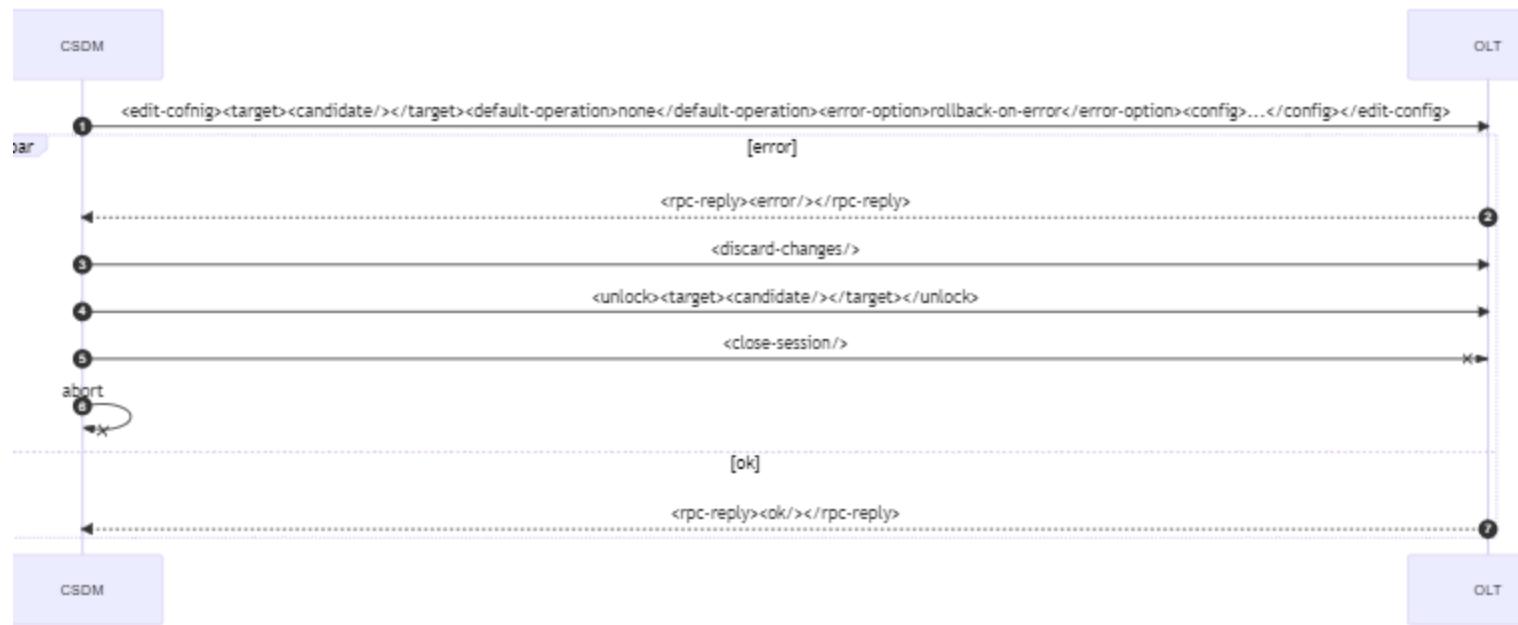
OLT - NETCONF Edit Operation (1/5) - Two Phase Commit

- Lock datastore
 - If already locked, disconnect



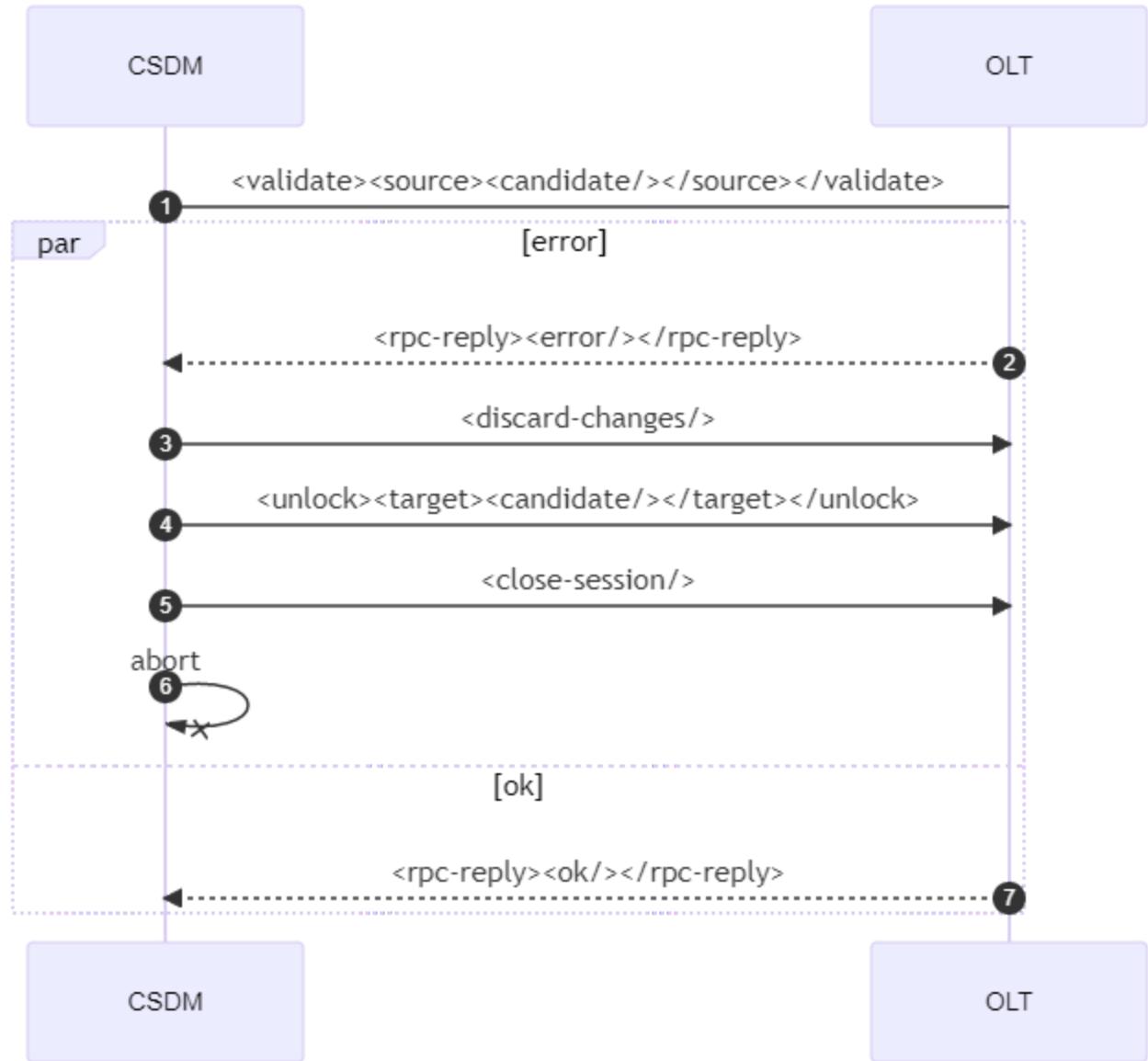
OLT - NETCONF Edit Operation (2/5)

- Edit configuration
 - Auto rollback on error
 - Force discard if error (unlock datastore)
 - Disconnect
 - Operation (merge|replace)



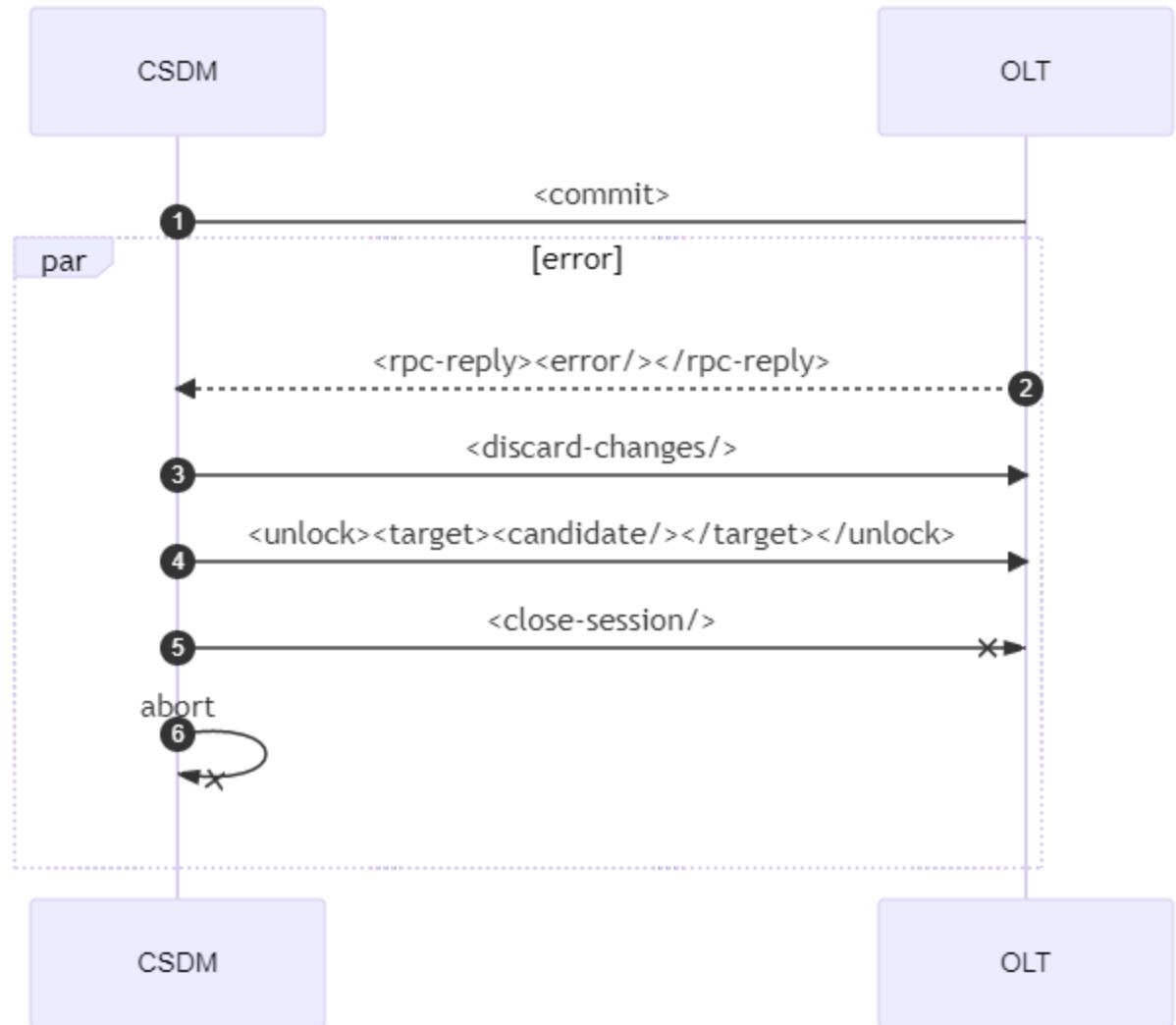
OLT - NETCONF Edit Operation (3/5)

- Request configuration is validated
 - Force discard if error (unlock datastore)
 - Disconnect



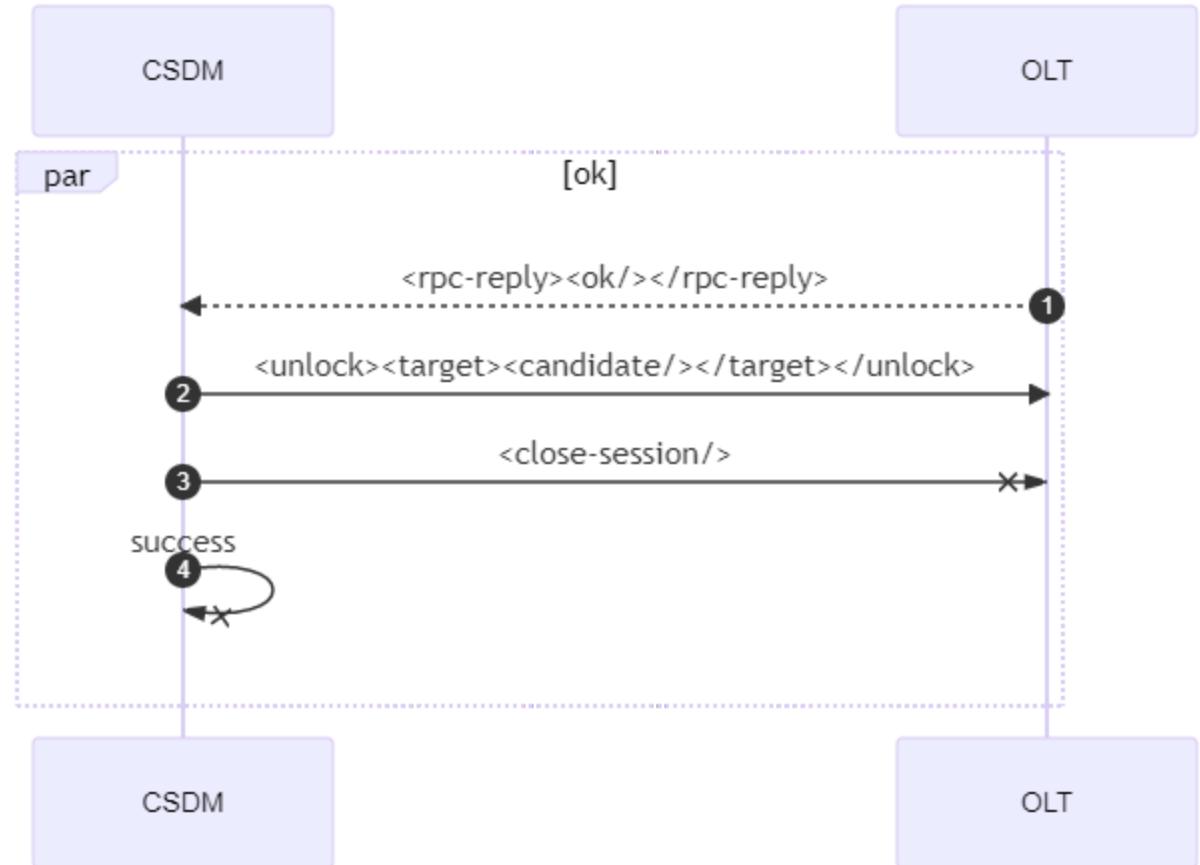
OLT - NETCONF Edit Operation (4/5)

- Commit changes to running datastore
 - Force discard if error (unlock datastore)
 - Disconnect



OLT - NETCONF Edit Operation (5/5)

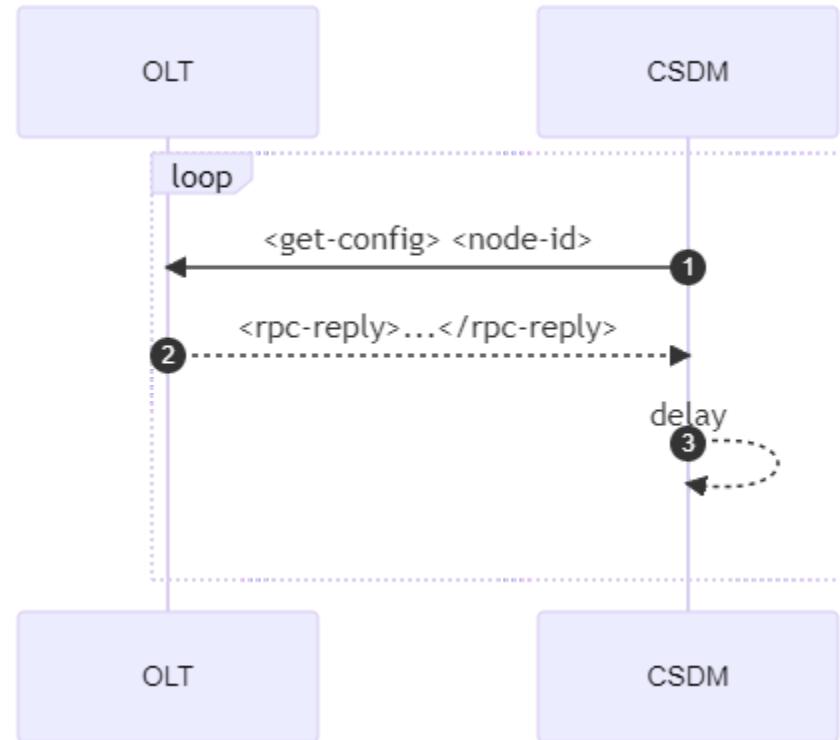
- All changes delivered & validated without error
- Unlock datastore
- Disconnect



OLT - NETCONF Keep-Alive Operation

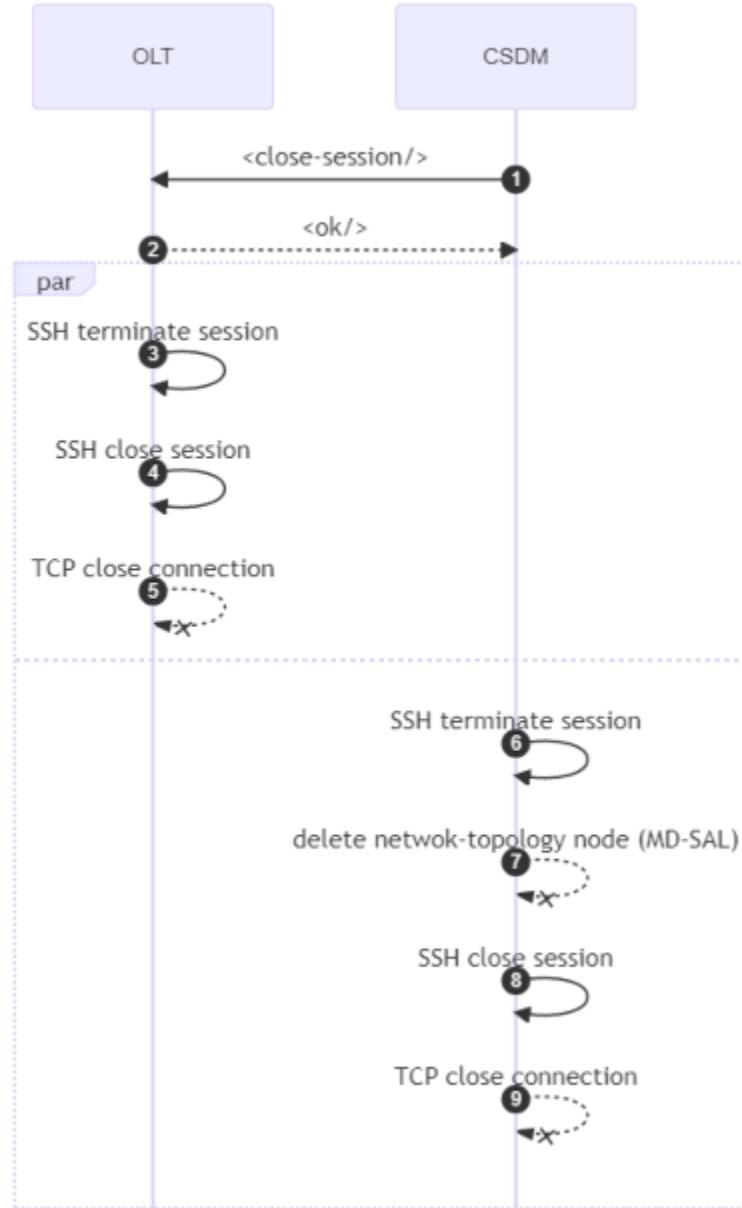
- Periodic nudge
 - Get configuration

keep connection open
for (inband)
notifications



OLT - NETCONF Unmount Operation

- Disconnect
- Remove local notification subscriptions



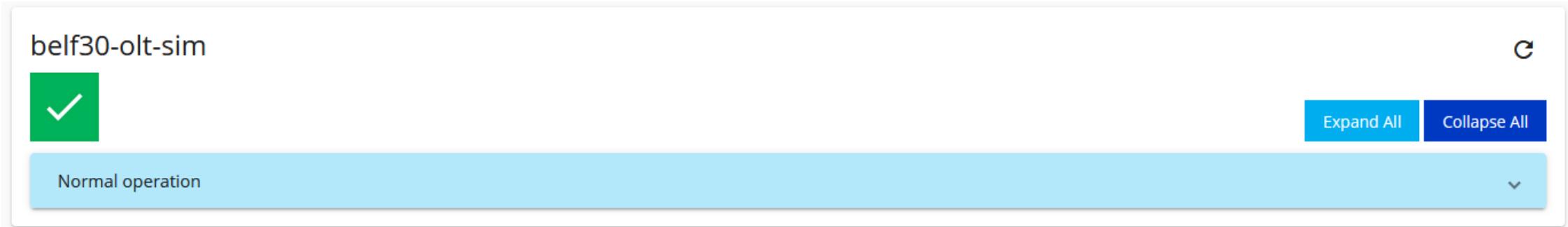
OLT - UI - Operational Status

Monitoring/PON OLT

<input type="checkbox"/>	State	Status	Vendor	Family	Model	Name ↑	SerialNumber	Location
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf30-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf31-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf32-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf33-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf34-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf35-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf36-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf37-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf38-olt-sim		
<input type="checkbox"/>		Online	CommScope	PON-OLT	XP6168S	belf39-olt-sim		

Items per page: 10 ▾ 1 – 10 of 10 | < < > >|

OLT - UI - Normal Operation



OLT - UI - Degraded Operation

belf34-olt-sim

 ⌂

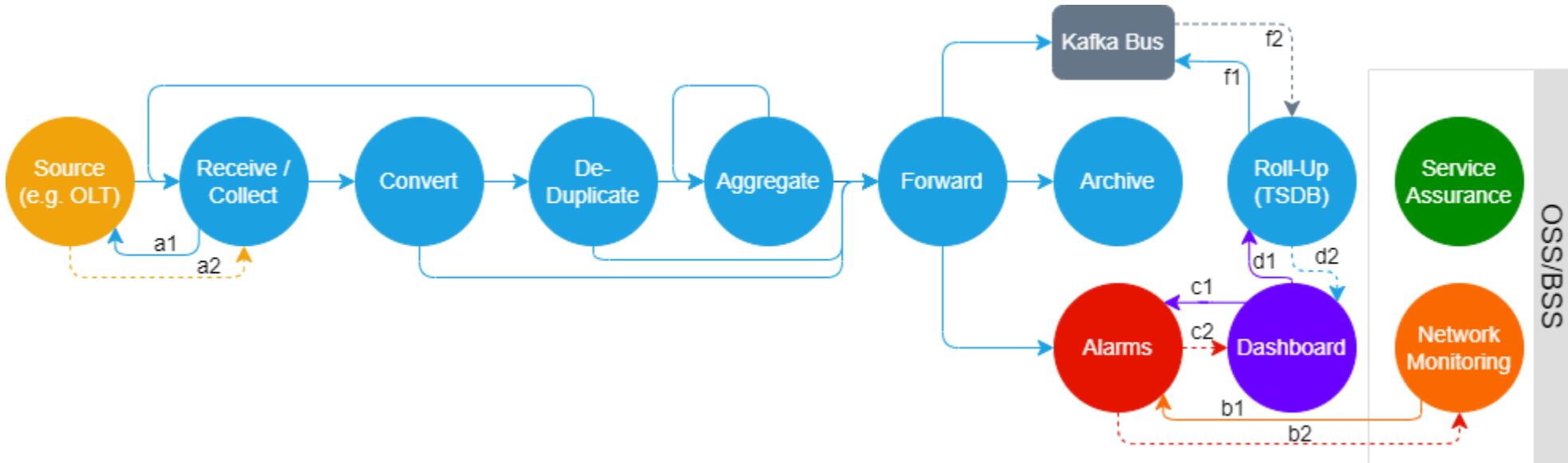
Out of service ONUs ^

5 Out of Service (OOS) ONUs were detected on: Mar 15, 2023, 7:48:40 PM

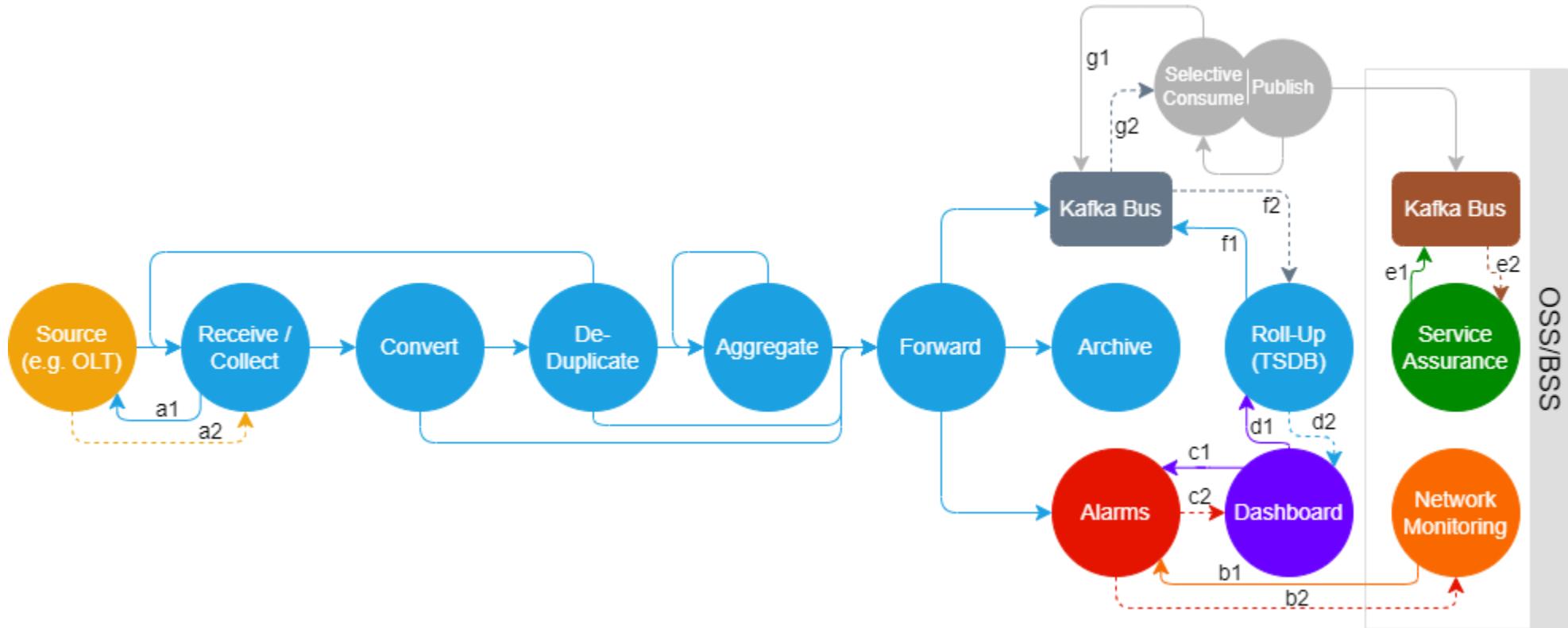
Expand All **Collapse All**

Telemetry

Basic Principle

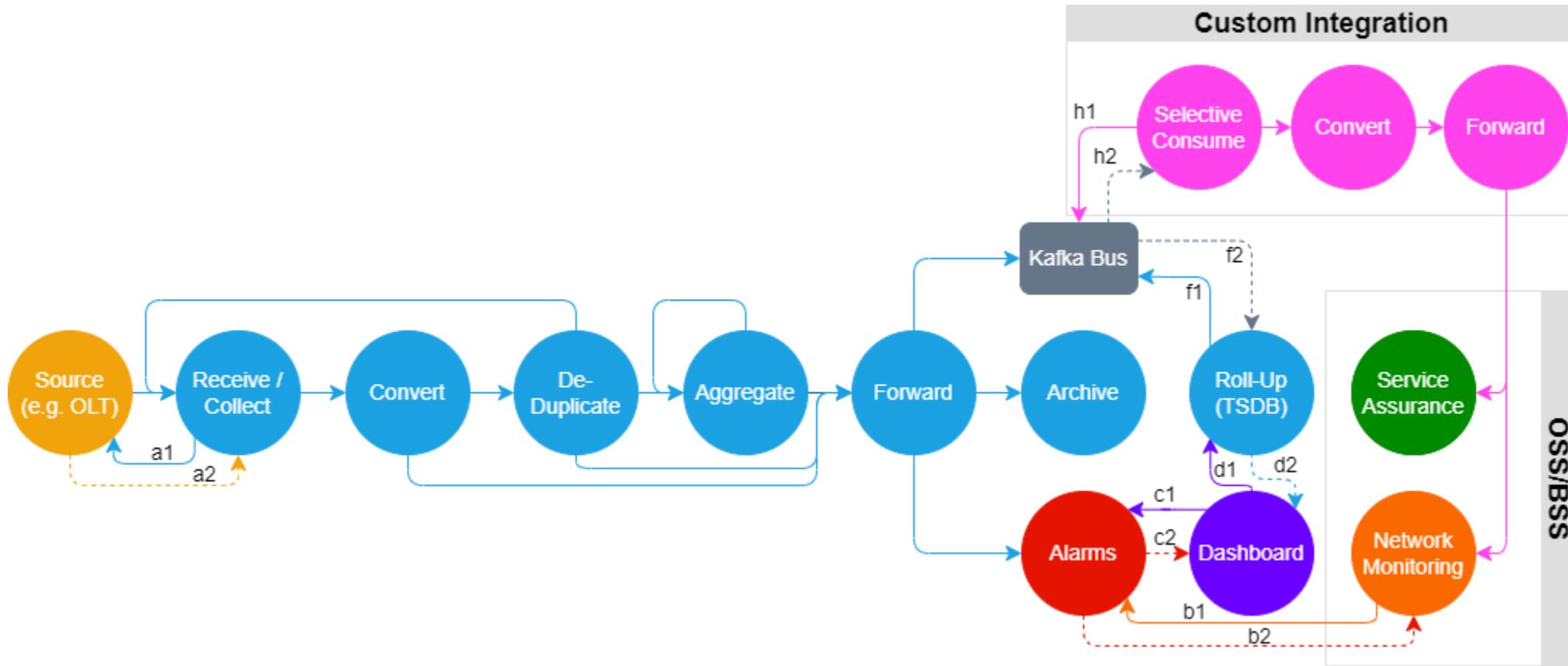


Publication to External Kafka Bus



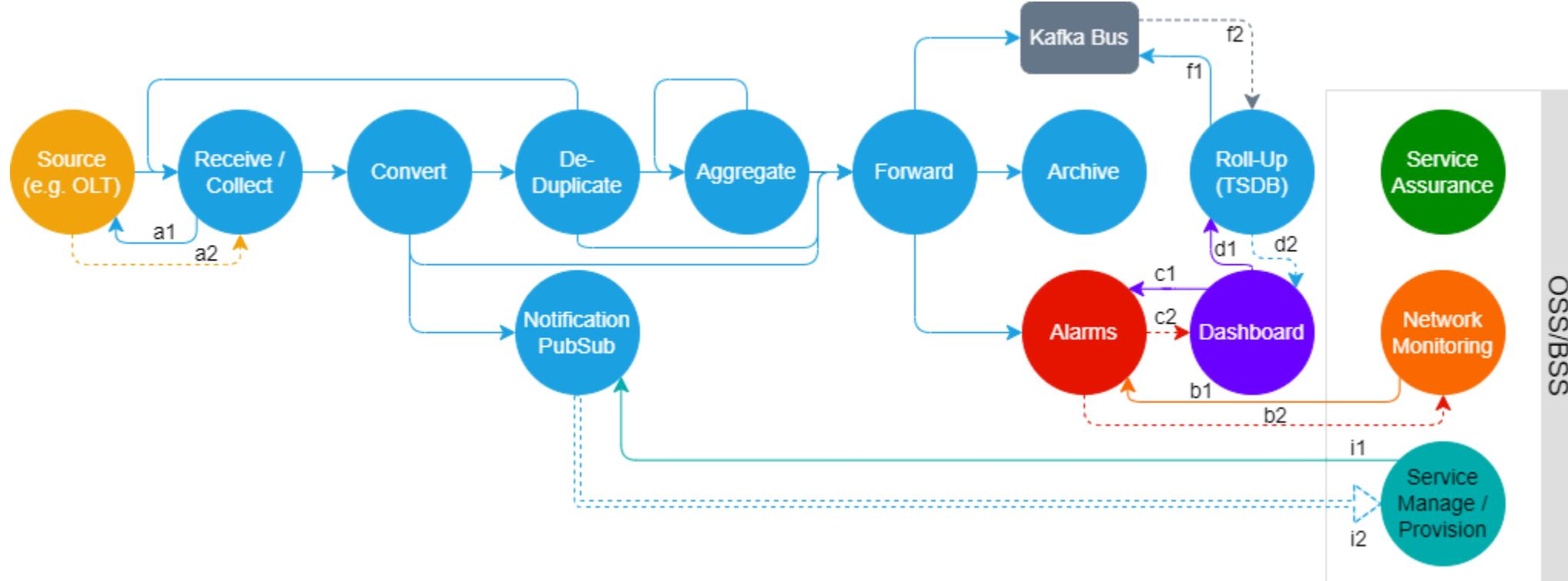
currently under PLM/Architecture discussion

Custom Notifications & Metrics Integration



customer funded integration that requires Scope of Works & High Level Design

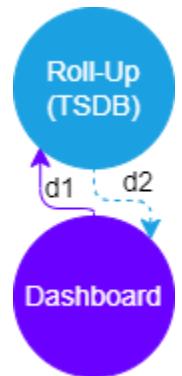
PubSub Notification Streams



initially unknown ONU discovery (OLT id&port, ANI, ONU serial&make/model)
currently under PLM/Architecture discussion

Domain Manager Usage

- TSDB is used as source data by PON History under UI Monitoring section
 - OLT GEM Port Metrics
 - OLT Interface Metrics
 - OLT Single Interface
 - ONU Interface Metrics



TSDB is not available externally, defer to Kafka

OLT GEM Port Metrics

Monitoring / PON History / OLT GEM Port Metrics

General / PON OLT GEM Port Metrics

Last 24 hours

OLT alpha-8

PON GEM Port Metrics								
timestamp	olt	name	onu	if-type	sub-if-type	actual-gemport-id	v-ani-side.in-frames	v-ani-side.out-frames
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1024	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1025	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1034	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1035	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1036	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1037	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1038	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1039	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1026	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1027	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1028	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1029	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1030	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1031	0	0
2023-03-30 08:00:00	alpha-8	onu001000-gempor...	onu001000	olt	gem	1032	0	0

OLT Interface Metrics

Monitoring/PON History/OLT Interface Metrics

General / PON OLT Interface Metrics

Last 7 days ▾

OLT alpha-8

PON Interface Metrics								
timestamp	olt	name	type	onu	serial-number	if-type	sub-if-type	in-broadcast-pkts
2023-03-28 07:50:00	alpha-8	cpair-1-1-1	bbf-xponift:channel...	na	na	olt	channel-pair	0
2023-03-28 07:50:00	alpha-8	cpair-1-10-1	bbf-xponift:channel...	na	na	olt	channel-pair	0
2023-03-28 07:50:00	alpha-8	cpair-1-9-1	bbf-xponift:channel...	na	na	olt	channel-pair	0
2023-03-28 07:50:00	alpha-8	cterm-1-1-1	bbf-xponift:channel...	na	na	olt	channel-termination	0
2023-03-28 07:50:00	alpha-8	cterm-1-10-1	bbf-xponift:channel...	na	na	olt	channel-termination	0
2023-03-28 07:50:00	alpha-8	cterm-1-9-1	bbf-xponift:channel...	na	na	olt	channel-termination	0
2023-03-28 07:50:00	alpha-8	nni-1-1-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-2-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-3-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-4-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-5-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-6-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-7-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 07:50:00	alpha-8	nni-1-8-1	ianaift:ethernetCsm...	na	na	nni	na	0
2023-03-28 08:10:00	alpha-8	cpair-1-1-1	bbf-xponift:channel...	na	na	olt	channel-pair	0

OLT Single Interface

Monitoring/PON History/OLT Single Interface Metrics

General / PON OLT Single Interface Metrics ☰

Last 24 hours

OLT	alpha-8	NAME	cterm-1-9-1	timestamp	olt	name	type	onu	serial-number	if-type	sub-if-type	in-broadcast-pkts
				2023-03-30 08:00:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 08:10:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 08:30:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 08:40:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 09:00:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 09:10:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 09:30:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 09:40:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 10:00:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 10:10:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 10:30:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 10:40:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 11:00:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	
				2023-03-30 11:50:00	alpha-8	cterm-1-9-1	bbf-xponift:channel-...	na	na	olt	channel-termination	

ONU Interface Metrics

Monitoring/PON History/ONU Interface Metrics

General / PON ONU Interface Metrics

Last 3 hours ▾

OLT alpha-8 ONU onu001000

ONU Interface Metrics - (onu001000)								
timestamp	olt	name	type	onu	serial-number	if-type	sub-if-type	in-broadcast-pkts
2023-03-30 09:30:00	alpha-8	onu001000	bbf-xponift:v-ani	onu001000	GPON2150003c	olt	vani	0
2023-03-30 09:30:00	alpha-8	onu001000-uni-1-1-1	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 09:30:00	alpha-8	onu001000-uni-1-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0
2023-03-30 09:30:00	alpha-8	onu001000-uni-10-1...	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 09:30:00	alpha-8	onu001000-uni-10-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0
2023-03-30 09:40:00	alpha-8	onu001000	bbf-xponift:v-ani	onu001000	GPON2150003c	olt	vani	0
2023-03-30 09:40:00	alpha-8	onu001000-uni-1-1-1	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 09:40:00	alpha-8	onu001000-uni-1-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0
2023-03-30 09:40:00	alpha-8	onu001000-uni-10-1...	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 09:40:00	alpha-8	onu001000-uni-10-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0
2023-03-30 10:00:00	alpha-8	onu001000	bbf-xponift:v-ani	onu001000	GPON2150003c	olt	vani	0
2023-03-30 10:00:00	alpha-8	onu001000-uni-1-1-1	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 10:00:00	alpha-8	onu001000-uni-1-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0
2023-03-30 10:00:00	alpha-8	onu001000-uni-10-1...	ianaift:ethernetCsm...	onu001000	GPON2150003c	uni	na	0
2023-03-30 10:00:00	alpha-8	onu001000-uni-10-1...	bbf-xponift:olt-v-enet	onu001000	GPON2150003c	olt	venet	0

Thank you

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