

Passive ODN modeling:

A candidate proposal (UPDATE!)

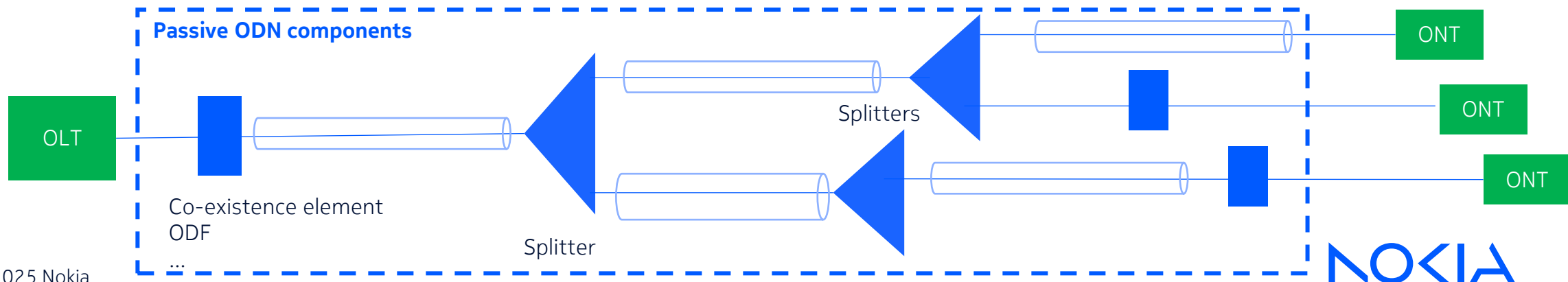
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Passive ODN modeling

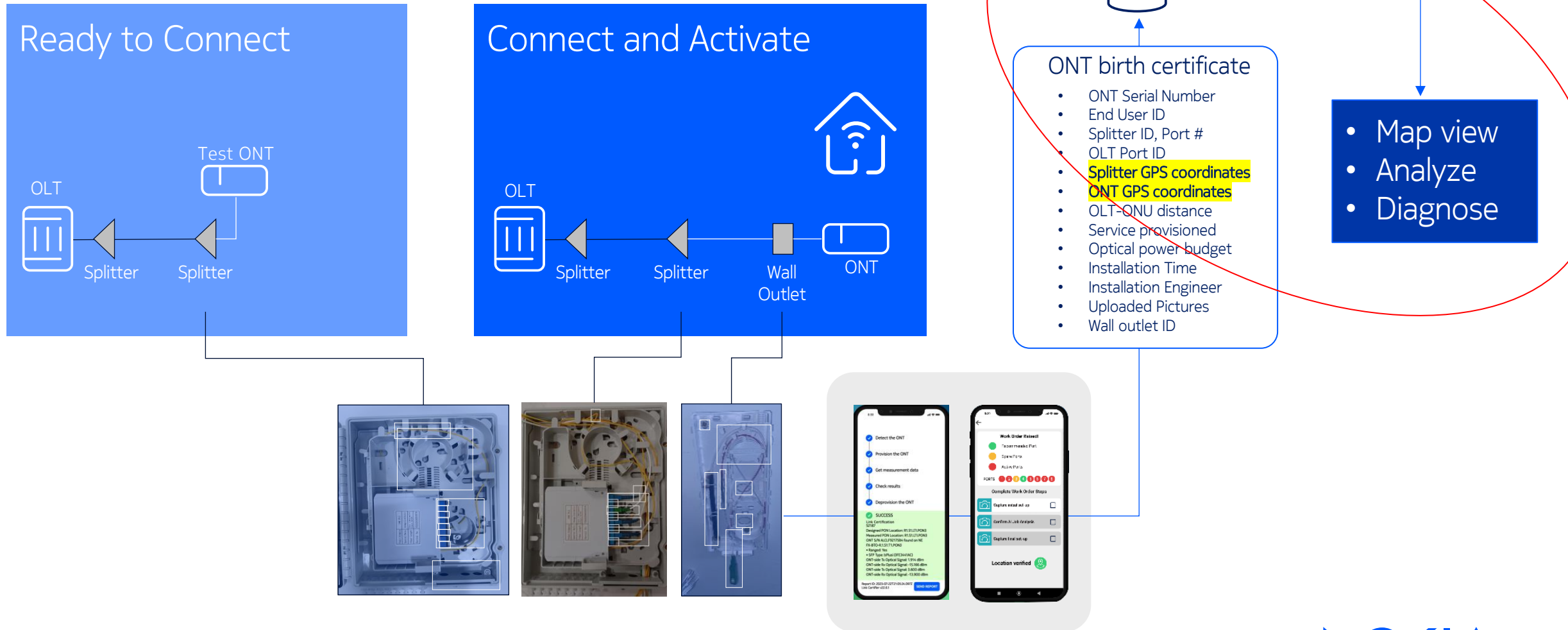
- Target: enable easy trouble shooting and root cause determination when there are ODN incidents or ODN degradations, resulting in alarms generated by OLT and/or ONUs
- Model passive ODN topology (specifically PON), including individual fiber termination points at each (passive) “interconnect”
- How
 - Include passive modeling in BBF Topology NRM and Inventory NRM
 - Re-use RFC 8345 node ,TP, and link objects
 - “Link” = individual fiber core between two nodes/TPs



Use cases involving information from (passive) ODN topology

- Fiber Cable Cut/Damage
 - (probably) all fiber cores in this cable are cut/damaged
 - Required Capability:
 - Determine from impacted OLT ports/ONTs whether they share the same (impacted) fiber cable(s) and provide fiber cable segment identifier(s)
- Passive Node Damage
 - Potentially impacting all fiber cores terminated in this passive node
 - Required Capability:
 - Determine from impacted OLT ports/ONTs whether they share the same passive node and provide the passive node identifier
- New ONU connected
 - Compare optical perform. (ONU birth certificate) with FTTH-passed optical test

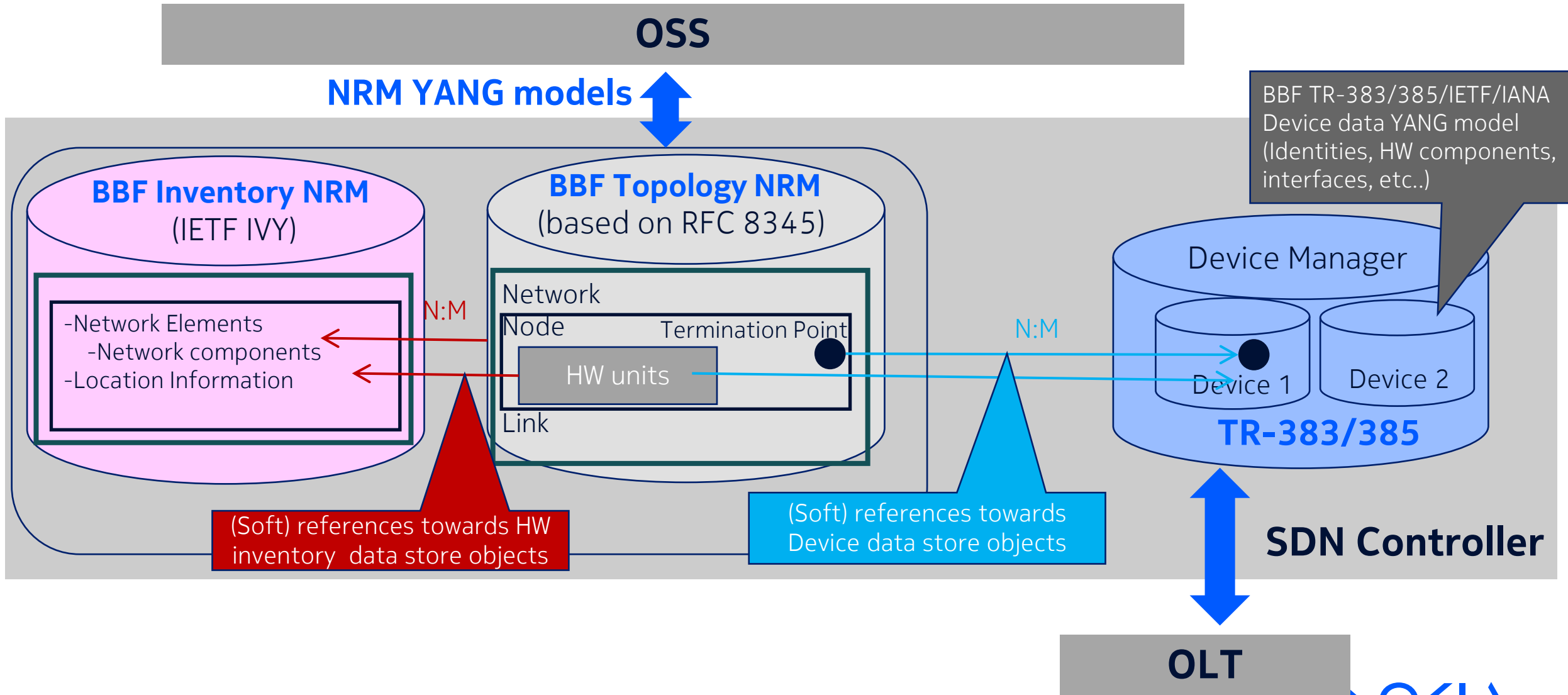
ONT birth certificate



Proposed passive modeling across Inventory and Topology

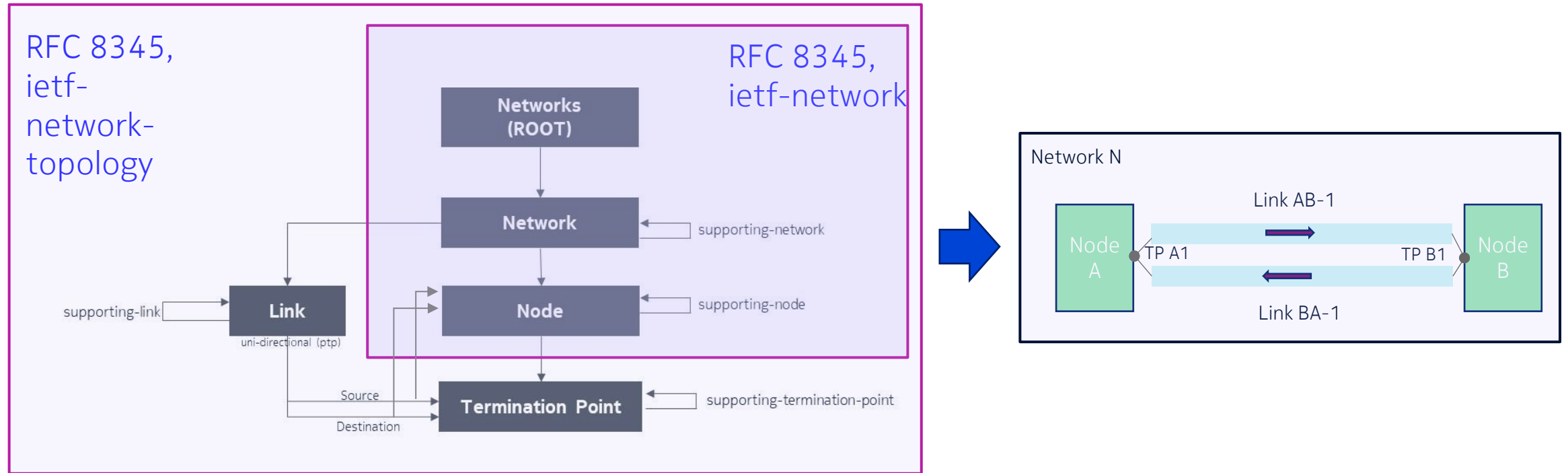
- Inventory lists the passive nodes and the fiber cables present in the OSP
 - Passive node model may include internals (eg available splitters, etc)
 - Fiber cables: id, number of fiber cores, cable type, fiber core type etc..
- Inventory (IETF IVY inventory model) also has location information
 - For (passive) nodes: address/ geo-location
 - For fiber cables
 - Information needed is based on GIS, fiber routes mapped eg via Google maps
- Inventory should NOT include which fiber cores of which fiber cables are interconnected and how.... => Topology view
- As such the passive ODN inventory information /view is static and represents the initial install design view...Once realized, the fiber core inter-connectivity is imported in the topology NRM

BBF Inventory and Topology Network Resource Model (NRM)



Topology NRM builds on RFC 8345

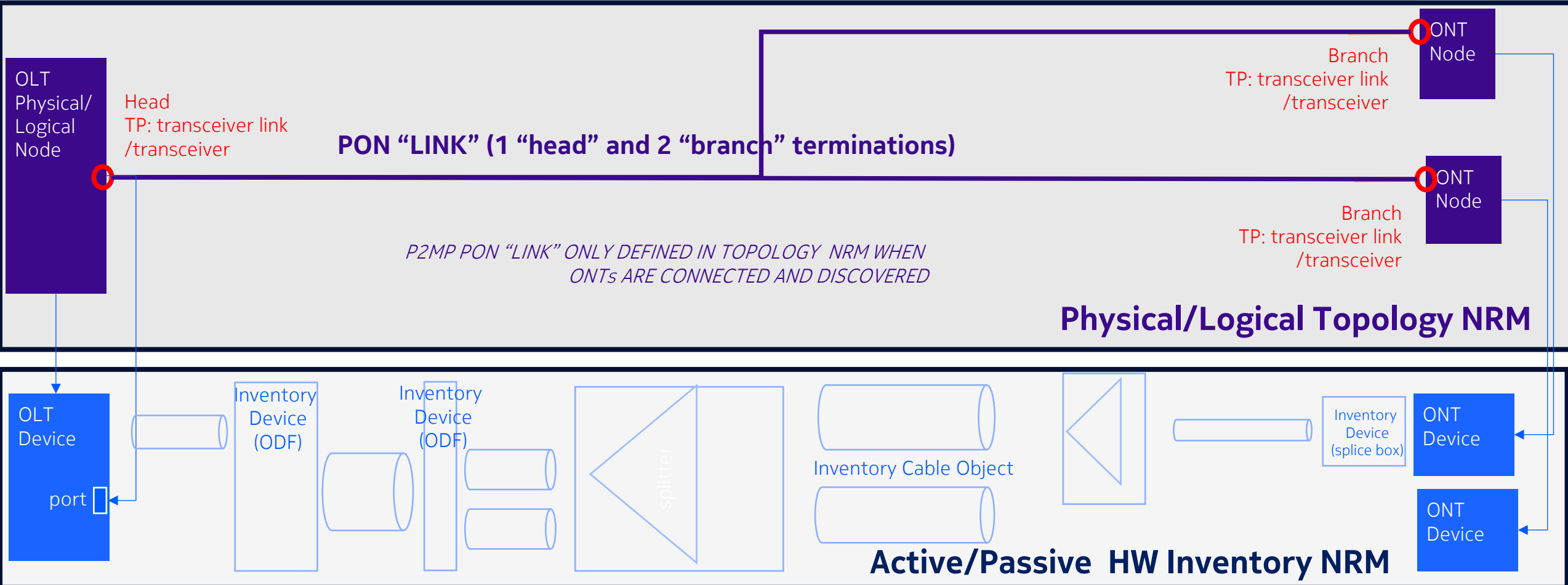
RECAP



The NRM that is exposed on the NB of an Access SDN M&C is based on RFC 8345, enabling to define

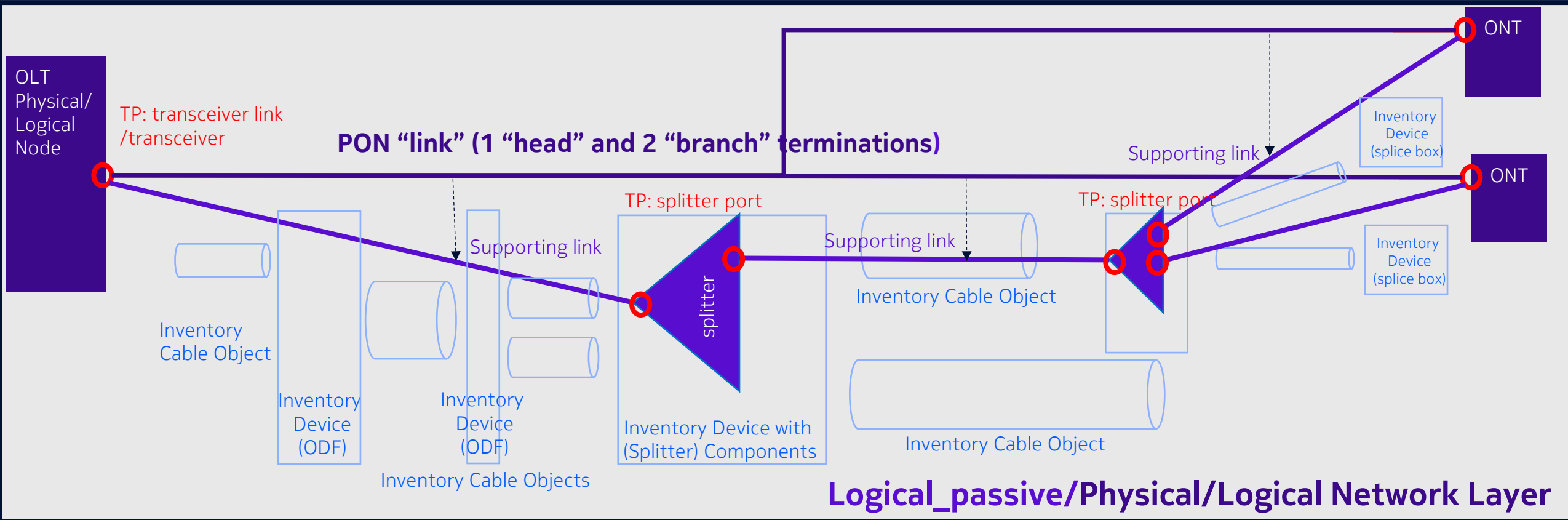
- Multiple networks
- Multiple layers / network types within a network
- Nodes representing access equipment
- TPs and links (topology or inter-device connectivity)

Topology and Inventory NRM



(PON) link is defined in the Topology NRM Physical/Logical network layer and is terminated by OLT node transceiver (head termination) and ONT node transceivers (branch terminations). It informs which ONTs are connected to which OLT port using which (PON) technology. It represents not just a physical E2E connection, its presence indicates operational transceivers at either side (an active PON) as its presence in the topology NRM is based on (automated) network discovery!

“Passive Modeling” Topology NRM : abstract (logical) view



Single network layer where “network-types” presence container has values “logical” + “physical” + “logical_passive” and “physical_passive”

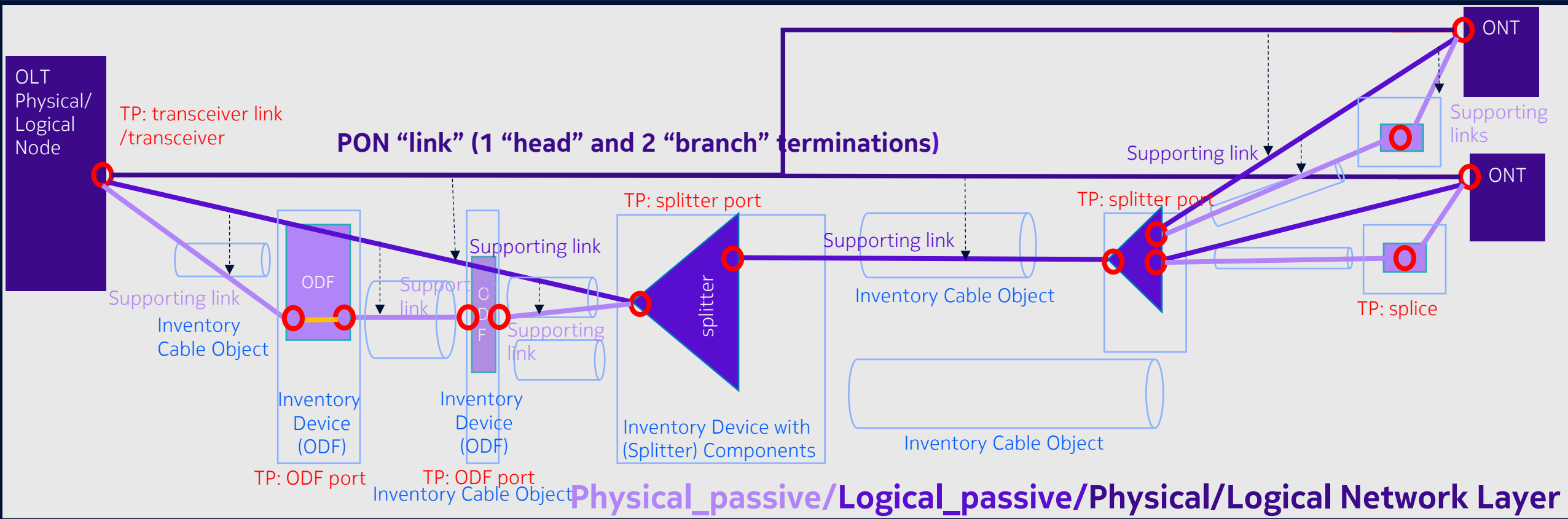
-OLT, ONT = (active) nodes where “node-types” presence container has values “physical” + “logical”

-Splitters= nodes where “node-types” presence container has value “logical_passive”

-> splitter node has one upstream and N downstream ports

Allows to define (passive) links between active and passive nodes and passive and passive nodes, as all nodes belong to same network layer

“Passive Modeling” Topology/Inventory NRM: physical view



Single network layer where “network-types” presence container has values “logical” + “physical” + “logical_passive” and “physical_passive”

-**OLT, ONT** = (active) nodes where “node-types” presence container has values “physical” + “logical”

-**Splitters**= nodes where “node-types” presence container has value “logical_passive”

-**ODFs/Splice Boxes** = nodes where “node-types” presence container has value “physical_passive”

-TPs of links representing P2P fibre cores being terminated at ODF or splice box can be modeled as

1) either downstream OR upstream facing (e.g. ports on an ODF) OR as 2) simultaneously downstream and upstream facing (e.g. splice)

Inventory

Active

-

Passive

- **Passive Devices**

- UID, node-type, mark/model/vendor, location, # input ports, # output ports , ports-in-use ??
 - Device components
 - Splitters,..

- **Fiber Cables**

- UID, # fiber cores, cable type, mark/model/vendor, GIS-reference)

Topology (nodes, TPs and links)

Logical/Physical/Logical_Passive/Physical_Passive Network Layer

- (Logical/Physical) Nodes
 - OLT and its TPs
 - ONTs and its TPs
- PON (M)P2MP Link
 - OLT/ TP
 - ONT-1/TP; ONT-2/TP;...
 - **Supporting Links**

- **(Passive) Nodes**

- TPs

Reference to “passive device” and “device components”

- **P2P Fiber link segment 1**

- Passive or Logical/physical Node X/ TP
- Passive or Logical/physical Y/ TP

Reference to Fiber Cable

- **P2P Fiber link segment 2**

- ..

Passive topology modeling in BBF/IETF

Summary

- Enable a passive abstract topology view for Optical Distribution Networks (access domain) based on RFC 8345 link/TP/node concepts
- Different levels of abstraction
 - **Logical-Passive:** connectivity between OLT and splitter / splitter and ONT / splitter and splitter
 - Always based on P2P (bidirectional) links
 - Splitters are the only passive nodes defined in this abstraction
 - Physical-Passive : connectivity/topology information down to the individual fiber strands, and including all passive interconnectivity “devices”
 - Supportive towards the logical-passive view
- Where passive topology links, nodes and termination points refer to passive inventory (cables, passive devices, ports..)