IETF 117 – ccamp Meeting

Applicability of ACTN to Packet Optical Integration (POI) extensions to support Router Optical pluggable interfaces.

draft-poidt-ccamp-actn-poi-pluggable-02

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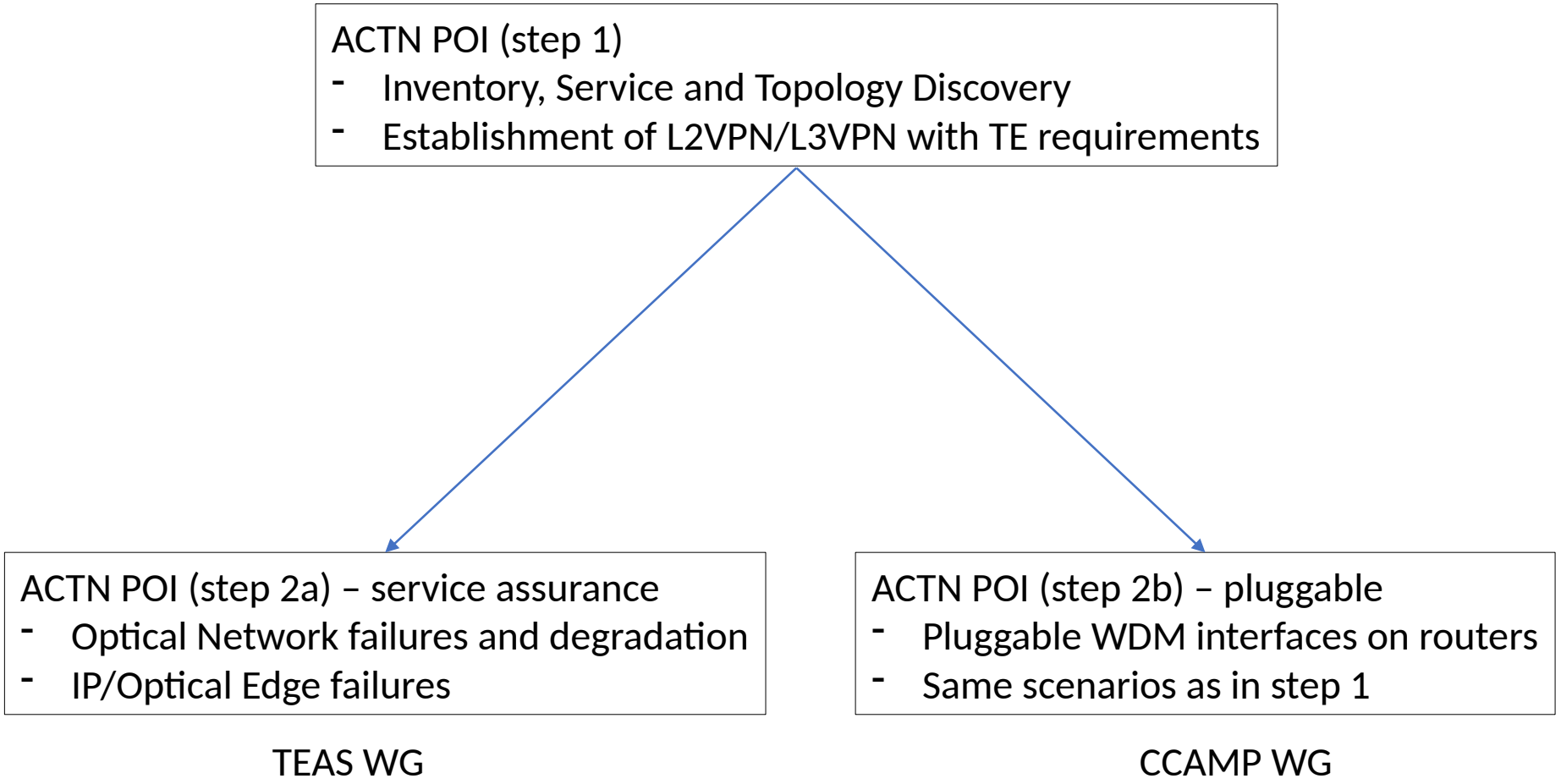
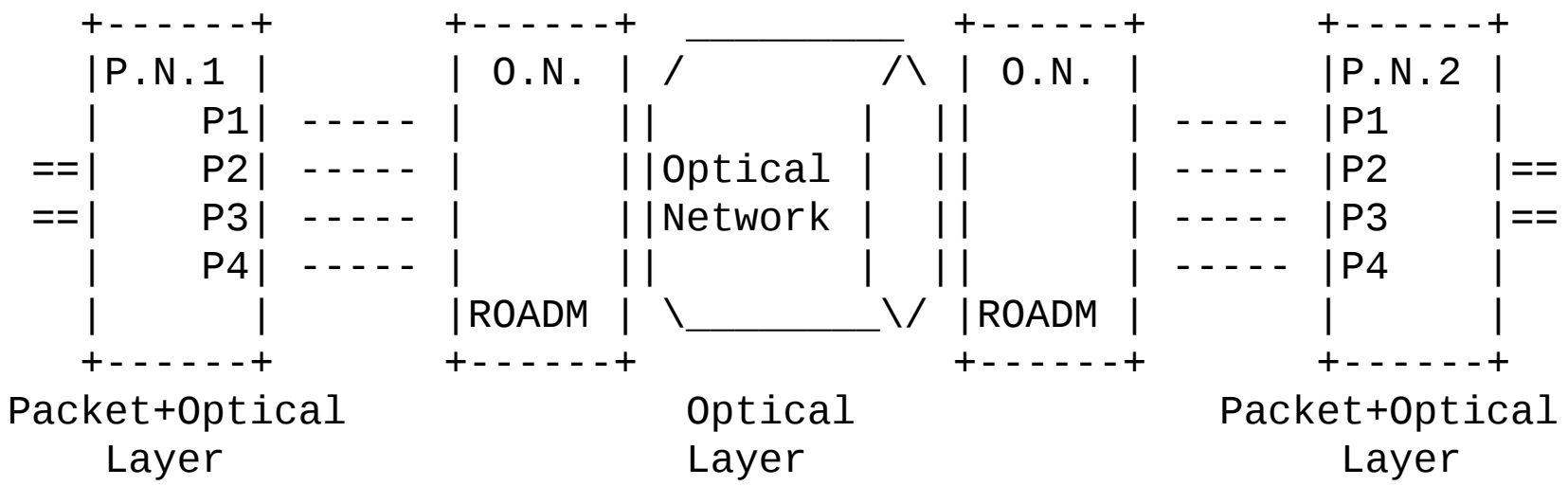
ACTN POI work and relations



ACTN POI changes from -00 version

- Added new co-authors Oscar Gonzalez de Dios and Sergio Belotti
- Fixed the references
- Added a new option to manage the pluggable, now we have:
  - Option 1 - Dual SBI management of IPoWDM routers
  - Option 2 - Single SBI management of IPoWDM routers
- Improved the use cases description
- Updated the terminology

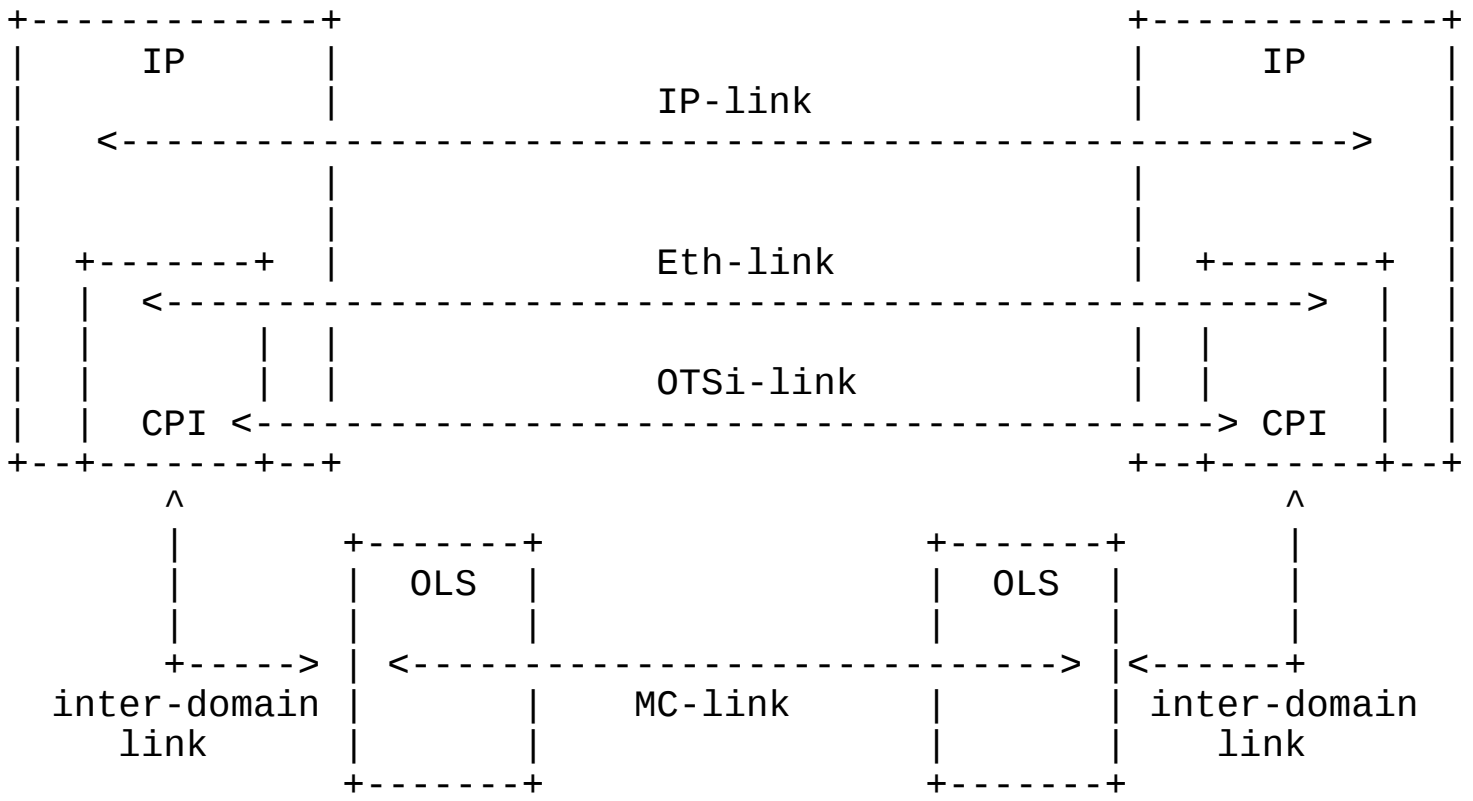
The network reference



P.N. = Packet/Optical Node (IPoDWDM router)
O.N. = Optical Switching DWDM Node (ROADM)
ROADM = Lambda/Spectrum switch
Px = DWDM (coherent pluggable) Router ports

Different types of links

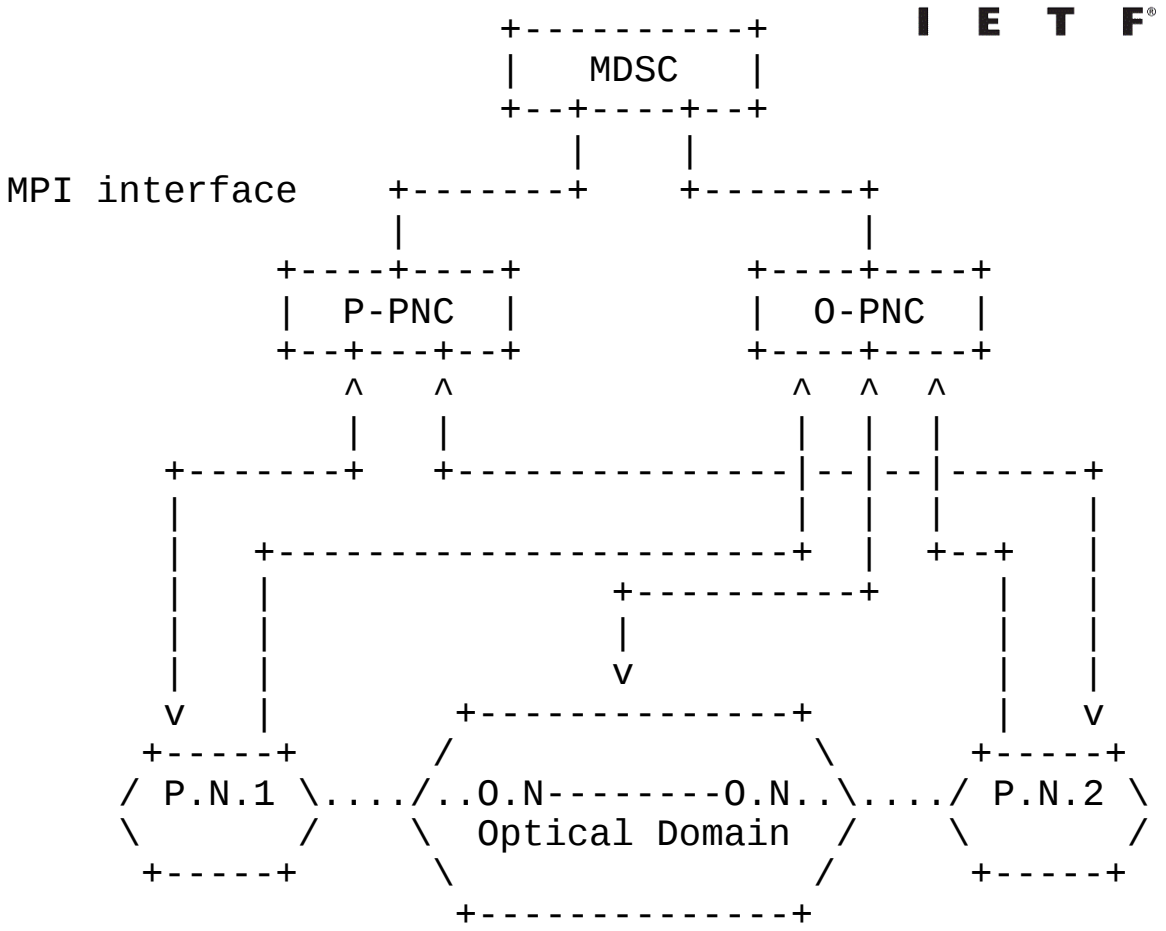
The different types of links supported by the network are shown below.



IP-link = IP service, out of this document scope
Eth-link = Ethernet connection
CPI = Coherent Pluggable Interface
OTSi-link = Pluggable connection (OTSi connection)
MC-link = Media Channel link (MC optical circuit)

Option 1 - Dual SBI management of IPoWDM routers

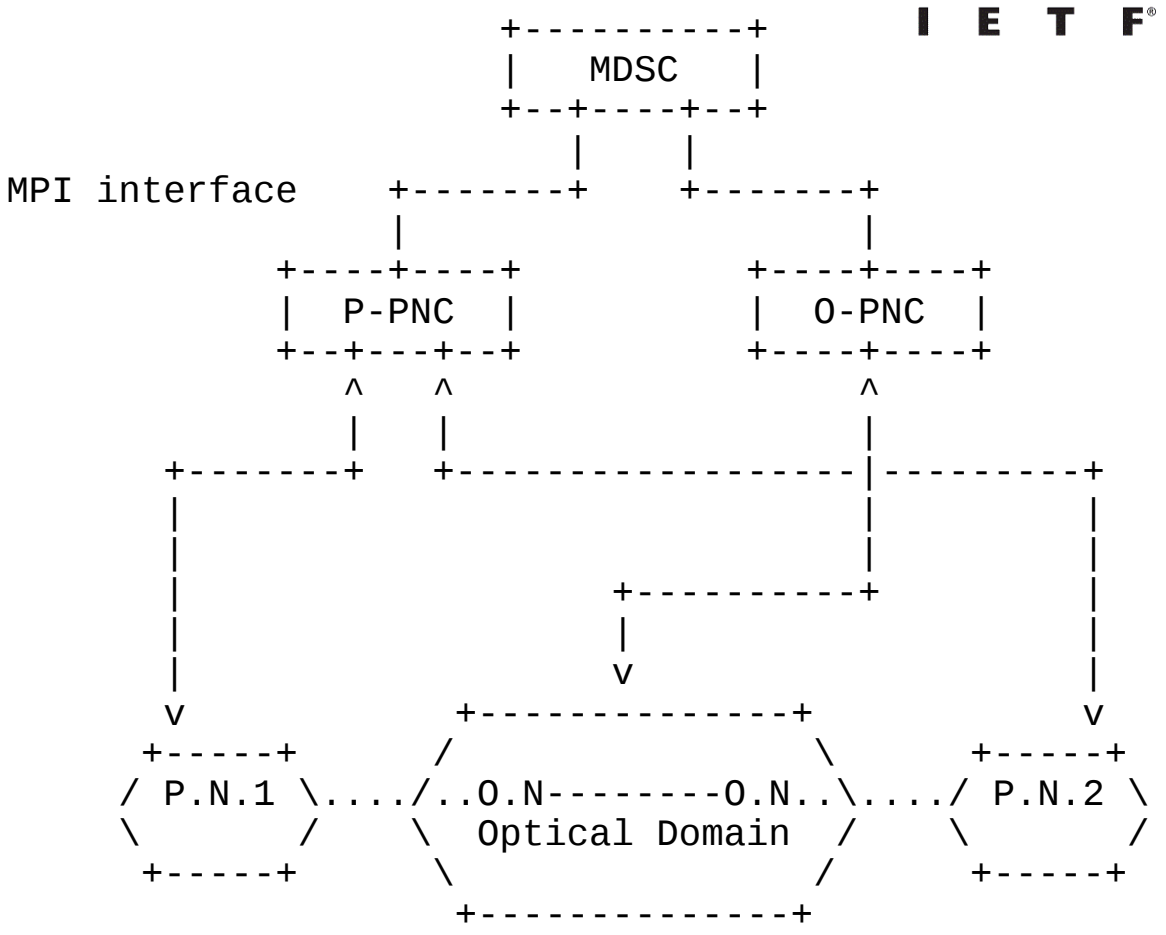
- Both the packet SDN controller (P-PNC) and the optical SDN controller (O-PNC) have access to the coherent pluggable optics on the routers.
- The P-PNC is the only entity allowed to configure them, while the O-PNC is granted with read-only permissions to avoid database inconsistency between them.
- Data write access permissions are expected to be implemented on the routers to only grant configuration rights to the P-PNC.
- O-PNC is allowed to:
  - Device discovery, poll or stream configuration, state and static capabilities.
  - Performance monitoring, periodically poll or stream performance counters.
  - Fault notification, received asynchronous alarm notifications.



P.N. = Packet/Optical Node (IPoWDM router)
O.N. = Optical Switching DWDM Node (ROADM)
ROADM = Lambda/Spectrum switch

Option 2 - Single SBI management of IPoWDM routers

- The P-PNC is the only component which has access to the routers and implements all the management capabilities.
- In this case the P-PNC not only needs to expose to the MDSC all the needed info for the management of the multi-layer network, but also physical impairment data needed for the computation and validation of the optical channel.
- In addition, also performance data need to be exported, as well as the API needed for the configuration of the pluggables.
- The MDSC is then the real co-ordinator between the IP and the Optical domains.



P.N. = Packet/Optical Node (IPoWDM router)
O.N. = Optical Switching DWDM Node (ROADM)
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Options analysis

- Both doable, even if managing dual access to routers in Option 1 might require a bit more effort/attention.

- What about having both P-PNC and O-PNC managing the pluggables? Bad idea for the following reasons:
  - Race conditions: The state of the router and its pluggables is mainly owned by the IP controller and having multiple owners (optical controller for the WDM pluggables, IP controller for the rest of the router) is a recipe for **resource contention, race conditions, synchronization issues.**

  - State of the pluggables: is not independent of the state of the rest of the router: when you modify parameters on the pluggable, you affect IP layer behavior. For example, if you change the modulation format to a lower bitrate format, the IP layer needs to know about this and send less traffic down the link.

  - Evolution: Allowing an optical controller to be this single owner will block the evolution of the end to end use cases – and this evolution holds much more value than transponder replacement

  - Security headaches: security issues arise when multiple entities have access to the same resources.

  - Multiple vendor line systems: many routers connect to other routers via different vendor line systems: for example, an edge router may connect to a core router via a core WDM system and to aggregation routers via a metro WDM system, typically not from the same vendor. So now we don't have just two controllers wanting to change router state but 3 or 4…

  - Alignment with ACTN: with the hierarchical SDN architecture and standards and allows for clean roles & responsibilities for the different controllers.

The supported use cases

Inter Domain Link discovery and provisioning

The inter-domain links are the interconnections (fiber) between the pluggable ports (in the Packet Layer) and the ROADM ports (in the Optical Layer). They are set in the Packet and DWDM nodes either manually (e.g. CLI) or via PNCs. The values identifying the inter domain links may be defined by MDSC which has the visibility of both IP and Optical layers.

Network topology discovery and provisioning

MDSC retrieves the packet network topology from the P-PNC and the optical network topology from the O-PNC. MDSC collects and rebuilds the service topology based on the services information coming from P-PNC and O-PNC as described in draft-ietf-teas-actn-poi- applicability. [I-D.draft-ietf-teas-actn-poi-applicability]

End to End Packet service provisioning / deletion

MDSC is asked to set a Packet network service between two Routers requiring additional connectivity bandwidth.

Optical Circuit provisioning / deletion

MDSC is asked to set an Optical Circuit between two router ports (O-PNC will receive the same request from MDSC). This is specially needed during the network installation to provide Connectivity between two Routers, the IP link will be set up later using this optical circuit.

LAG extension

MDSC is asked to extend a network service bandwidth. This may require more Router optical connectivity.

Optical Restoration

O-PNC detects an optical network failure and reroutes the optical circuits to a different path (and lambda).

Network Maintenance Operations

MDSC is asked to isolate part of the optical network for maintenance and coordinate the O-PNC and P-PNC to preserve the traffic during the maintenance operation.

Next steps

- Keep the the draft updated with the proper IETF terminology
- Maintain the GitHub repo to support the DT:
  - https://github.com/ggalimba56/draft-poidt-ccamp-actn-poi-pluggable
- stream line (prioritize) the use cases set
- Address new use cases like (in conjunction with:draft-poidt-teas-poi-assurance)
  - End to End Performance management KPI
  - End to End Alarm Correlation at MDSC
- Get feedbacks and harmonize the terminology to the “parent draft” and L0 specific drafts (e.g. draft-ietf-ccamp-optical-impairment-topology-yang).
- Open to new authors and contributors
- Keep alignment on draft-ietf-teas-actn-poi-applicability and draft-poidt-teas-poi-assurance
- Identify candidate Yang models (and gaps) for the required workflows considering the routers equipped with plugables
- Request WG adoption