YANG Data Model for Passive Network Inventory

draft-ygb-ivy-passive-network-inventory-02

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Motivation Recap

- Passive infrastructure is a crucial part of communication networks. Inventory management for passive infrastructure is of good interest by operators and the OSS/BSS system
  - A common model is desired for different technology domains
- This work is in the scope for IVY (see issue #32 & #46 of network-inventory-yang)
- Passive inventory models both passive devices and cables (e.g. fiber, cable, optical splitters)
  - Passive components and cables inside NEs (not defined in this revision due to time constraints)
  - Cables, cable distribution & jumper devices connecting the NEs

Updates Since IETF-121

- Since -00 has been published, there have been good interest from many participants to progress the work
  - Desire is to create a generic NBI data model for passive inventory management applicable to various types of networks : optical transport, IP, optical access, microwave, etc.
  - Augmenting the base model in draft-ietf-ivy-network-inventory-yang
  - How the passive inventory is discovered is out of the scope of this work

- Updates in Rev-02
  - Added co-authors
  - Improved text on scope and updated terminology description
  - YANG model was updated on terminologies and aligned with the changes in the base inventory model
  - Added examples of passive inventory for optical transport and optical access networks

Terminologies

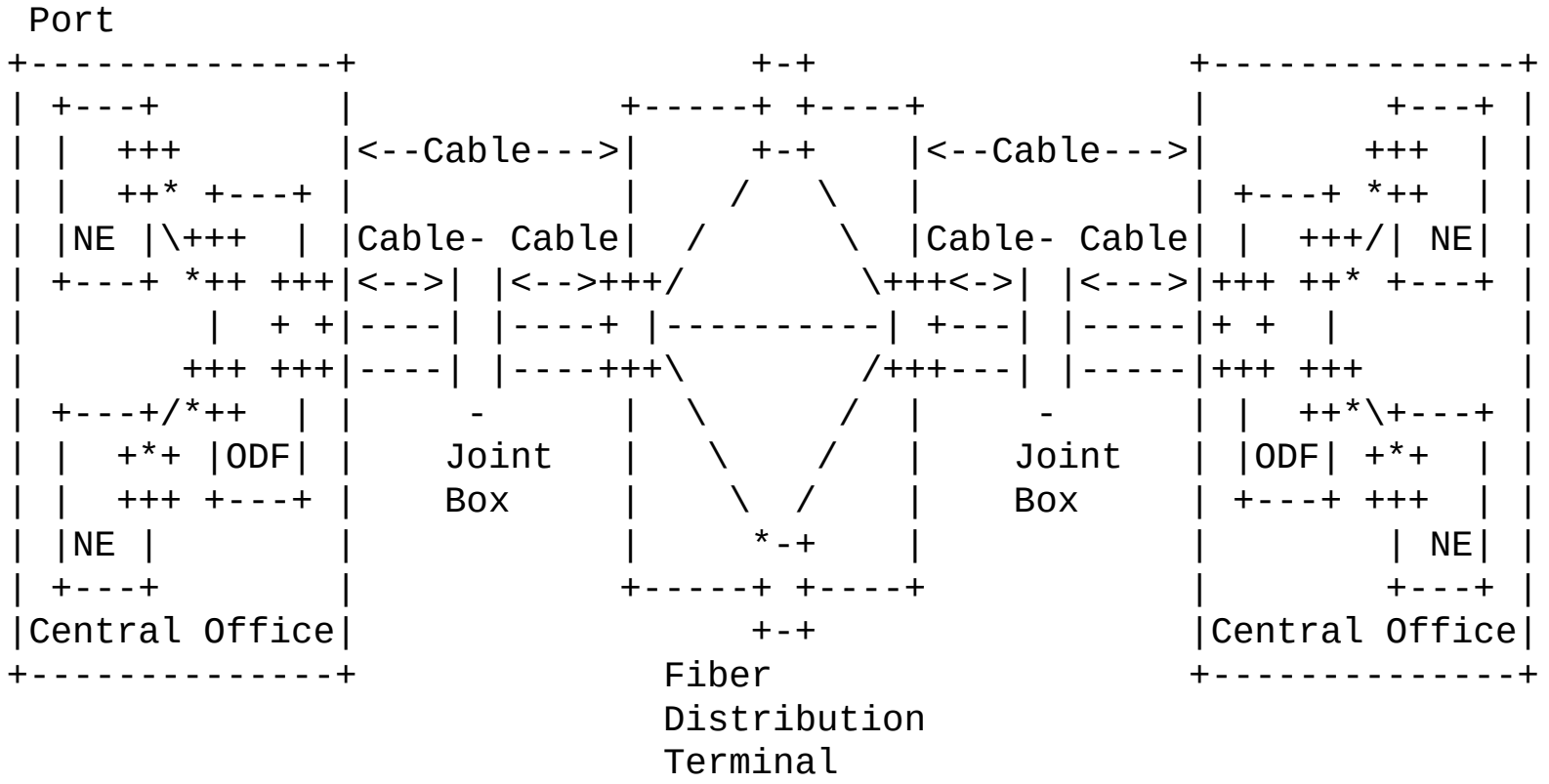
- Established a generic term “guiding media” to refer to physical transmission pathways that direct and confine electromagnetic signals along a specific route
  - Applicable to optical fiber cables, electrical cables, coaxial cables, etc.

- Optical Cable: a type of guiding media that uses optical fiber as media to transmit optical signals

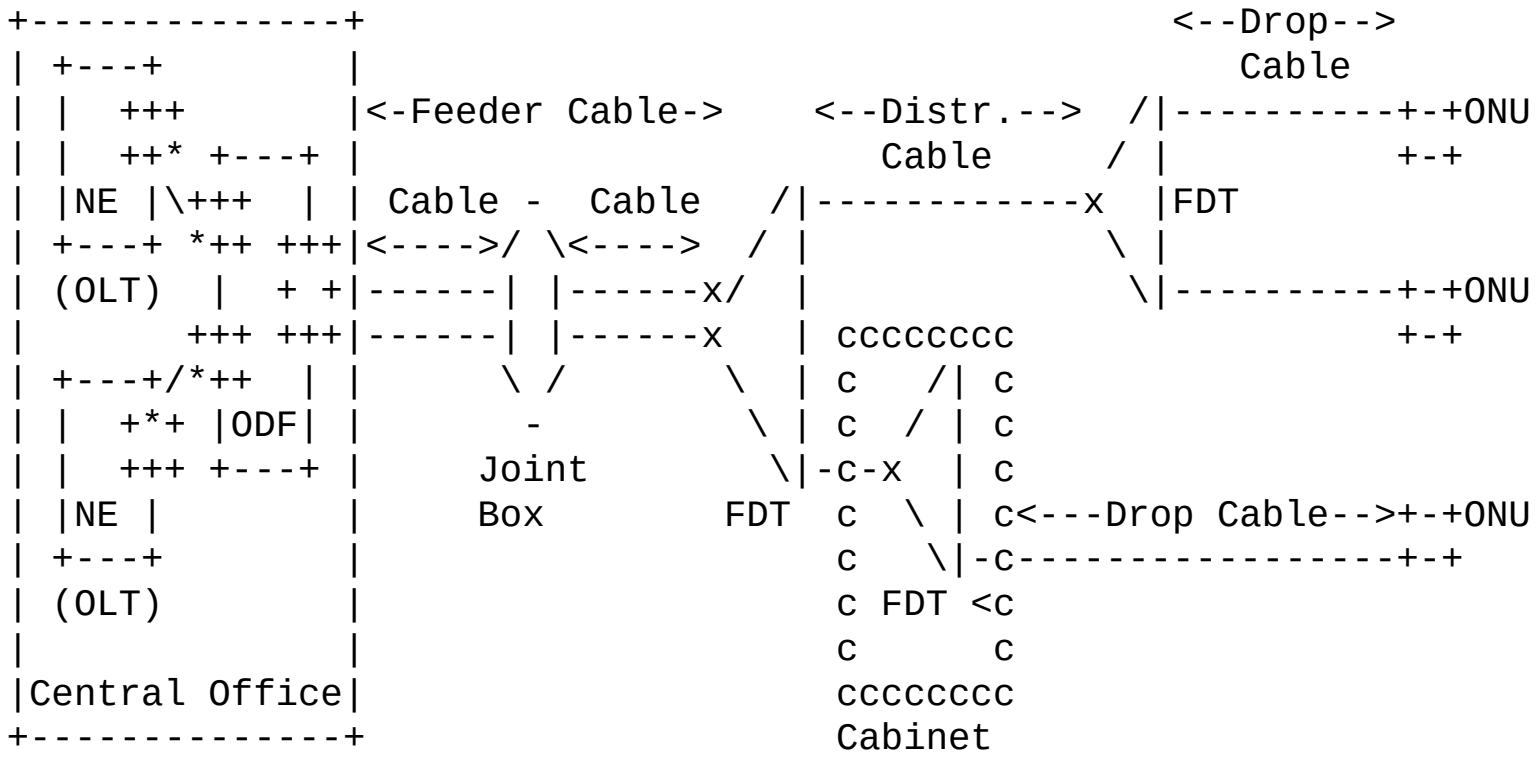
- Electrical Cable: a type of guiding media that uses metal conductors (such as copper or aluminum wires) as a medium to carry electrical signals for communication or power distribution.

- Guiding media can be concatenated to form longer guiding media
  - E.g. a cable can be formed by concatenating multiple child cables
  - Therefore we removed the definition of “cable segment”

Passive Infrastructure Example – Optical Transport



Passive Infrastructure Example – Optical Access



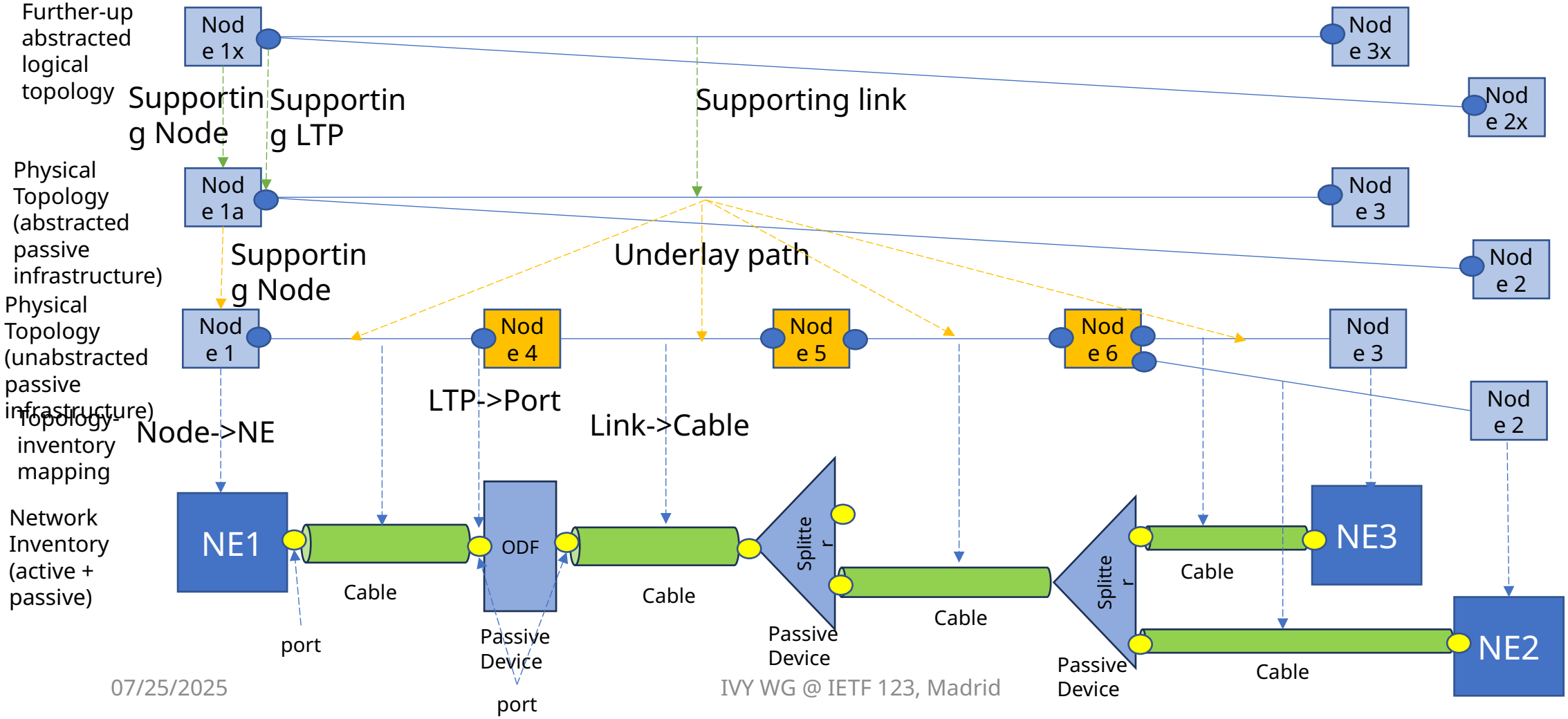
YANG Model Updates

```
augment /nwi:network-inventory:
   +--rw cable* [id]
   |  +--rw id                string
   |  +--rw length?           uint32
   |  +--rw a-end
   |  |  +--rw device-type?           identityref
   |  |  +--rw (connected-device-type)?
   |  |     +--:(passive)
   |  |     |  +--rw device-id?       string
   |  |     +--:(active)
   |  |        +--rw ne-ref?          leafref
   |  |        +--rw component-ref?   leafref
   |  +--rw z-end
   |  |  +--rw device-type?           identityref
   |  |  +--rw (connected-device-type)?
   |  |     +--:(passive)
   |  |     |  +--rw device-id?       string
   |  |     +--:(active)
   |  |        +--rw ne-ref?          leafref
   |  |        +--rw component-ref?   leafref
   |  +--ro uuid?             yang:uuid
   |  +--rw name?             string
   |  +--rw description?      string
   |  +--rw alias?            string
   |  +--rw cable-type?       identityref
   |  +--rw cable-role?       Identityref
   |
   |
   |  +--rw optical-cable
   |  |  +--rw fiber-core-num?   uint32
   |  |  +--rw fiber-type?       identityref
   |  |  +--rw attenuation?      decimal64
   |  +--rw child-cable* [index]
   |     +--rw index     uint8
   |     +--rw id?       string
   |     +--rw length?   uint32
   |     +--rw a-end
   |     |  +--rw device-type?           identityref
   |     |  +--rw (connected-device-type)?
   |     |     +--:(passive)
   |     |     |  +--rw device-id?       string
   |     |     +--:(active)
   |     |        +--rw ne-ref?          leafref
   |     |        +--rw component-ref?   leafref
   |     +--rw z-end
   |        +--rw device-type?           identityref
   |        +--rw (connected-device-type)?
   |           +--:(passive)
   |           |  +--rw device-id?       string
   |           +--:(active)
   |              +--rw ne-ref?          leafref
   |              +--rw component-ref?   Leafref
   |
   |
   +--rw passive-device* [id]
      +--rw id               string
      +--ro uuid?            yang:uuid
      +--rw name?            string
      +--rw description?     string
      +--rw alias?           string
      +--rw device-type?     identityref
      +--rw custom-tags*     string
      +--rw location-ref?    nil:ni-location-ref
      +--rw passive-port* [id]
         +--rw id                string
         +--ro uuid?             yang:uuid
         +--rw name?             string
         +--rw description?      string
         +--rw alias?            string
         +--rw port-type?        identityref
         +--rw fiber-core-num?   uint32
```

Considerations on Topology & Inventory Modeling for Passive Infrastructure

- There were comments regarding whether passive inventory can be modeled with topology (RFC8345-based) as in SIMAP
- It was already agreed to model network inventory and topology separately
  - Flexible mapping between the topology and inventory objects can be achieved by using the method defined in draft-ietf-ivy-network-inventory-topology
- Consistently, the same approach can be applied to passive inventory
  - Passive inventory hosting the information about the passive infrastructure
  - Single or multiple layers of physical topologies can be built and mapped to the passive inventory, depending on the level of abstraction
  - Preferences by some operators

Example Mapping

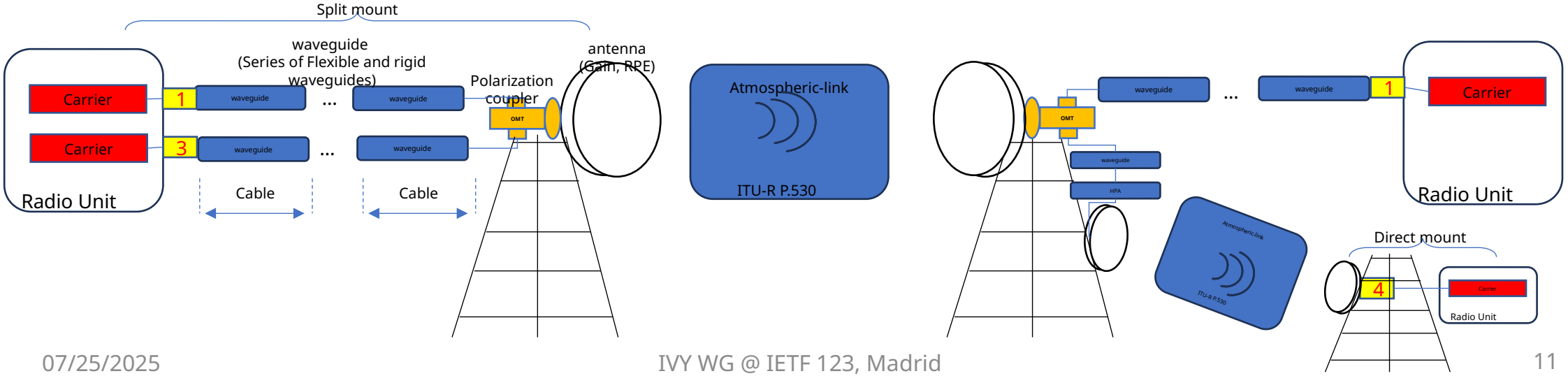


Open Issues & Discussion (1)

- Passive device modeling methodology (#6)
  - Option 1: modeled as a type of Network Element (NE)
    - Pro: unified inventory management by reusing the definition of NE and its list of components which can be generic
    - Con: NE typically associated with management capabilities while passive devices are not; different lifecycle between passive devices and NE
  - Option 2: modeled as a new inventory object (as-is)
    - Pro: optional for passive inventory, separate inventory repository and life-cycle management
    - Con: non-unified modeling of passive and active network inventory; only reuse the groupings for common parameter definitions
- Further discussion needed to determine which option to use

Open Issues & Discussion (2)

- Microwave inventory was not included in Rev-02 (#2)
  - More discussion is needed with MW experts to determine what are considered as passive inventory for MW networks, and the usage of inventory for MW use cases
- See the discussion thread from MW DT
  - https://github.com/samans/draft-ybam-rfc8561bis/blob/main/minutes/2025-07-03.md



Other Open Issues & Discussion (3)

- Shorten the co-author list (#19)
- Define properties of passive devices / ports (#13, #12, etc.)
  - Technology-specific augmentation vs. all-in-one model
- Modeling of passive components not already functionally presented in (active) NEs
  - E.g. cables connecting the components within an NE (#5)

Next Steps

- Addressing open issues
- Solicit reviews and comments from the WG
- WG adoption call?
  - Draft is relatively in good shape
  - Good interest with substantial support
  - Also interest from external organizations (e.g. BBF) to reuse the model

Meeting Logistics

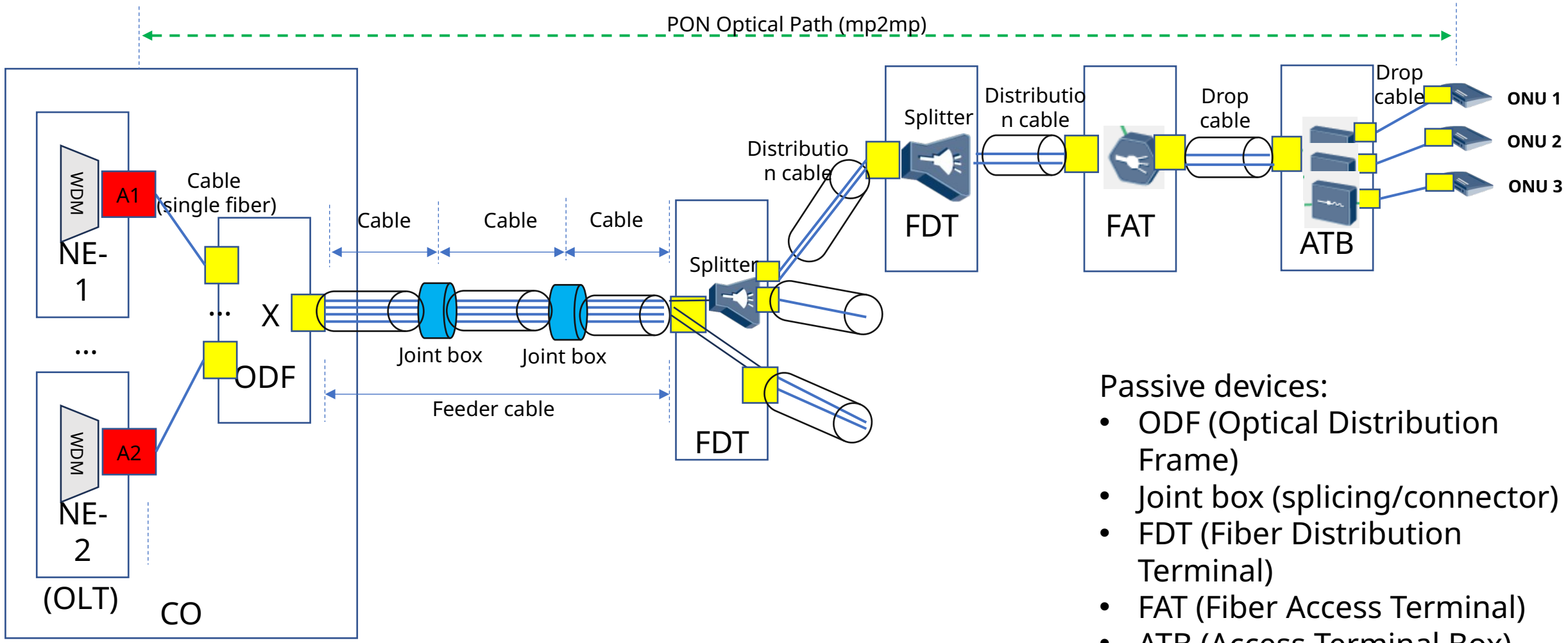
- GitHub Repo: https://github.com/aguoietf/draft-ygb-ivy-passive-network-inventory

- We meet weekly on Monday, 16:00pm – 17:00pm CET
  - For meeting invitation please request through aihuaguo.ietf@gmail.com
  - Webex by the WG?

Thank You!

Backup Slides

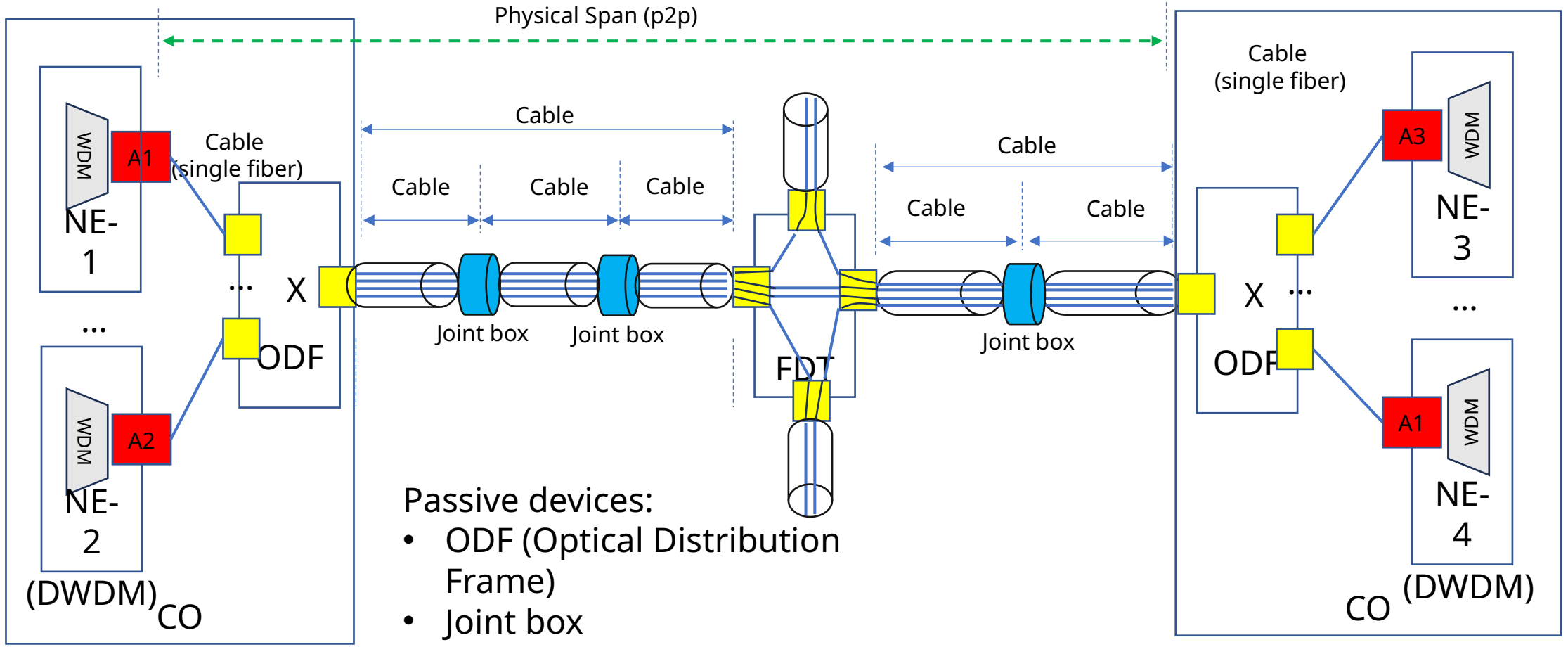
Passive Infrastructure - Access



Passive devices:

- ODF (Optical Distribution Frame)
- Joint box (splicing/connector)
- FDT (Fiber Distribution Terminal)
- FAT (Fiber Access Terminal)
- ATB (Access Terminal Box)
- Cable/cable segments

Passive Infrastructure – OTN/DWDM



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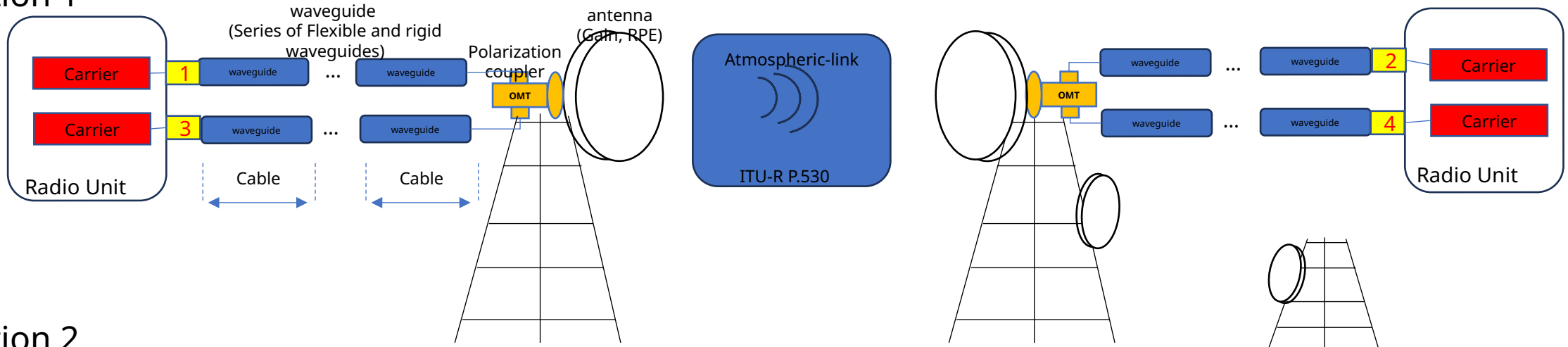
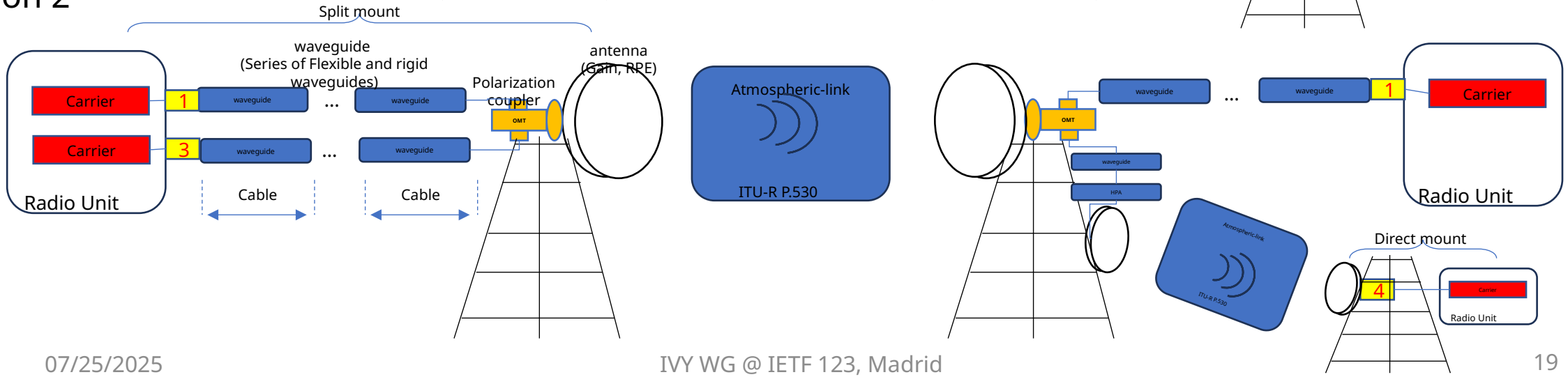
- ODF (Optical Distribution Frame)
- Joint box (splicing/connector)
- FDT (Fiber Distribution Terminal)

Passive Infrastructure – Microwave (To be further discussed)

Option 1



Option 2