

A YANG DATA MODEL FOR MICROWAVE TOPOLOGY

draft-ietf-ccamp-mw-topo-yang-02

<https://datatracker.ietf.org/doc/html/draft-ietf-ccamp-mw-topo-yang-02>

<https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-mw-topo-yang>

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STATUS

- Main changes compared to that previous version
 - Modeling of both radio-links and carriers as separate link entities
 - Introduction of two additional modules, possibly also usable/applicable for other technologies
 - ietf-bandwidth-availability-topology
 - ietf-tp-interface-reference-topology
 - A recommendation to leverage "YANG Data Model for Traffic Engineering (TE) Topologies" for a microwave topology – A microwave profile
 - Addition of an example of a simple microwave link with representation of carriers as a separate links

NEW GENERIC MODULES

ietf-bandwidth-availability-topology

- Bandwidth availability for links with variable/adaptive link bandwidth
- Example use cases include:
 - Defining bandwidth availability matrix for a microwave link
 - Defining bandwidth availability matrix for a LAG link comprising of two or more member links

```
module: ietf-bandwidth-availability-topology

  augment /nw:networks/nw:network/nt:link/tet:te/
    tet:te-link-attributes:
      +--rw link-availability* [availability]
      |   +--rw availability          decimal64
      |   +--rw link-bandwidth?      uint64
      +--ro actual-bandwidth?       yang:gauge64
```

ietf-tp-interface-reference-topology

- Defining a reference from a termination point in a te topology to a list element in interfaces as defined in RFC 8343

```
module: ietf-tp-interface-reference-topology

  augment /nw:networks/nw:network/nw:node/
    nt:termination-point/tet:te:
      +--rw tp-to-interface-path?
      -> /if:interfaces/if:interface/if:name
```

APPLICATION OF TE-TOPOLOGY

- Based on the recommendation from IETF – TEAS to use te-topology as a basis for technology specific extensions
- Complexity was an initial issue
- RFC 8795 (te-topology) was designed to be technology agnostic and support augmentation
- Augmentations created
 - mw-topology (te-topology)
 - mw-tp-choice (termination-point)
 - mw-link-choice (te-link-attributes)

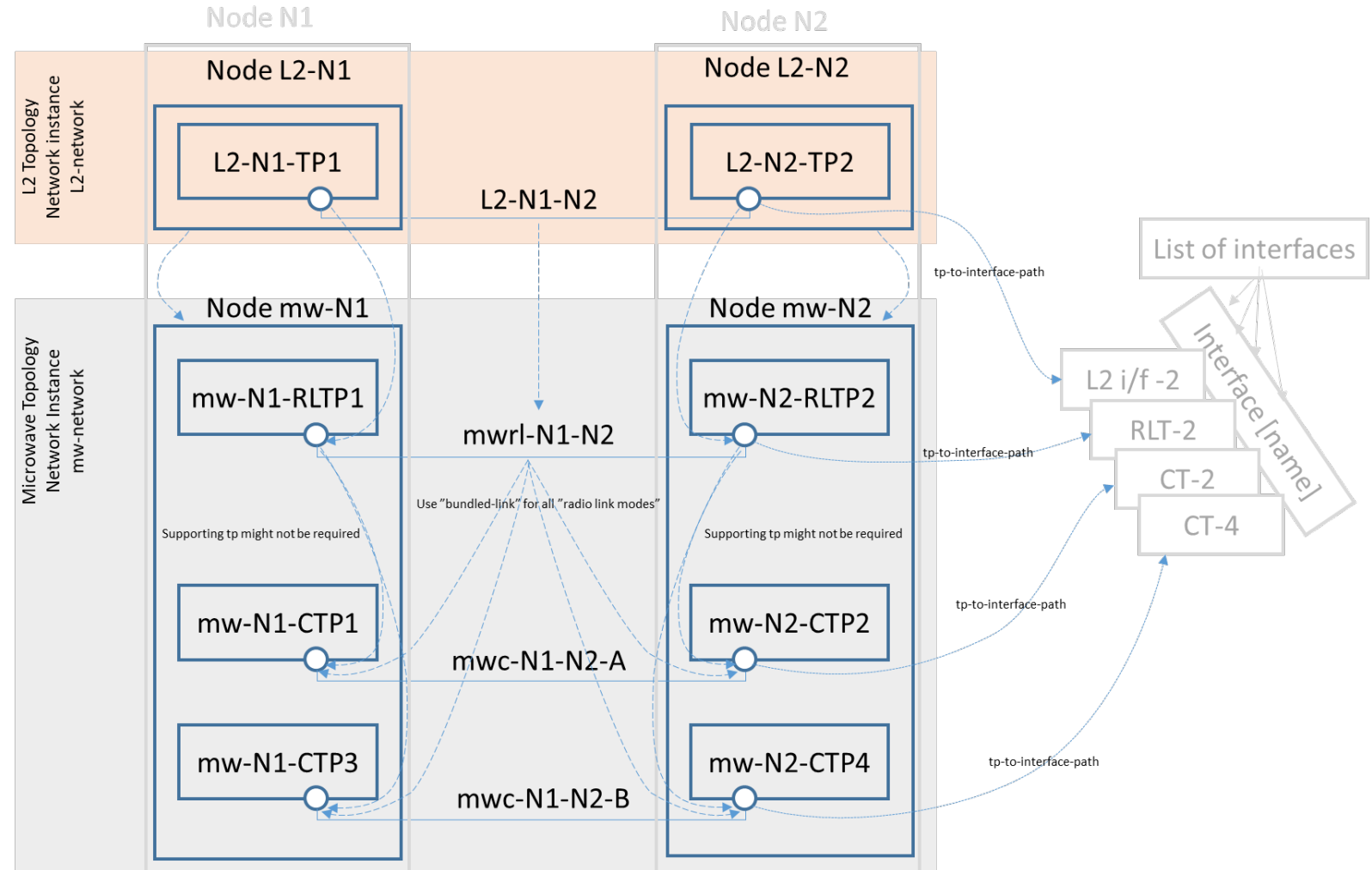
```
module: ietf-network
  +--rw networks
  | +--rw network* [network-id]
  | | +--rw network-id          network-id
  | | +--rw network-types
  | | | +--rw tet:te-topology!
  | | | | +--rw mwtopo:mw-topology!
  | | | +--rw supporting-network* [network-ref]
  | | | | +--rw network-ref      -> /networks/network/network-id
  | | | +--rw node* [node-id]
  | | | | +--rw node-id          node-id
  | | | | +--rw supporting-node* [network-ref node-ref]
  | | | | | +--rw network-ref
  | | | | | | -> ../../../../supporting-network/network-ref
  | | | | | +--rw node-ref      -> /networks/network/node/node-id
  | | | | +--rw nt:termination-point* [tp-id]
  | | | | | +--rw nt:tp-id
  | | | | | | +--rw nt:supporting-termination-point*
  | | | | | | | [network-ref node-ref tp-ref]
  | | | | | | | +--rw nt:network-ref
  | | | | | | | | -> ../../../../nw:supporting-node/network-ref
  | | | | | | | +--rw nt:node-ref
  | | | | | | | | -> ../../../../nw:supporting-node/node-ref
  | | | | | | | +--rw nt:tp-ref
  | | | | | | | | -> /nw/networks/network[nw:network-id=current()]
  | | | | | | | | | | ../../network-ref/node[nw:node-id=current()]
  | | | | | | | | | | ../../node-ref/termination-point/tp-id
  | | | | +--rw tet:te!
  | | | | | +--rw tet:name?      string
  | | | | | +--ro tet:geolocation
  | | | | | | +--ro tet:altitude?  int64
  | | | | | | +--ro tet:latitude?  geographic-coordinate-degree
  | | | | | | +--ro tet:longitude? geographic-coordinate-degree
  | | | | | +--rw ifref:tp-to-interface-path?
  | | | | | | -> /if:interfaces/if:interface/if:name
  | | | | | +--rw mwtopo:mw-tp-choice
  | | | | | | +--rw (mwtopo:mw-tp-option)?
  | | | | | | | +--:(mwtopo:microwave-rltp)
  | | | | | | | | +--rw mwtopo:microwave-rltp!
  | | | | | | | | +--:(mwtopo:microwave-ctp)
  | | | | | | | | +--rw mwtopo:microwave-ctp!
  | | | +--rw nt:link* [link-id]
  | | | | +--rw nt:link-id          link-id
  | | | | +--rw nt:source
  | | | | | +--rw nt:source-node?  -> ../../../../nw/node/node-id
  | | | | | +--rw nt:source-tp?
  | | | | | | -> ../../../../nw/node[nw:node-id=current()]
  | | | | | | | ../../source-node/termination-point/tp-id
```

```
+--rw nt:destination
| +--rw nt:dest-node?  -> ../../../../nw/node/node-id
| +--rw nt:dest-tp?
| | -> ../../../../nw/node[nw:node-id=current()]
| | | ../../dest-node/termination-point/tp-id
+--rw tet:te!
| +--rw (tet:bundle-stack-level)?
| | +--:(tet:bundle)
| | | +--rw tet:bundled-links
| | | | +--rw tet:bundled-link* [sequence]
| | | | | +--rw tet:sequence      uint32
| | | | | +--rw tet:src-tp-ref?   -> ../../../../nw:node[nw:node-id=current()]
| | | | | | ../../nt:source/source-node/
| | | | | | | termination-point/tp-id
| | | | | +--rw tet:des-tp-ref?  -> ../../../../nw:node[nw:node-id=current()]
| | | | | | | ../../nt:destination/dest-node/
| | | | | | | | termination-point/tp-id
+--rw tet:te-link-attributes
+--rw tet:name?      string
+--rw tet:admin-status? te-types:te-admin-status
+--rw tet:max-link-bandwidth
| +--rw tet:te-bandwidth
| | +--rw (tet:technology)?
| | | +--:(mwtopo:microwave)
| | | | +--ro mwtopo:mw-bandwidth? uint64
+--rw mwtopo:mw-link-choice
| +--rw (mwtopo:mw-link-option)?
| | +--:(mwtopo:microwave-radio-link)
| | | +--rw mwtopo:microwave-radio-link!
| | | | +--rw mwtopo:mode? identityref
| | | | +--:(mwtopo:microwave-carrier)
| | | | +--rw mwtopo:microwave-carrier!
| | | | | +--rw mwtopo:tx-frequency?  uint32
| | | | | +--rw mwtopo:rx-frequency?  uint32
| | | | | +--rw mwtopo:channel-separation? uint32
| | | | | +--ro actual-tx-cm?      identityref
| | | | | +--ro actual-snr?        decimal64
| | | | | +--ro actual-transmitted-level? power
+--rw bwatopo:link-availability* [availability]
| +--rw bwatopo:availability      decimal64
| +--rw bwatopo:link-bandwidth?  uint64
| +--ro bwatopo:actual-bandwidth? yang:gauge64
+--ro tet:oper-status?          te-types:te-oper-status
```

ADDITION OF EXAMPLE

A SIMPLE MICROWAVE LINK WITH REPRESENTATION OF CARRIERS AS A SEPARATE LINKS

- Diagram of the JSON example included in the internet-draft in section A.2



WAY FORWARD

- Moving over to the github for the continued discussion/evolution
 - <https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-mw-topo-yang>
- Creating Instance data to aid validation and semantic checking in the YANG model
 - Using yanglint (libyang)
- Considering including more data nodes in the next version
- More JSON examples
- Asking for feedback on all modules, especially the two new generic modules
- Work continues on conference calls that are announced on the ccamp mailing list