

# A NRP YANG Module

[draft-wd-teas-nrp-yang-00](#)

TEAS WG

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# NRP model intention

- NS framework 6.1. Architecture to Realize IETF Network Slices
  - In realization, the NSC can use NRPs to map the connectivity constructs of one or multiple NS.
  - To provide SLOs and SLEs for the specific connectivity constructs, an NRP needs to have specific topology and resources.
- NRP model is network configure data model, per RFC 8309 definition.
  - Depending the NS service, NRP instantiation can be pre-built or dynamic along with a NS service request.

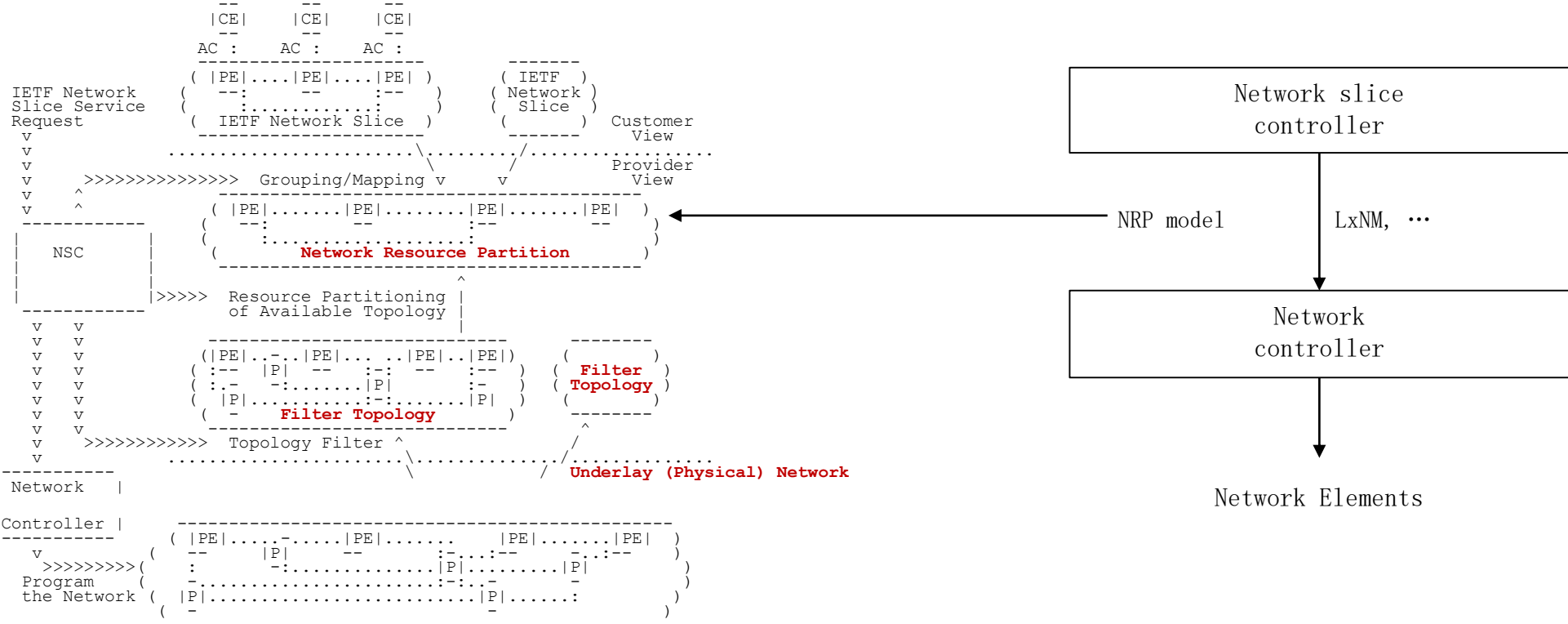
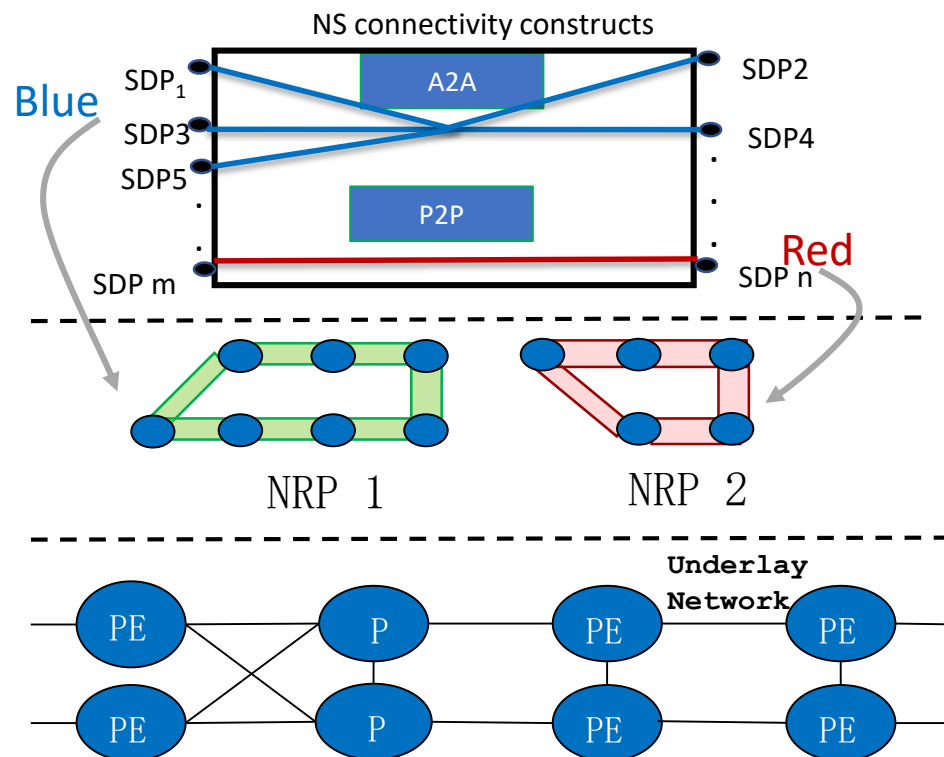


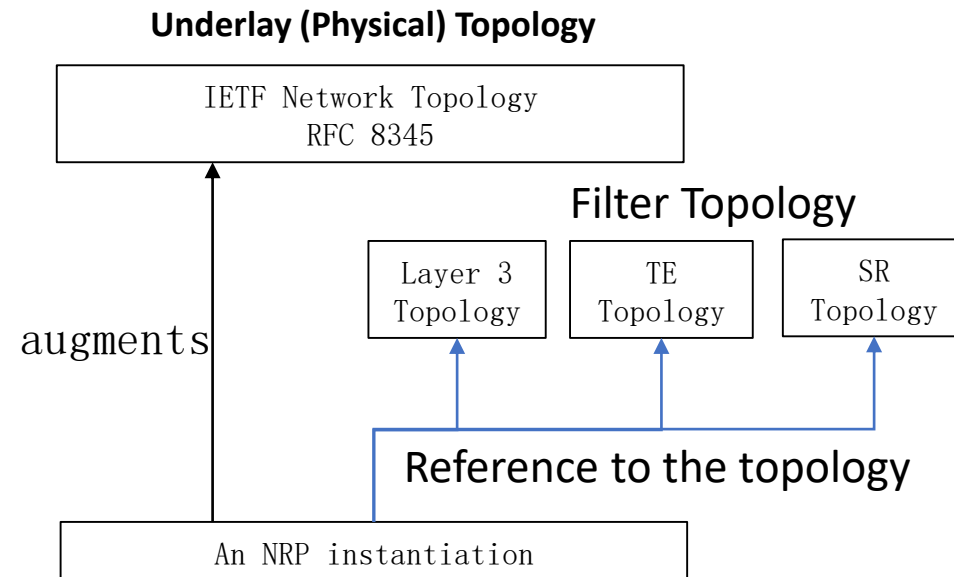
Figure 5: Architecture of an IETF Network Slice NS framework

# NRP topology modelling

- To support SLOs and SLEs of the connectivity constructs, the nodes and links providing the resources need to be identified
- Based on NS framework, an NRP topology can be derived from a filter topology or from the underlay physical topology.
- Therefore, to support various use cases, NRP modeling considers the following approaches:

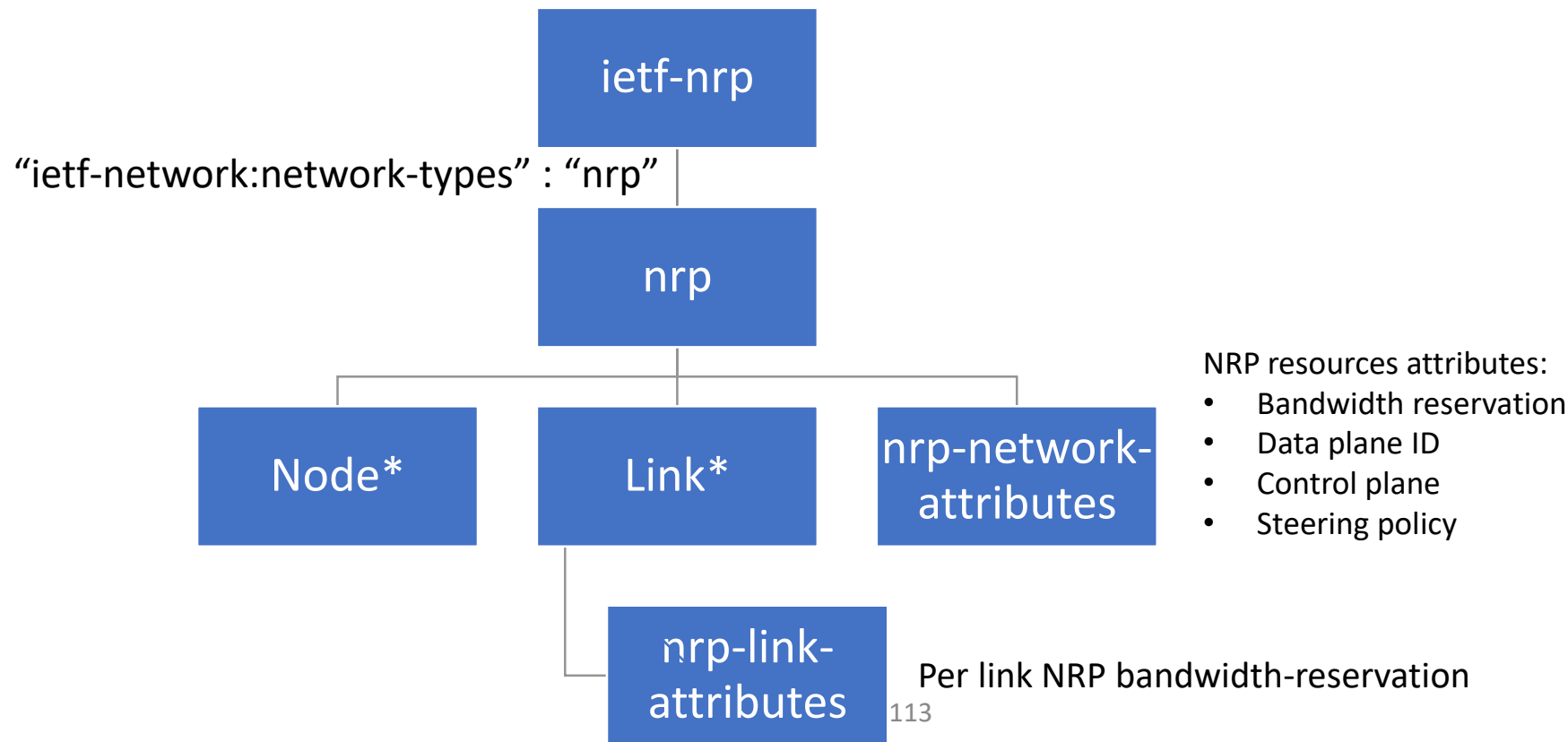


**Multiple NRPs can share same base Layer 3 topology, TE topology, etc.**



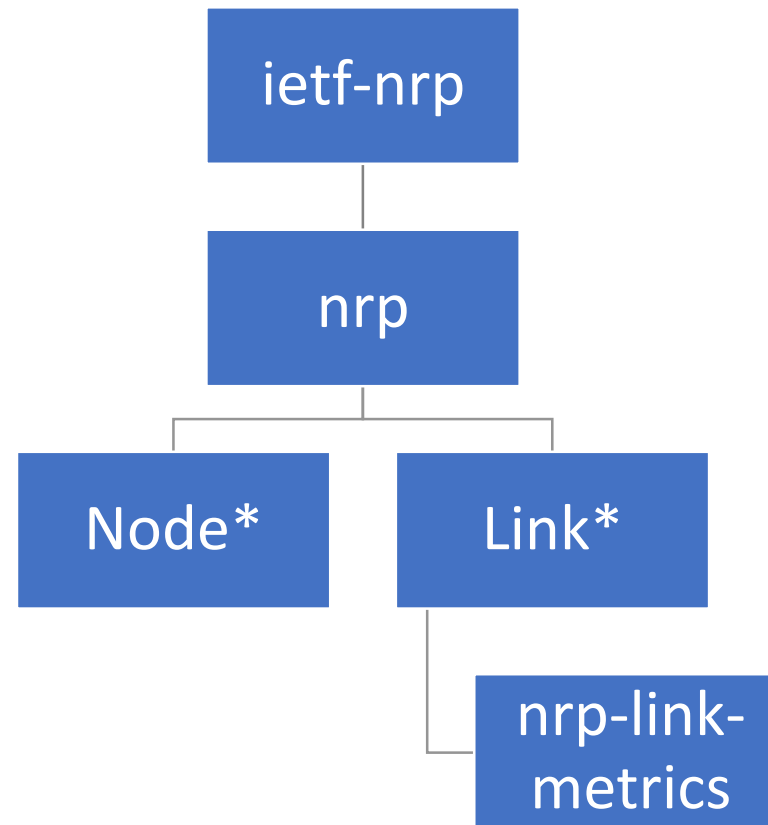
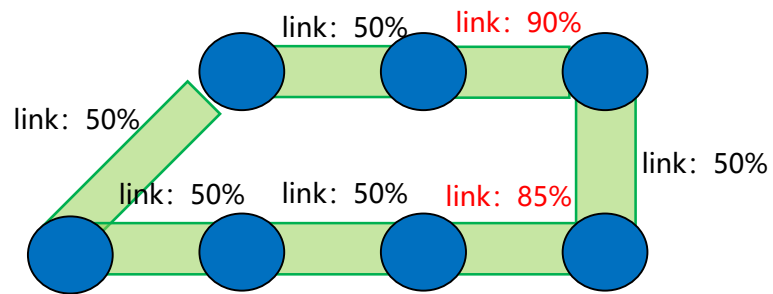
# NRP resource configuration modelling

- NRP Resources include:
  - Bandwidth reservation: network-wide and link-specific
  - NRP data plane ID: The data plane encapsulation and identifier used in data packets to map to the NRP
  - NRP control plane: The topology and SLO & SLE constraints used for route computation of the NRP



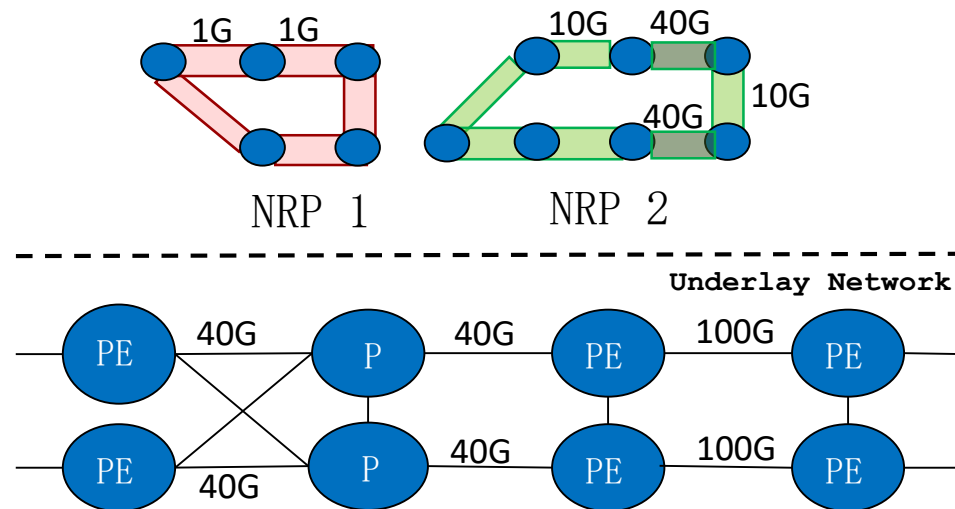
# NRP monitoring

- NRP link status
- NRP link resource usage
- NRP link PM metrics



# NRP modification

- Extended as network conditions change
  - E.g. bandwidth on specific links



# Next Step

- Solicit comments and reviews from WG

# Backup

```
module: ietf-nrp
augment /nw:networks/nw:network/nw:network-types:
  +--rw nrp!
augment /nw:networks/nw:network:
  +--rw nrp
    +--rw nrp-id?          uint32
    +--rw nrp-name?       string
    +--rw bandwidth-reservation
      | +--rw (bandwidth-type)?
      |   +--:(bandwidth-value)
      |   | +--rw bandwidth-value?    uint64
      |   +--:(bandwidth-percentage)
      |     +--rw bandwidth-percent?  rt-types:percentage
    +--rw control-plane
      | +--rw topology-ref
      |   +--rw igp-topology-ref
      |     | +--rw network-ref?
      |     | | -> /nw:networks/network/network-id
      |     | +--rw multi-topology-id? uint32
      |     | +--rw flex-algo-id?      uint32
      |     +--rw te-topology-identifier
      |       +--rw provider-id?    te-global-id
      |       +--rw client-id?      te-global-id
      |       +--rw topology-id?    te-topology-id
    +--rw data-plane
      | +--rw global-resource-identifier
      | | +--rw nrp-dataplane-ipv6-type
      | | | +--rw nrp-dp-value?    inet:ipv6-address
      | | +--rw nrp-dataplane-mpls-type
      | |   +--rw nrp-dp-value?    uint32
      | +--rw nrp-aware-dp
      |   +--rw nrp-aware-srv6-type!
      |   +--rw nrp-aware-sr-mpls-type!
    +--rw steering-policy
      +--rw color-id*    uint32
      +--rw acl-ref*    -> /acl:acls/acl/name
```

```
augment /nw:networks/nw:network/nw:node:
  +--rw nrp
    +--rw nrp-aware-srv6
      | +--rw nrp-dp-value?    srv6-types:srv6-sid
    +--rw nrp-aware-sr-mpls
      +--rw nrp-dp-value?    rt-types:mpls-label

augment /nw:networks/nw:network/nt:link:
  +--rw nrp
    | +--rw link-partition-type?    identityref
    | +--rw bandwidth-reservation
    | | +--rw (bandwidth-type)?
    | | | +--:(bandwidth-value)
    | | | | +--rw bandwidth-value?    uint64
    | | | +--:(bandwidth-percentage)
    | | |   +--rw bandwidth-percent?  rt-types:percentage
    | +--rw nrp-aware-srv6
    | | +--rw nrp-dp-value?    srv6-types:srv6-sid
    | +--rw nrp-aware-sr-mpls
    |   +--rw nrp-dp-value?    rt-types:mpls-label
  +--ro statistics
    +--ro admin-status?          te-types:te-admin-status
    +--ro oper-status?          te-types:te-oper-status
    +--ro one-way-available-bandwidth?
      | rt-types:bandwidth-ieee-float32
    +--ro one-way-utilized-bandwidth?
      | rt-types:bandwidth-ieee-float32
    +--ro one-way-min-delay?      uint32
    +--ro one-way-max-delay?      uint32
    +--ro one-way-delay-variation? uint32
    +--ro one-way-packet-loss?    decimal64
```