DetNet

Discussions

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DetNet WG

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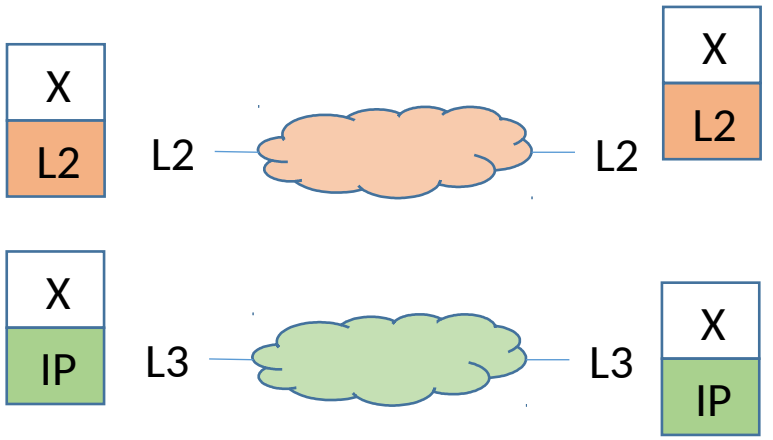
DetNet Service
Networking characteristics

- Service types
  - L2/TSN
  - IP



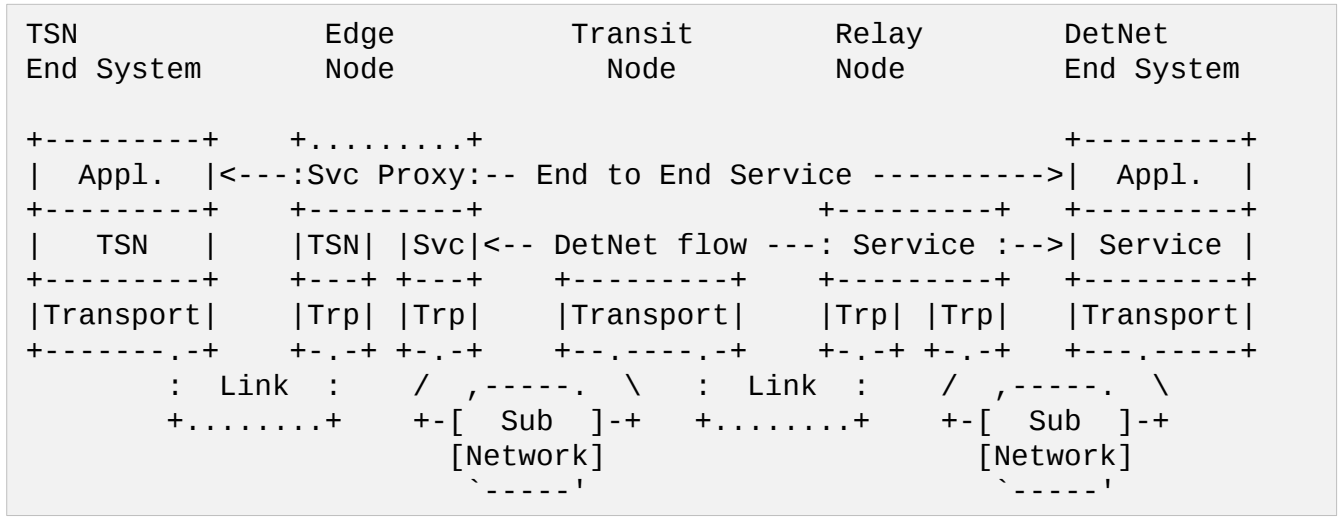
- DetNet Encapsulation:
  - MPLS
  - IP

DetNet functions & nodes
(as per draft-ietf-detnet-architecture)

- DetNet functions
  1. Congestion protection (Queuing) need: flow identification
  2. Explicit routes (TE) need: flow identification
  3. Service protection (PREF, IOD) need: flow id + sequence number

  Note: These three techniques can be applied independently …

  Note: Svc Proxy = DN-Inter-Working Function (DN-IWF)



- DetNet nodes
  - Edge node req.functions: 1, 2, 3
  - Relay node req.functions: 1, 2, 3
  - Transit node req.functions: 1, 2

Agenda

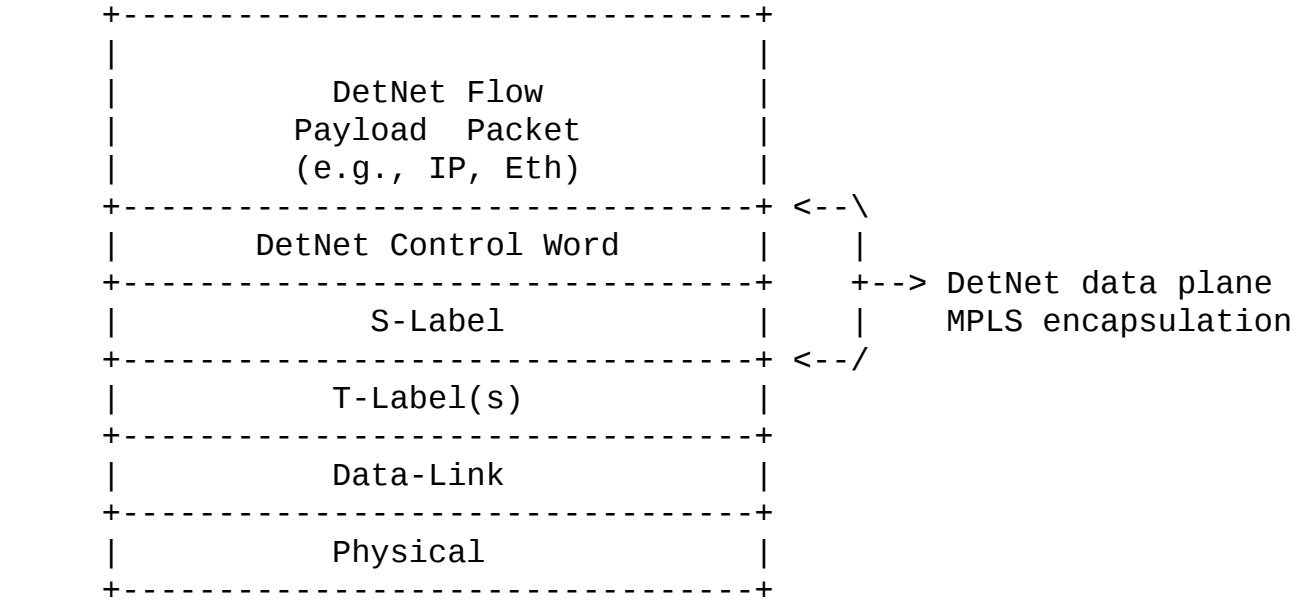
- MPLS DetNet
- IPv{4|6} DetNet
- Edge behaviors
- Other topics

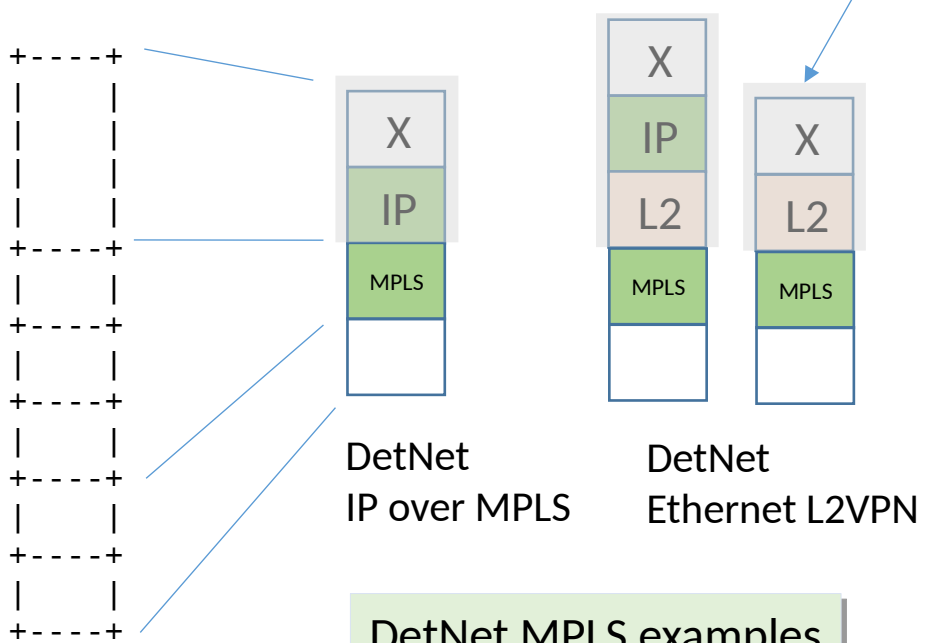
MPLS DetNet

MPLS encapsulation with PREF

MUST include d-CW (for PREF)

DetNet MPLS-based encapsulation





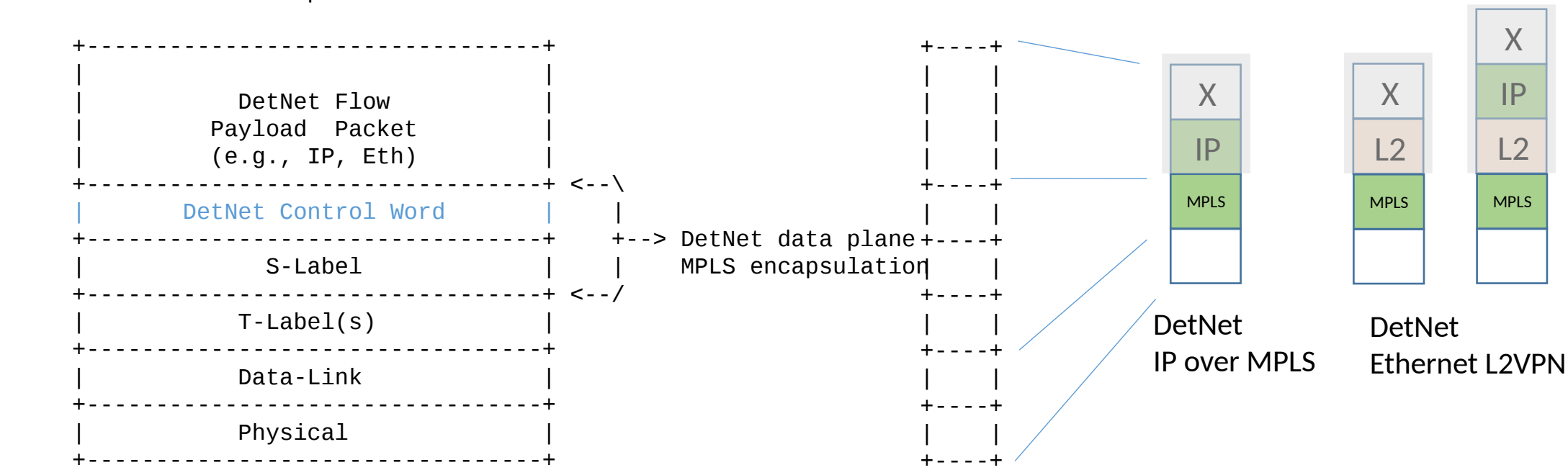
DetNet control word (d-CW) provides sequencing number for packet replication and duplicate elimination purposes.

DetNet S-Label that identifies a DetNet flow within a DetNet Edge or a Relay node.

MPLS encapsulation without PREF

Should we include d-CW (no PREF) ?

DetNet MPLS-based encapsulation



DetNet control word (d-CW) provides sequencing number for packet replication and duplicate elimination purposes.

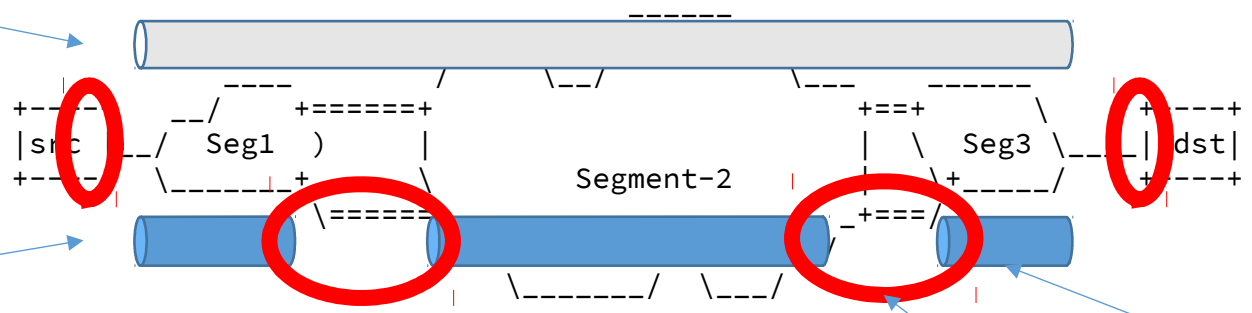
DetNet S-Label that identifies a DetNet flow within a DetNet Edge or a Relay node.

IPv{4|6} DetNet

DetNet IP

1. Simplified IP
   - Using appl. native encap. format, limited or no DetNet encap. headers
   - DetNet Encapsulation: unmodified IP stack
     - 6-tuple (5+DSCP) to identify flows (may include wildcards …)
     - No sequence number included

No end-to-end PREF

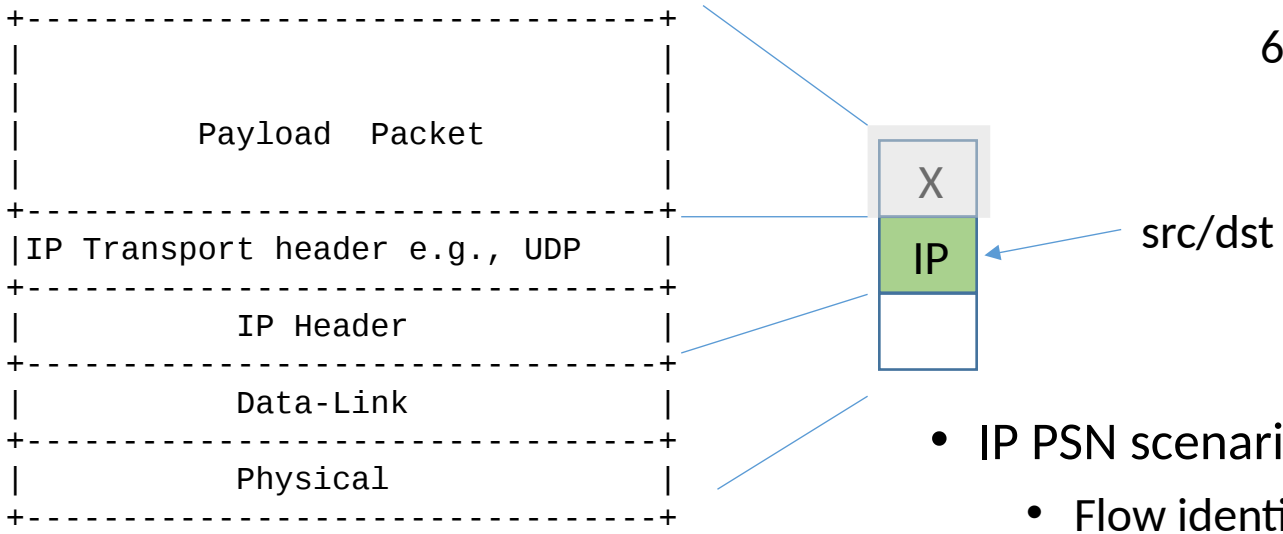


Simplified IP scenario

DetNet Functions Coverage

IP packet 6-tuple is matched and mapped to DetNet capable link/sub network

Simplified IP encapsulation



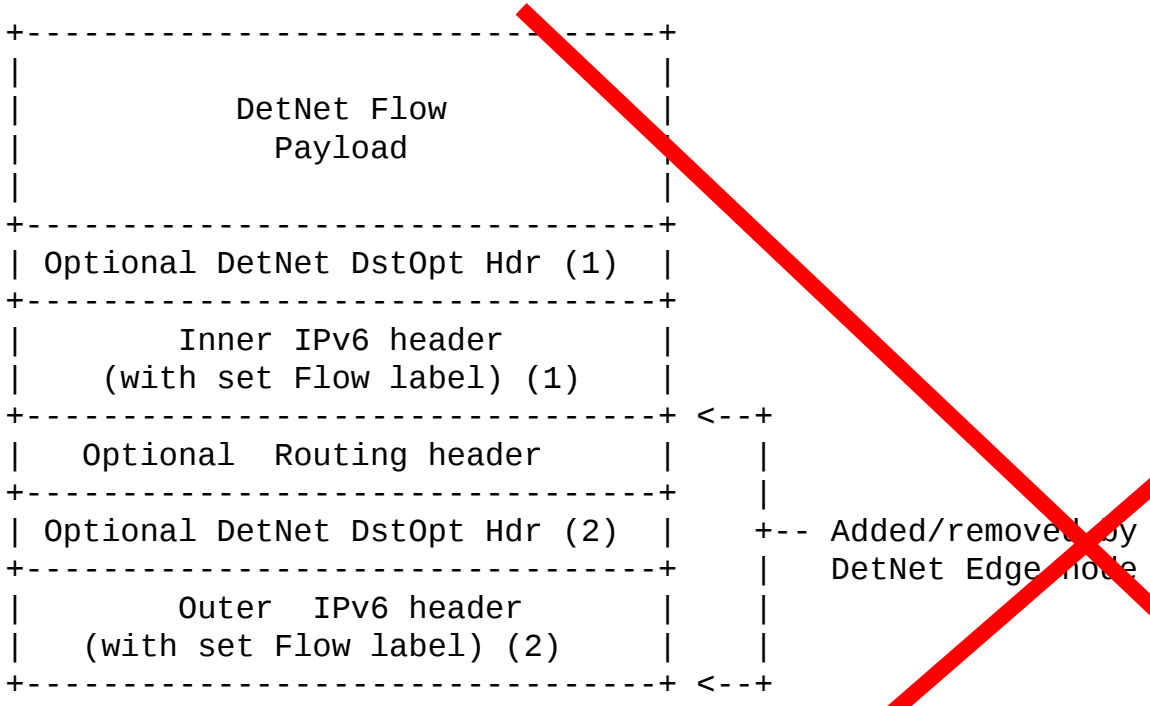
Encapsulation of a native IPvX (6-tuple)

6-tuple = {src-IP, dst-IP, Proto, src-Port, dst-Port, DSCP}
any field can be wildcarded/masked

- IP PSN scenario
  - Flow identification per hop
  - Standard router IP header processing (only TTL/Checksum modified)
- Implementing DetNet functions with simplified IP
  1. Congestion protection (Queuing) need: flow-identification
     - 6-tuple match based queue selection, latency control
  2. Explicit routes (TE) need: flow-id
     - Paralels Policy Based Routing on 6-tuple match
  3. Service protection (PREF, IOD) need: flow-id + Seq#

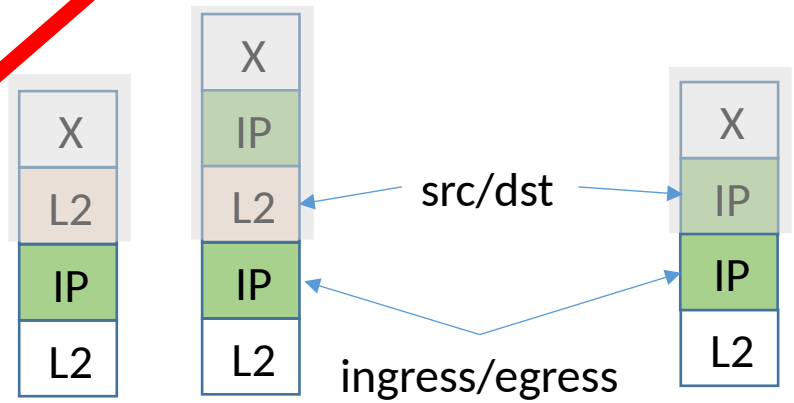
Native IP encapsulation

current draft text is out of date



Encapsulation of a DetNet-flow IPv6 packet at the DetNet Edge node

DetNet IP Examples



Edge Behaviors

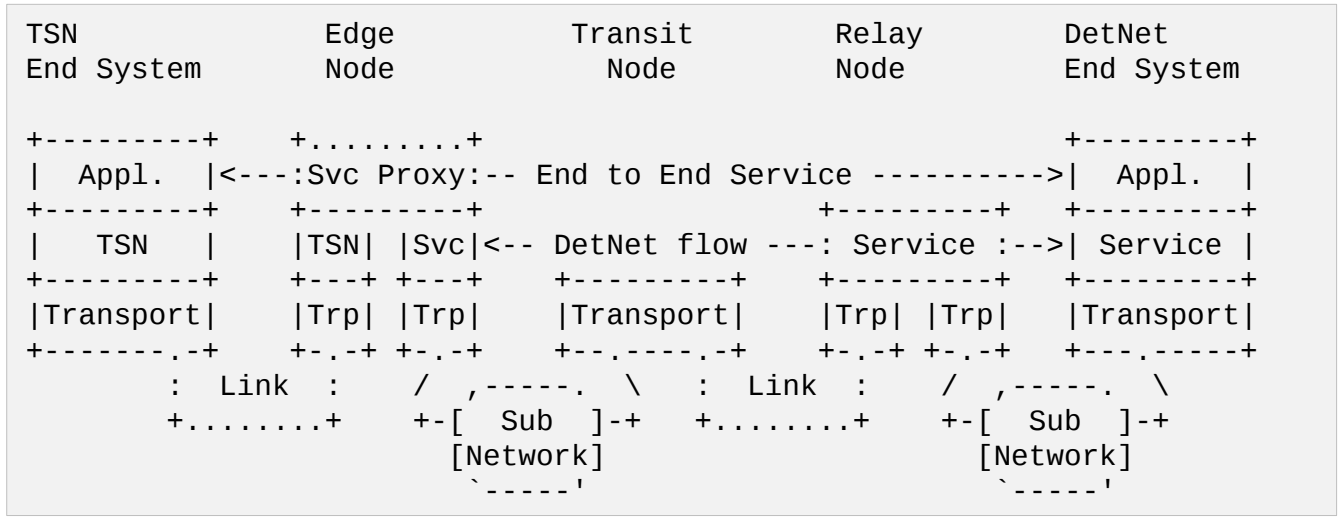
DetNet functions & nodes
(as per draft-ietf-detnet-architecture)

Scenarios
- L2VPN/TSN over MPLS
- IP over MPLS

- DetNet functions
  1. Congestion protection (Queuing) need: flow-ID
  2. Explicit routes (TE) need: flow-ID
  3. Service protection (PREF, IOD) need: flow-ID + Seq#

  Note: These three techniques can be applied independently …

Note: Svc Proxy = DN-Inter-Working Function (DN-IWF)



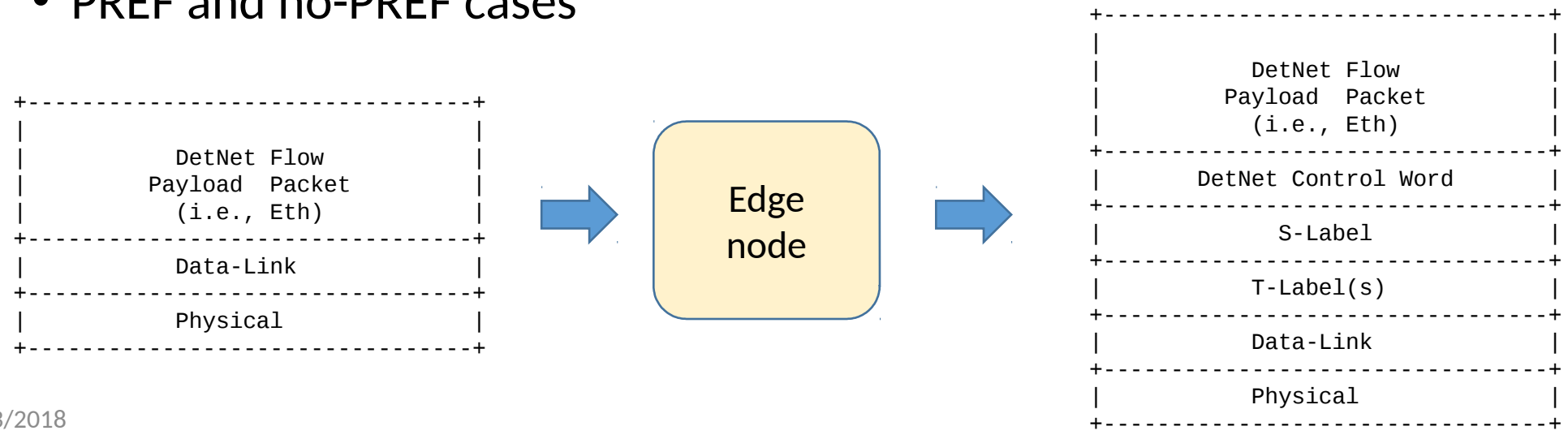
- DetNet nodes
  - Edge node req.functions: 1, 2, 3
  - Relay node req.functions: 1, 2, 3
  - Transit node req.functions: 1, 2

Edge node behaviors
Relationship to classic VPN capabilities

- End-systems may have both regular and DetNet traffic
- Usually there is a DN related “classic VPN” service
  - DetNet traffic and regular traffic use a common UNI
    - same Link or Subnet
  - DN flows are “directed” to/from DN-PW
    - Upstream:
      - select DN-PW, encapsulate and execute DN functions (e.g., PR)
    - Downstream:
      - Execute DN functions (e.g., EF) and remove DN-PW encap
      - send to AC/Subnet
        (AC: may need modify L2 header e.g., VLAN translation)
        (Subnet: may need interaction with node local functions, e.g., ARP)

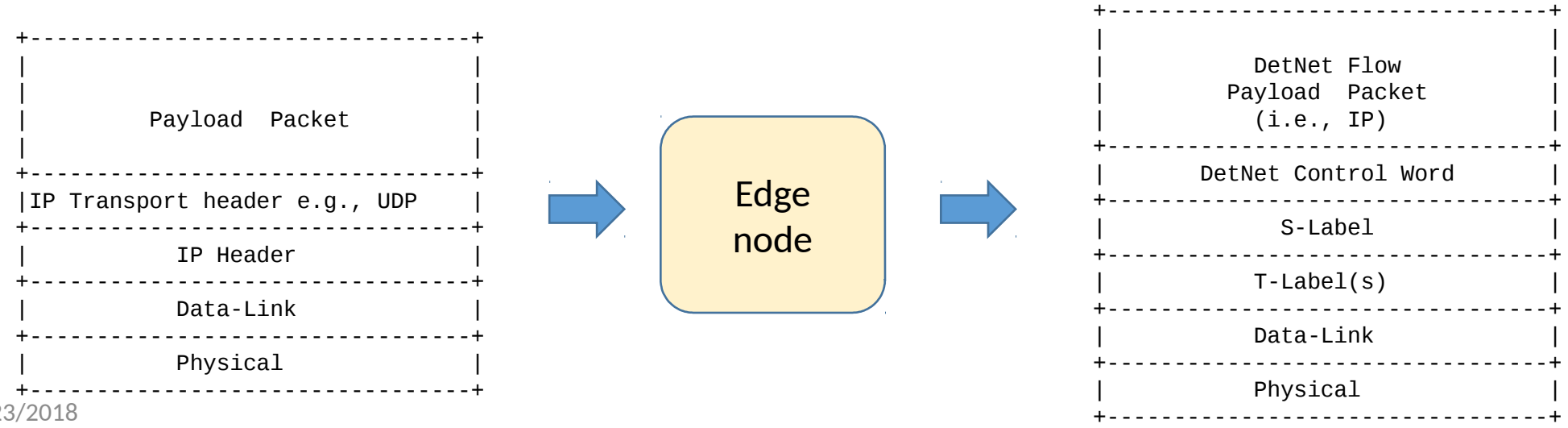
Discussion items
Eth/TSN over MPLS

- Definition of Eth/TSN over MPLS
  - Mapping of TSN and non-TSN flows to DetNet encap
    - Number of d-CWs?
    - Number of S-labels?
    - T-label per TSN flow or per aggregate: both allowed
  - PREF and no-PREF cases



Discussion items
IP over MPLS

- Definition of IP over MPLS
  - Mapping of IP flows to MPLS LSPs
    - IP over native MPLS or IP over L3VPN or both?
  - PREF and no-PREF cases
    - TSN/DetNet Inter-Working Function for further study



Other topics

Other topics
Each requires more work, please contribute (text or drafts)

- IP host: DetNet flow to TSN flow mapping
- Queuing
  - What is the depth we need to go here? Is pointing at other specifications and stating obvious factual requirements enough?
- Aggregates
  - There's existing text pointing at H-LSP and DSCP based aggregation approach directions.. Is this fine?
- OAM
  - Would this actually need a separate document/work?
- TSN host to DetNet host interconnection
- Transport protocol impact (Transport = TSV area)
  - Should not be in our scope at the moment

Thanks …

Backup

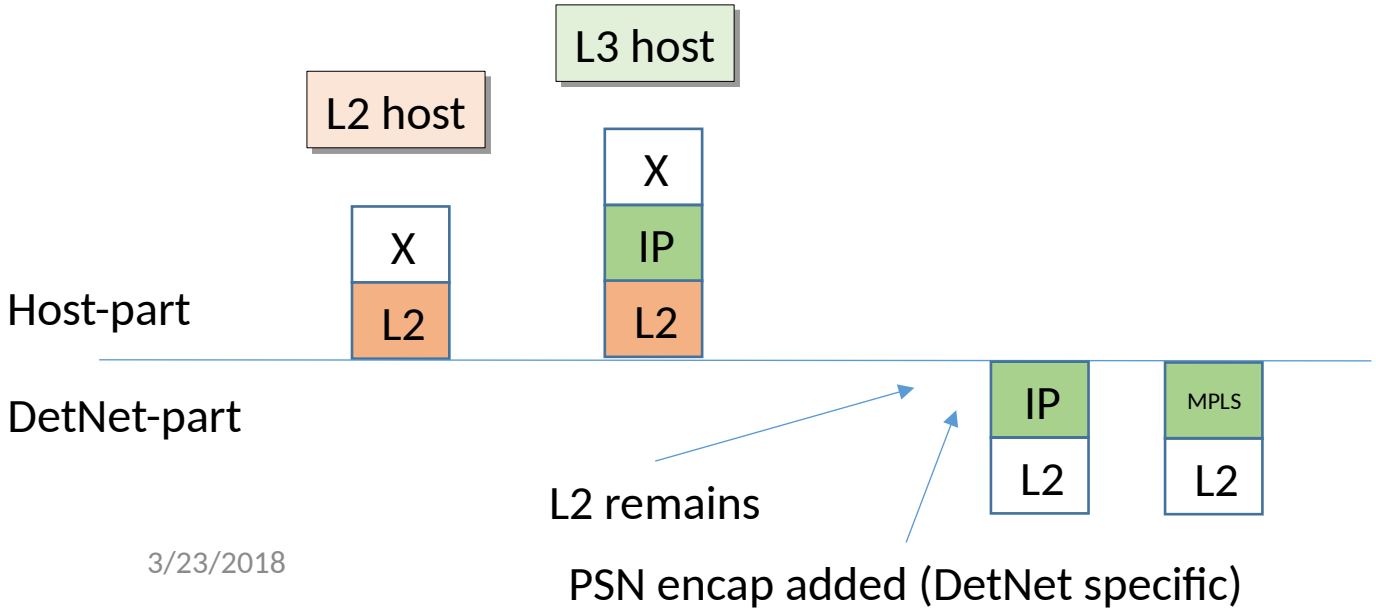
Service & Encapsulations

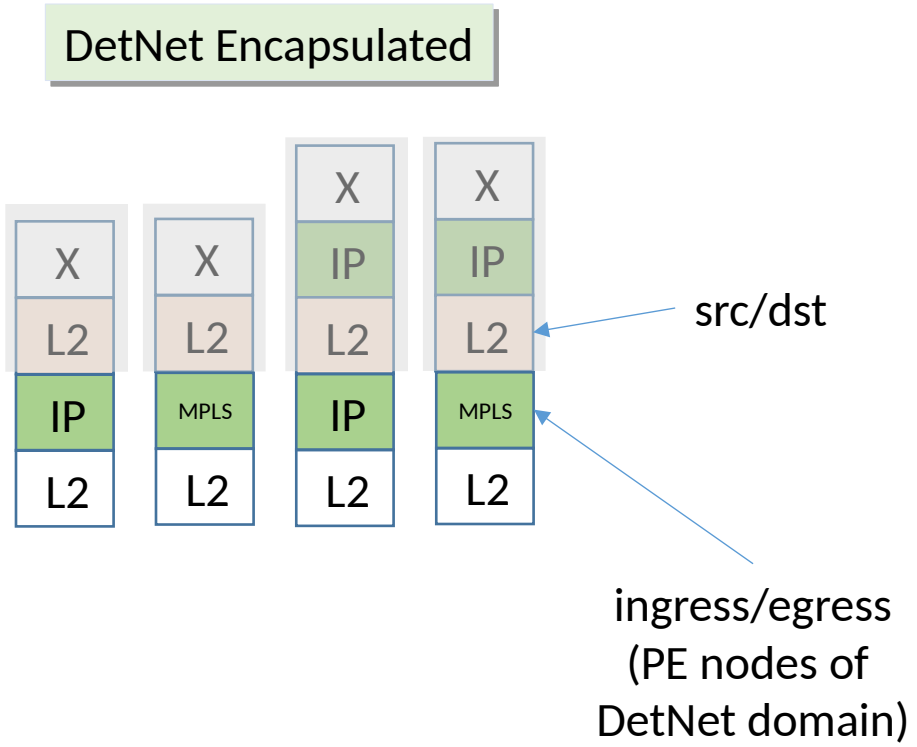
Option 1: PWE3

DetNet Service

Encapsulation within the DetNet domain – L2 service

- L2 service (tunneling for L2)
  - Hosts are in same BC domain
  - Forwarding based on L2 address (i.e. ”dst-L2”)
    - MUST keep L2 header during transport
  - Tunnel Encapsulation: add new IP/MPLS header



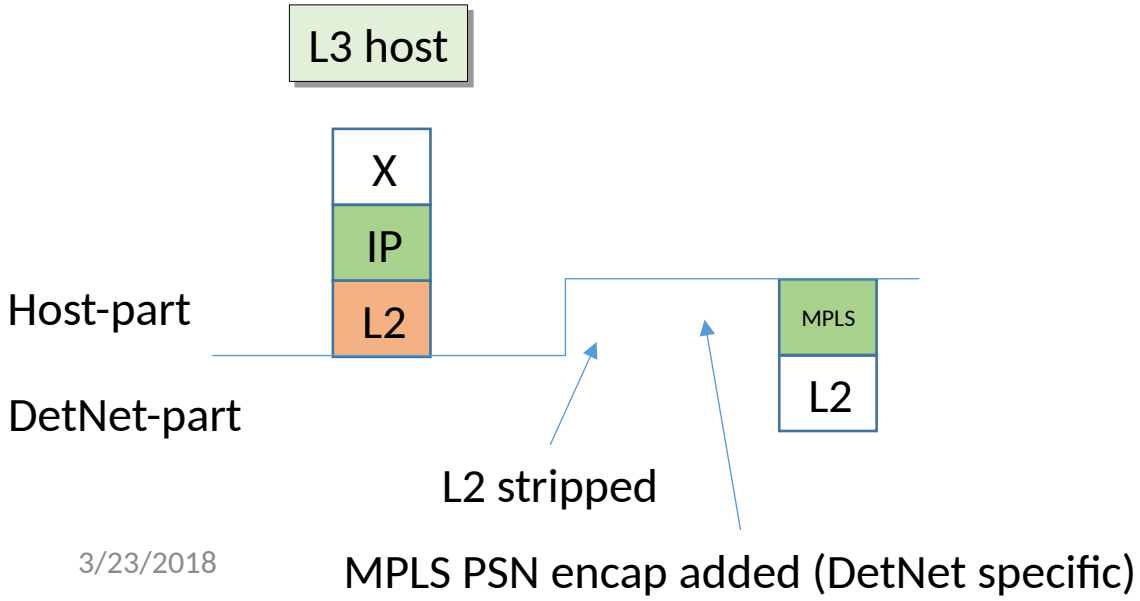


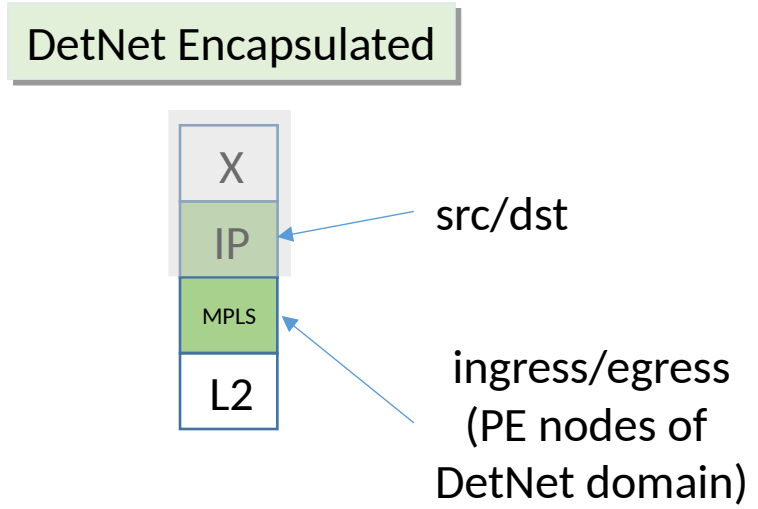
Option 1: PWE3

DetNet Service

Encapsulation within the DetNet domain – Routing service (MPLS)

- Routing service (adding an MPLS tunnel)
  - Hosts are in different BC domain
    - L3 hosts only
  - Forwarding based on L3 address (i.e. ”dst-L3”)
  - Tunnel Encapsulation: add new MPLS header



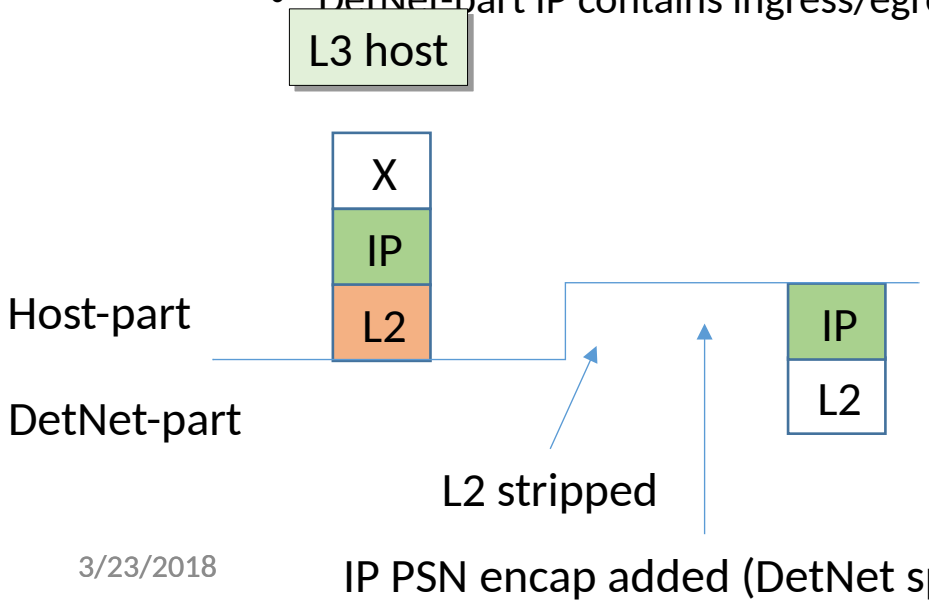


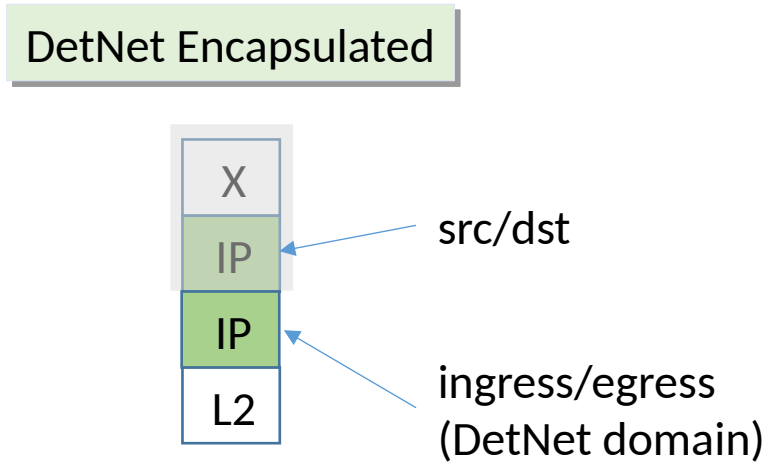
Option 1: PWE3

DetNet Service

Encapsulation within the DetNet domain – Routing service (IP PSN)

- Routing service
  - Hosts are in different BC domain
  - Forwarding based on L3 address (i.e. ”dst-L3”)
    - Host-part IP contains source/destination
  - Tunnel Encapsulation: add new IP header
    - DetNet-part IP contains ingress/egress





Option 2: Simplified IP

DetNet Service

Simplified IP – Routing service (IP PSN)

- Routing service
  - DetNet Encapsulation (simplified): IP header
    - 6-tuple (5+DSCP) to identify flows
    - No Seq# included
  - Impact on network design
    - DetNet functions provided per network segment
    - May require e.g., PBR