

DetNet

DetNet PW and OAM for the DetNet Service Sub-Layer

[draft-varga-detnet-service-sub-layer-oam](#)

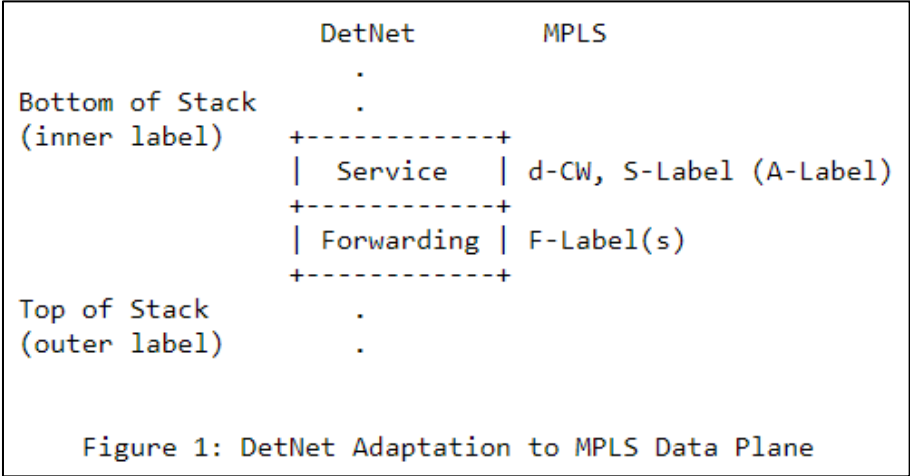
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PALS/MPLS/DetNet

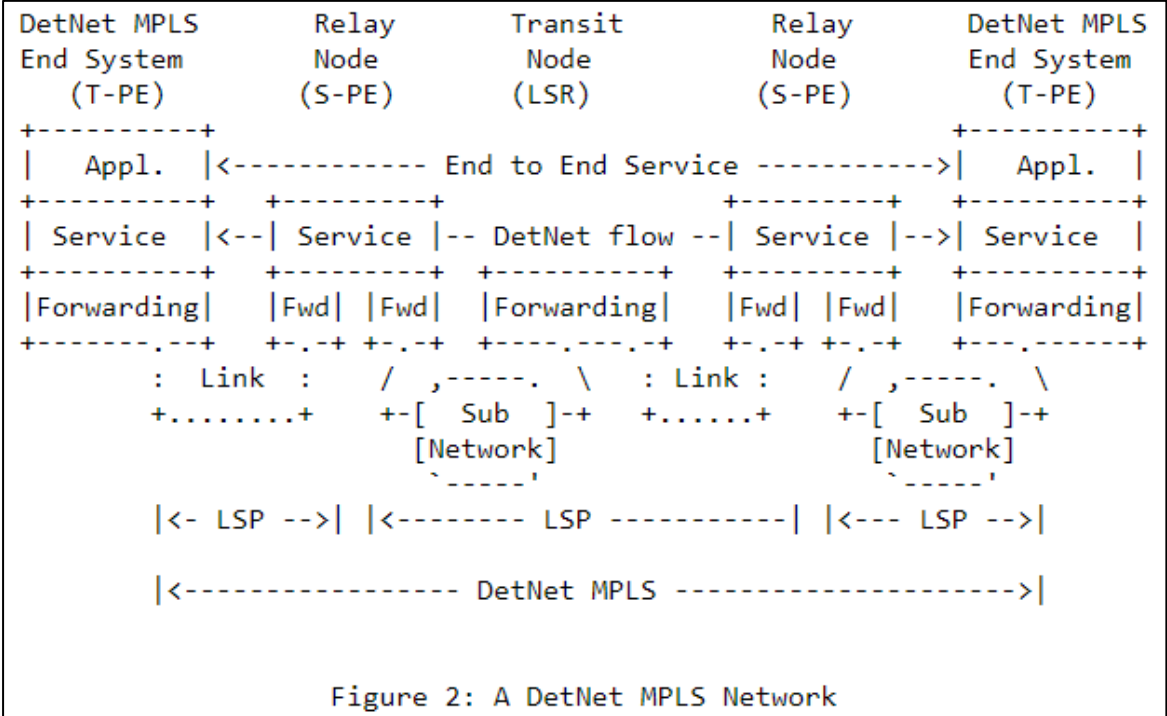
8th November, 2021, IETF 112 online

DetNet Data Plane: MPLS

- RFC 8964
 - specifies the Deterministic Networking data plane when operating over an MPLS Packet Switched Networks.



- DetNet MPLS Data Plane
 - DetNet service sub-layer
 - DetNet forwarding sub-layer
- DetNet MPLS Data Plane Procedures
 - Flow identification: Labels
 - Sequence number: d-CW

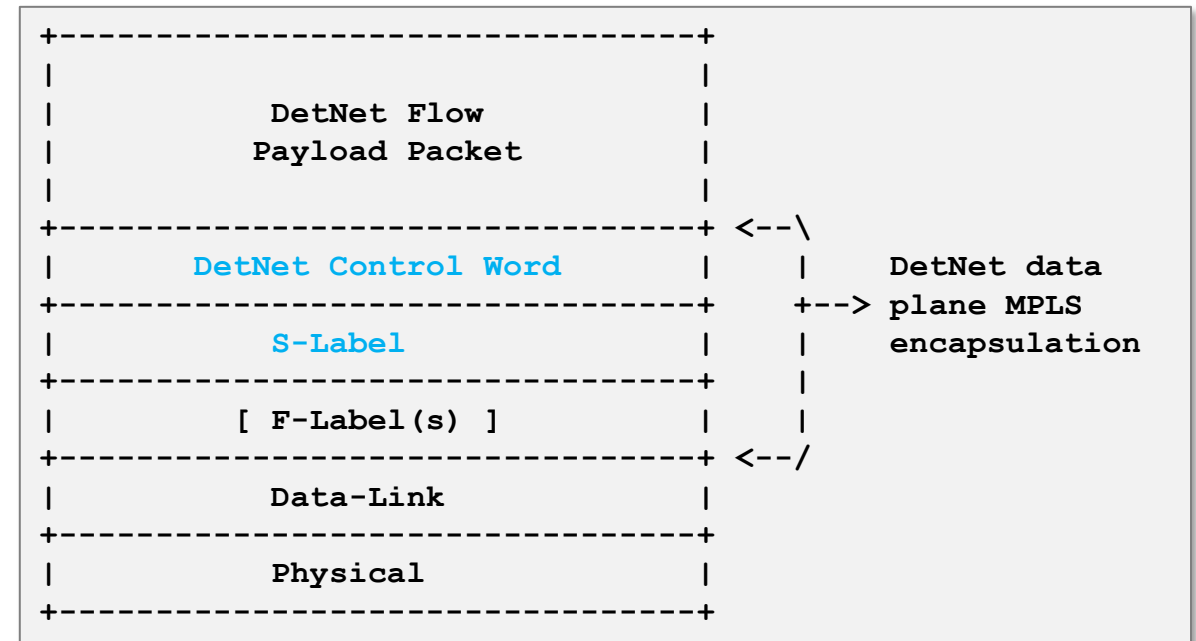


MPLS data plane – Encapsulation

DetNet PW

- MPLS-based DetNet data plane encapsulation:
 - **DetNet CW (d-CW) or d-ACH** contain sequencing information for packet replication and duplicate elimination purposes, and the OAM indicator.
 - **DetNet service Label (S-label)** identifies a DetNet flow.
 - Zero or more MPLS forwarding LSP label(s) (F-label) used to direct the packet along the label switched path (LSP) to the next peer node.
 - The necessary data-link encapsulation is then applied prior to transmission over the physical media.

d-CW is immediate after the label stack:
its usage is MANDATORY for DetNet flows



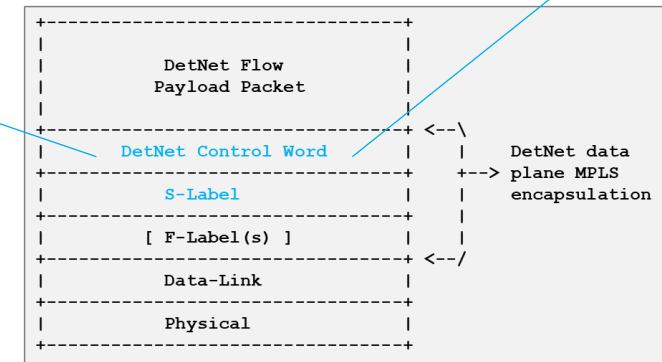
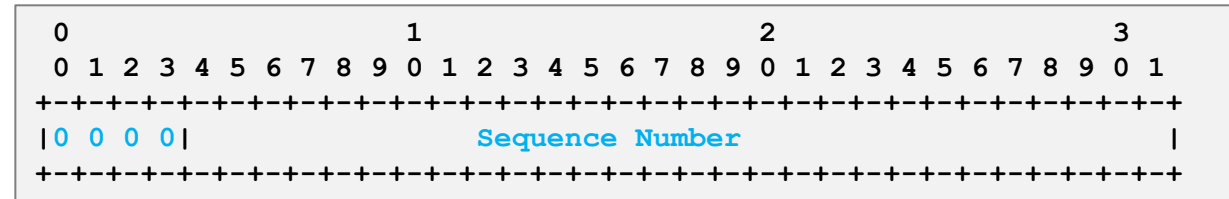
MPLS data plane – Encapsulation

DetNet control word

d-CW data packet:
First nibble is 0x0000

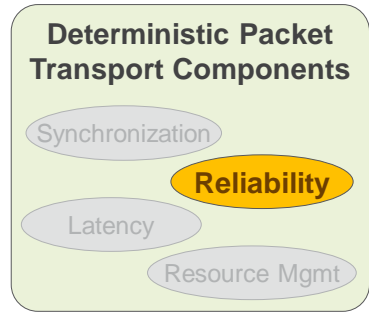
- d-CW:

- d-CW **MUST always be present** in a packet (even if it is not used)
- A DetNet control word (d-CW) conforms
 - to the Generic PW MPLS Control Word (PWMCW) defined in [RFC4385]
- Two sequence number sizes are supported:
 - **16** bits and **28** bits.
- The sequence number size
 - in use for the d-CW associated with a DetNet flow (S-Label) is configured either by a controller plane or manually for each DetNet flow.
- **Zero is an ordinary sequence number** with no special meaning



DetNet Service sub-layer: PREOF function

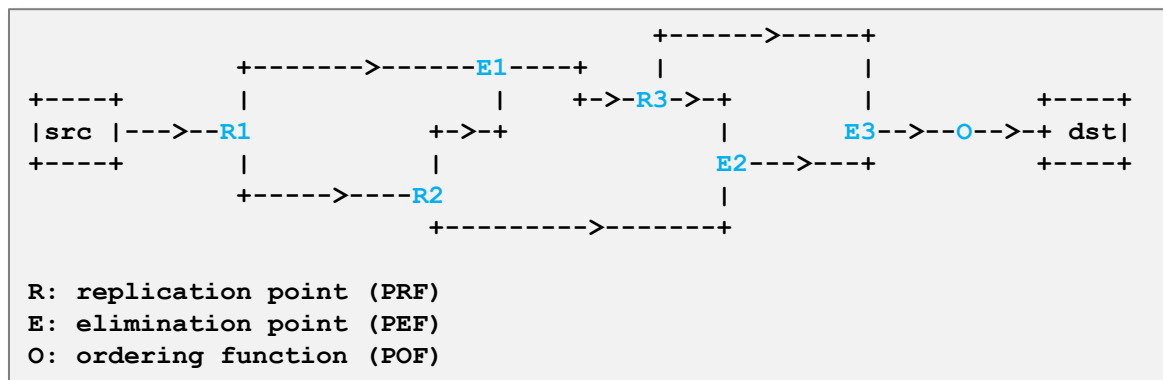
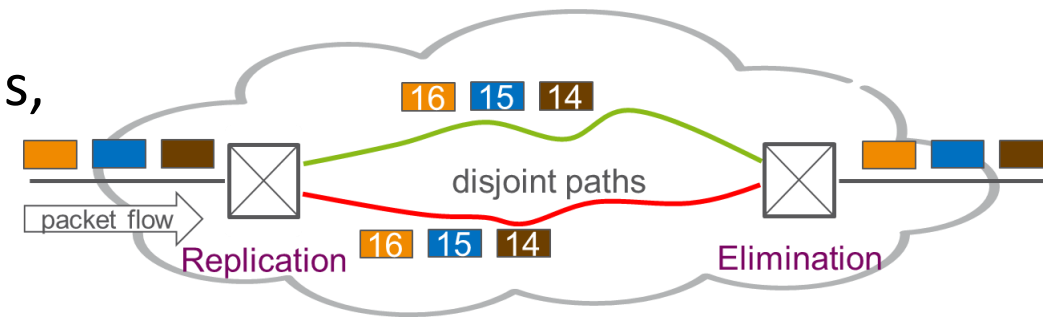
How it works ... (RFC8655)



- PREOF: Packet Replication, Elimination and Ordering Function

- Basics:

- Per packet 1+1 (1+N) redundancy
- Send packets on two (or more) disjoint paths, then combine and delete extras
- No primary/backup paths differentiated, all paths are active (“zero switchover time”)



PREOF acts as per-packet protection: functions have a per-flow state.

OAM for The Service Sub-Layer

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- DetNet Service Sub-layer Specifics for OAM

- The service sub-layer graph is segmented into multiple parts, as forwarding sub-layer paths are terminated at DetNet relay nodes.

- Characteristics of DetNet PW:

- PREOF acts as per-packet protection. PEF is a brand-new functionality at network layer, due to the per-packet merge action.
- All paths are active and forward traffic. These paths may have a different number of hops.
- Mandatory usage of a sequence number.

- Requirements on OAM for DetNet Service Sub-layer

- Discover DetNet relay nodes in a DetNet network.
- Collect DetNet service sub-layer specific information from DetNet relay nodes, e.g.: configuration/operation/status
- Applicable to both DetNet data planes: (i) MPLS and (ii) IP.

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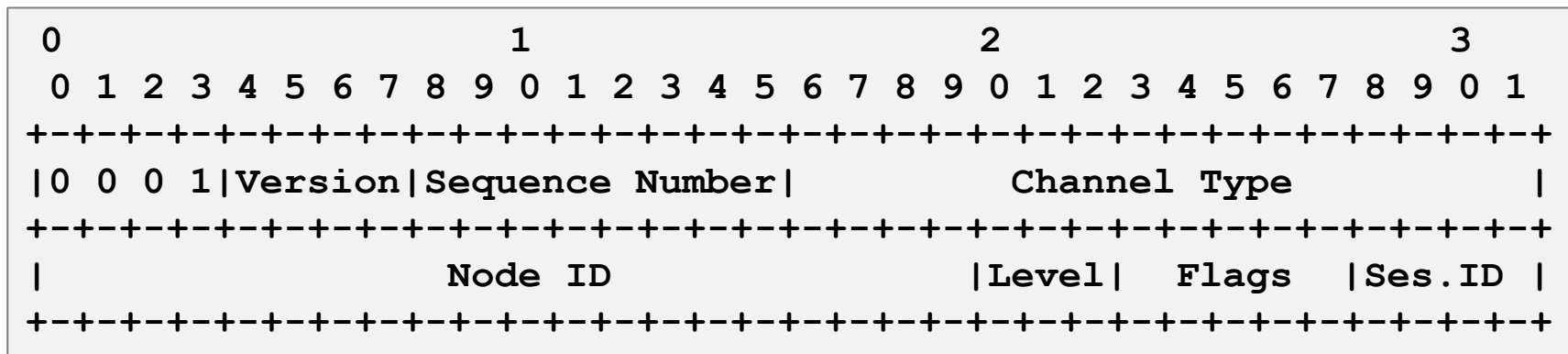
OAM packets MUST follow precisely the same path as the packets of the corresponding DetNet data flow. All paths are active and forward traffic.

OAM for The Service Sub-Layer

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DetNet OAM packet:
First nibble is 0x0001

- DetNet Associated Channel Header (d-ACH)
 - First nibble: MUST be 0b0001
 - Version = 0x1
 - Sequence number: OAM session specific
 - Channel Type: DetNet Associated Channel Type
 - Node ID: Originator node
 - An active DetNet OAM packet MUST include d-ACH immediately following the S-label.



Thanks ...