

# OAM for Deterministic Networks

draft-mirsky-detnet-oam

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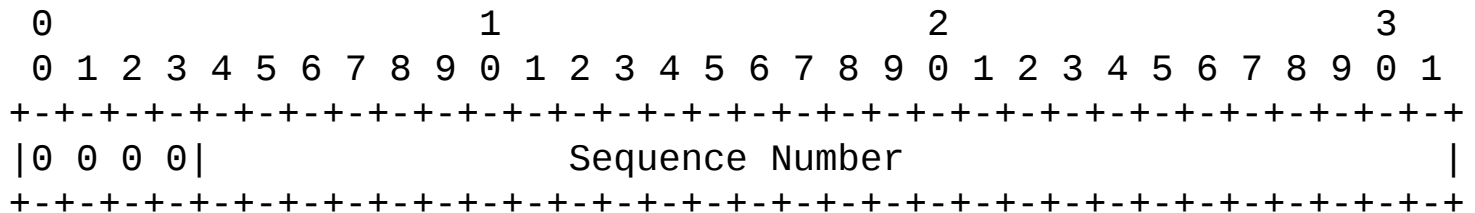
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# Problem statement

- Deterministic Networking (DetNet) intended to provide transport layer solution for services that require bounded low latency and very low, almost none, packet loss. The scope of the DetNet solution includes networking domains with MPLS and IPvX data planes as Layer 2, Ethernet, domains to use Time-Sensitive Networking (TSN) (product of [IEEE 802.1 TSN Task Group](#)).
- In addition to using traffic engineered paths, policing and traffic shaping, DetNet may use Packer Replication and Elimination function (PREF) to further minimize packet loss in the DetNet network. PREF ingress generates two or more copies of the DetNet packet. The packets are forwarded over disjoint paths to the PREF egress. The egress node eliminates all but the first arrived copy of the packet using a sequence number.

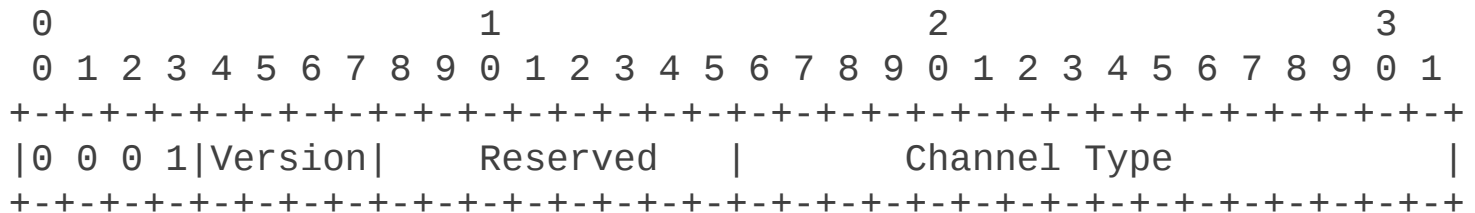
# DetNet over MPLS data plane

Solution, extracted from draft-ietf-detnet-dp-sol, draft-bryant-detnet-mpls-dp resembles PW with mandatory DetNet CW which is similar to PW CW:



Like PW label, DetNet service identified by S-label, which is BoS. DetNet service transport, T-labels, may be MPLS LSP or SR-MPLS.

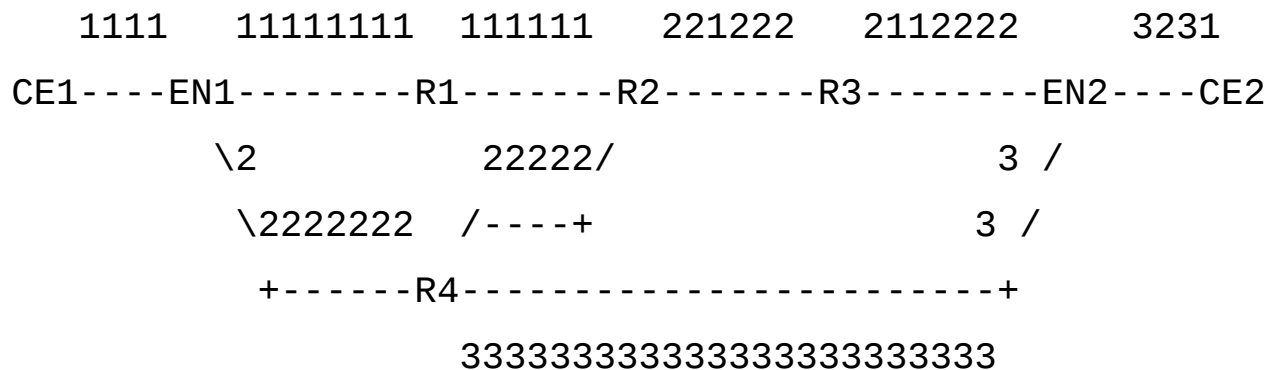
For DetNet OAM draft-bryant-detnet-mpls-dp proposes to use ACH that replaces DetNet CW in the encapsulation:



Use of GAL is for further consideration.

# DetNet' Packet Replication and Elimination Function (PREF)

PREF egress is to use the Sequence Number information included in the DetNet Control Word (d-CW) when eliminating extra copies of the packet it already forwarded:

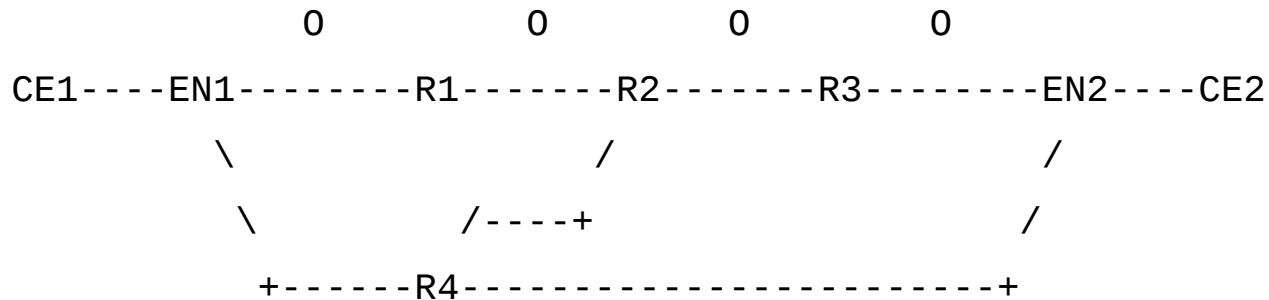


PREF is composed of two sub-functions:

- replication;
- elimination.

# Active OAM and DetNet' PREF

Consider an active OAM packet traversing DetNet domain if the replication sub-function uses S-label and d-CW:

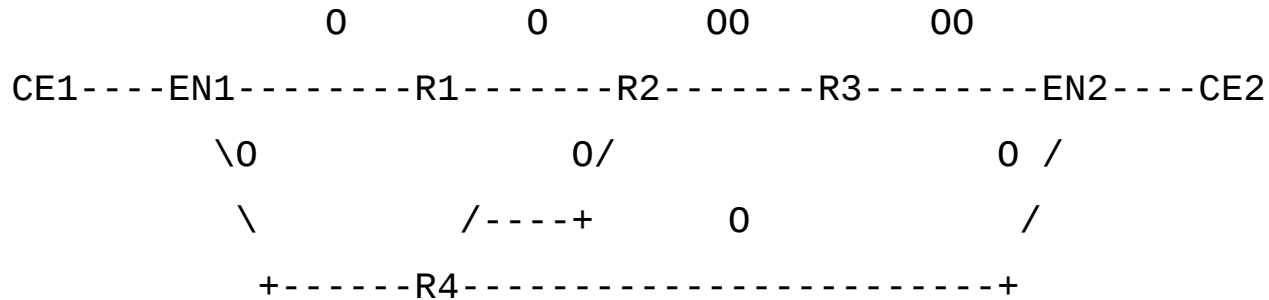


Because the OAM packet has Associated Channel Header, not d-CW the replication sub-function at the node EN1 doesn't create a copy of the OAM packet.

Active OAM will traverse only one path between the edge nodes EN1 and EN2.

# Active OAM and DetNet' PREF (cont.)

Consider an active OAM packet traversing DetNet domain if the replication sub-function uses S-label only:



The replication sub-function creates copies of the OAM packet at nodes EN1 and R4.

The elimination sub-function won't work on OAM because ACH does not include Sequence Number.

# Recommendations

- In order to ensure active DetNet OAM is in-band with the monitored data flow the sequencing information **MUST** be part of DetNet OAM encapsulation
- Sequencing information may be per flow, e.g., sequence number or per platform, e.g., wall-clock. In the latter case, the sequencing information may be used to time-out DetNet packets that are “too late” (high level of clock synchronization is expected in the DetNet domain).
- Dedicated marking field in the DetNet encapsulation may be used by the Alternate Marking method (RFC 8321)

# Next steps

- Extend list of DetNet requirements for OAM
- OAM, active and hybrid, protocols to comply with the requirements
- Your comments, suggestions, questions always welcome and greatly appreciated
- WG adoption