BIER-TE PREF&OAM

IETF101

draft-thubert-bier-replication-elimination-03

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Summary

- Candidate to support DetNet PREF + advanced OAM together with BIER-TE
  - Useful to any “high resilience” application with BIER-TE, not only DetNet
  - DetNet may? Also force stronger QoS parameters (bandwidth, jitter guarantees)
  - IPTV, Finance, other classical multicast:
    - Probabilistic as fast as possible is good enough. Does not have to be deterministic

- PREF – Packet Replication and Elimination Function
  - New ? Term for classical “live-live”, “dual-transmission” scheme
  - Packets with flow-id + sequence numbers sent across two disjoint paths
    - Receiver perfoms “duplicate elimination” – by flow/sequence-number
  - Used by IP multicast applications (video receivers) since ~ 2010 ?
    - Finance multicast application since ~1997
    - Feasibility of in-router-forwarding plane duplicate eliminiation proven in prototype
      - AFAIK, not shipping in L3 routers / NPU (software forwarding routers may exist)
    - TSN (L2 ethernet switches likely support this too already (asic based ?)
  - DetNet -> good opportunity to get standardized supported model?!

BIER-TE and PREF

- BIER-TE responsible/flexible for disjoint dual (or triple,..) path definition.
- PREF modelling (may discuss better during proposed header draft)
  - Enhanced BIER-TE header: include sequence number
  - Existing (BFIR-id, entropy) act as flow-id
  - BFIR app creates BIER-TE packet with sequence-number, flow-id
  - Any BFR configured for EF (Elimination Function) eliminates duplicates
    - IN INGRES, BEFORE REPLICATION (see next slide)
  - Current thinking!
    - Still considering if creation / recreation of sequence number or egres EF is beneficial/necessary (may take a while to understand all DetNet details)
- Linkage BIER-TE / PREF
  - BIER encap already includes BFIR-ID not required by BIER – only for overlay function (RPF for ecap'ed traffc)
  - BFIR-ID and entropy in BIER header can nicely/logically act as flow-id.
    Makes it very logical not to introduce another separate header for sequence-number
  - EF happening on ingres of BFR's (not simple function outside of BIER domain)

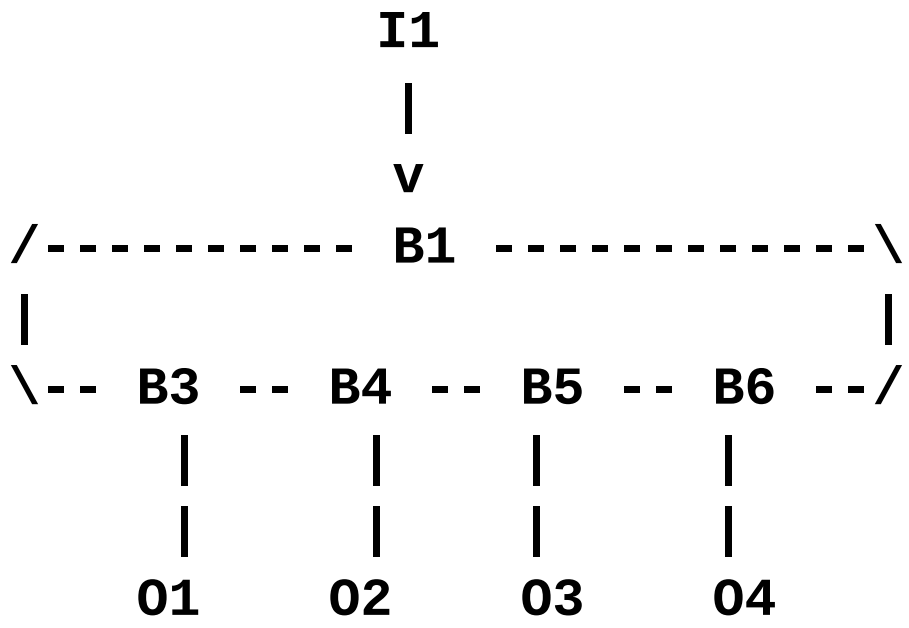
EF example - ring

- Traffic from I1 via BIER-TE bitstring engineered to flow in both directions around the ring.

- Each BFER B3, B4,B5,B6 performs ingres EF and passes resulting packets on.

- Likely result
  - Copy1: I2->B1->B3->B4->B5
  - Copy2: ->B6->B5->B4

- Aka: ingres EF achieves maximum efficiency: will not have packets unnecessarily run fully twice around ring. Only to place where packet “meet”
  - Will have one segment (eg: B4<->B5) where both copies are sent across
  - Which one this is depends on delay across segments.



OAM function

- Enhanced function on top of OAM (optional ?!)
  - Examines received (remaining) bitstring, compares with known sender bitstring. Can identify which path packet has taken.
  - Can therefore provide resilience statistics
  - E.g.: in non-ring topologies (common in TSN), every BFIR will receive both copies.
    - OAM would show/account that both copies arrive etc.

- Mote details when Pascal can present (conflict with ROLL WG today)

Changes from -02

- Fixed bugs, added co-author
- More explanation / background (BIER-TE, DetNet)
- More details about EF
  - Defined BIER-TE forwarding model extension
    - ingres feature on BFR configured separately from existing BIER-TE rules
      - Details of EF behavior (automatic recognition of flow vs. explicit creation)
      - Would be nice if we could move these details off this draft in future when we find a common EF definition in DetNet (unclear if/when that would happen)
      - Definition of EF behavior tries to align with existing non-EF DetNet EF defined so far.
    - Dependency against fitting header (flow-id/sequence number)
- Ring example with explanation

Applicability to BIER

- PREF could be be applicable to BIER
- Encapsulation proposed to allow use of BIER / BIER-TE
- With BIER would need to use IGP dual topology path engineering.
- BIER option not fully worked out (yet)
- OAM functions also likely more limited in diagnostics (TBD)