LOOPS (Local Optimizations on Path Segments) and its Geneve binding

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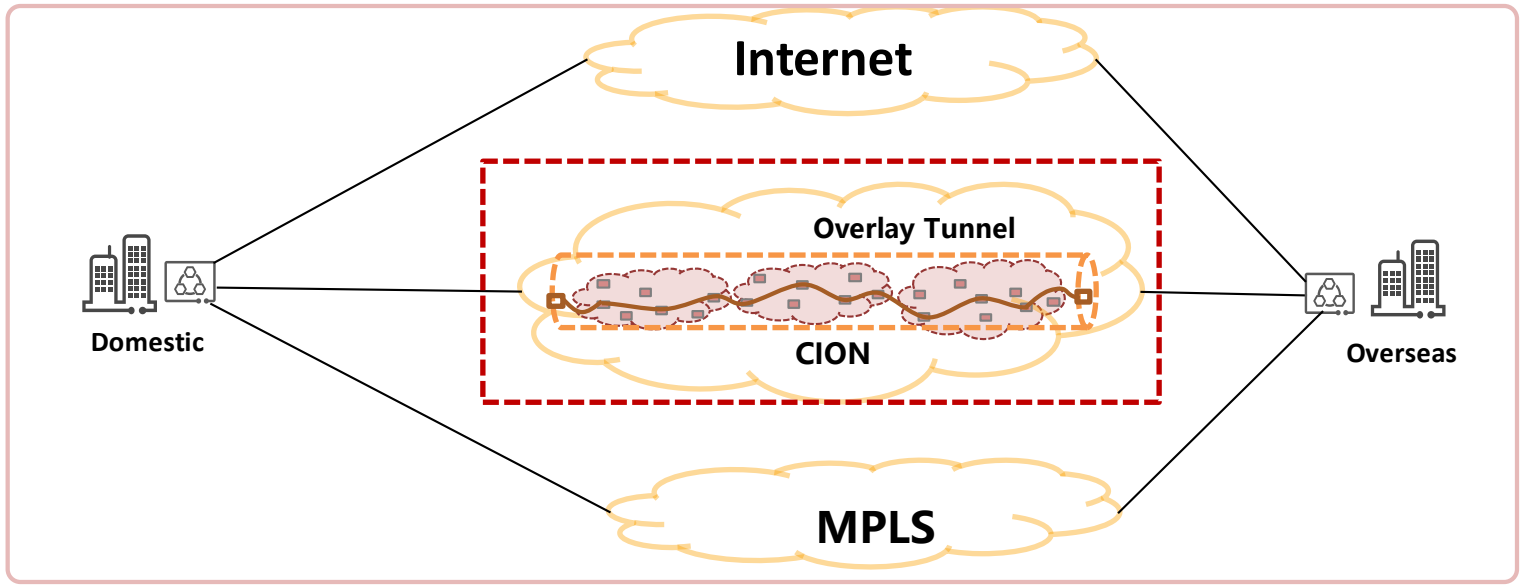
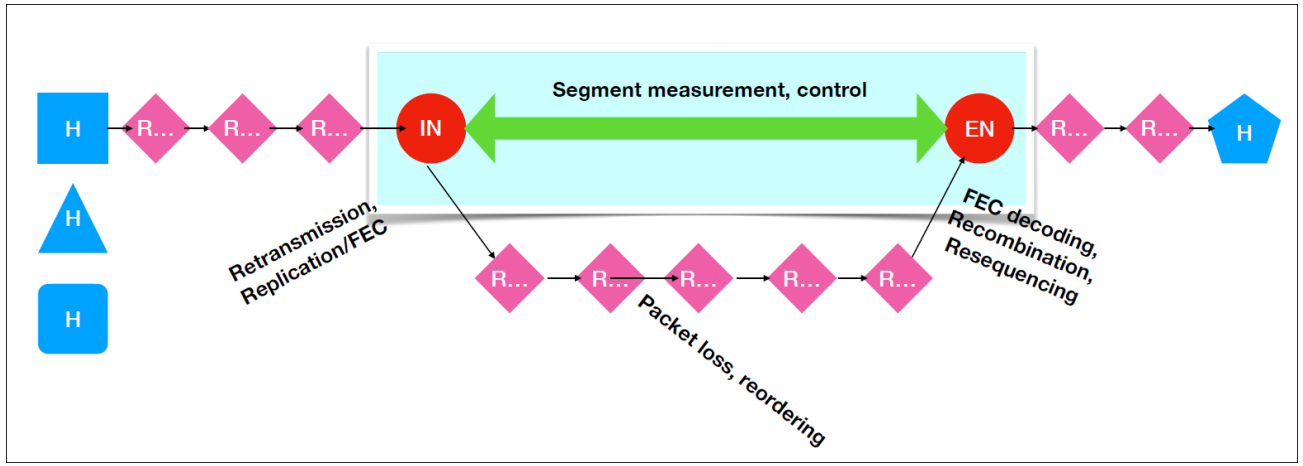
draft-bormann-loops-geneve-binding-00
draft-li-tsvwg-loops-problem-opportunities-03
draft-welzl-loops-gen-info-02

LOOPS Usage Scenario & Motivations



- Default path does not always give the best latency
- Cloud-Internet Overlay Network (CION): Build a better WAN path via overlay nodes in different geographic sites in multiple clouds
- Experiments based on 37 cloud routers globally: 71% chance of finding a better overlay path
- Problems: loss still exists in a selected path

LOOPS aims to provide local in-network loss recovery over specific segments to optimize packet delivery



Elements of LOOPS

- Information model for local **recovery**: in-network retransmission/FEC
  - Can be encapsulated in a variety of formats; define some of those
- Local **measurement**: e.g. segment forward delay/variation
  - To set recovery parameters
  - To determine if loss was caused by congestion
- Congestion **feedback**:
  - ECN (or drops) to inform end hosts about congestion loss

Geneve is a protocol that can embed LOOPS

How it relates to Geneve

- Solution sketch gives the whole picture of LOOPS function
  - Sequence space, Initial sequence number determination, ACK generation, FEC code structure, Loss detection, Retransmission persistency, Local measurement, Congestion indication, …..
  - draft-welzl-loops-gen-info-02
- Geneve binding defines the format when embedding LOOPS to Geneve
  - Map the functions to Geneve, define data plane format, take care of Geneve specifics
  - draft-bormann-loops-geneve-binding-00

Proposed LOOPS option - map LOOPS to tunnel protocol

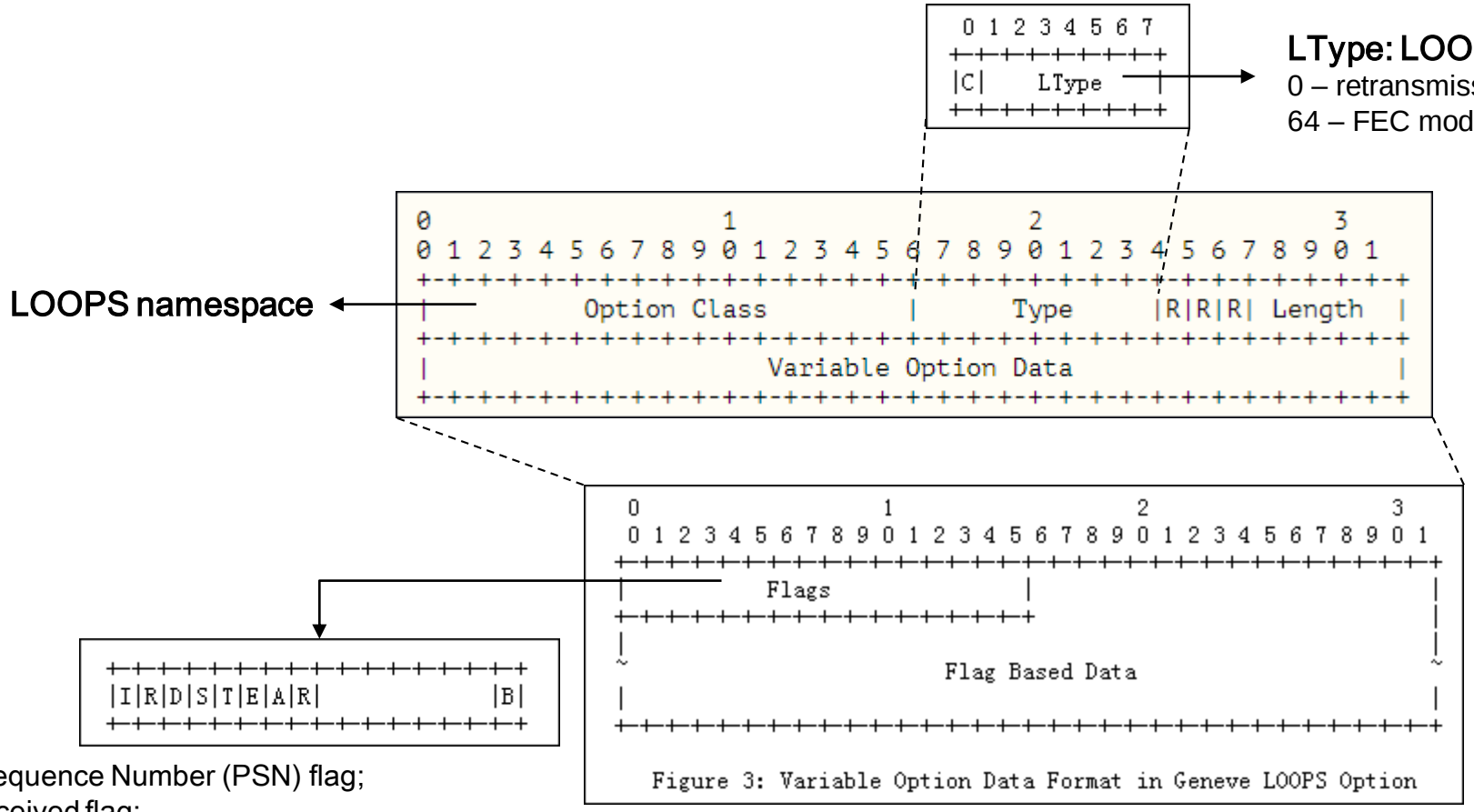


Figure 3: Variable Option Data Format in Geneve LOOPS Option

I: Initial Packet Sequence Number (PSN) flag;
R: Initial PSN Received flag;
D: ACK Desired flag;
S: PSN flag; indicates a PSN data block is carried.
T: Timestamp flag;
E: Echoed Timestamp flag.
A: ACK number flag; indicates presence of a BLOCK 1 timely ACK info
R: Reception time flag
B: Block 2 ACK info flag; for lost pkts

Not going to cover in details right now

Discussed in detail

- **In IETF 105**: had a BoF, and there was quite a strong feedback and interest showing standardization of the work was required. (https://datatracker.ietf.org/meeting/105/materials/slides-105-loops-proponent-slides-00)
- **Meet in IETF 106**: Discuss more detailed design issues, including retransmission operation and encapsulations; sketch a FEC version; and then clearly outline the work to be done in LOOPS.
- **Who would be interested**: transport protocol designers, tunnel protocol designers, FEC experts
- **Meeting info**: 8:30-9:45 Tuesday, Room: Orchard
- **Drafts**
  - Use cases (draft-li-tsvwg-loops-problem-opportunities-03)
  - Solution sketch (draft-welzl-loops-gen-info-02)
  - Encapsulation (draft-bormann-loops-geneve-binding-00)