ECN and Congestion Feedback Using the NSH and IPFIX

draft-eastlake-sfc-nsh-ecn-support-01

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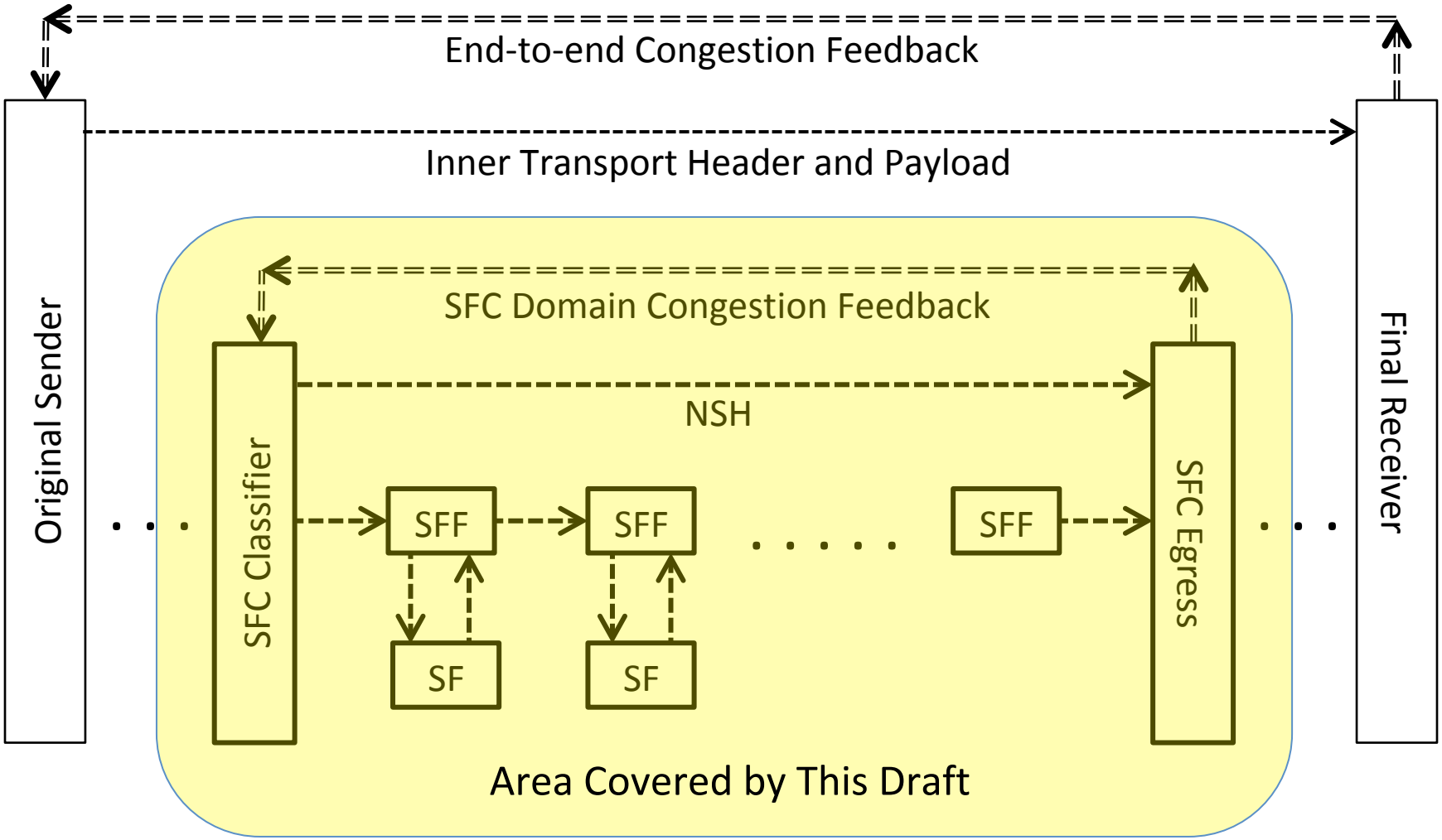
Goals of this Draft

- Collect congestion information within a Service Function Chaining (SFC) domain with minimal packet drops.
  - Also to contribute to the standardized collection of congestion information from origin before through destination after the SFC domain.
- Communicate SFC domain congestion information to the Classifier(s) so they might take action to reduce congestion.

High Level Overview

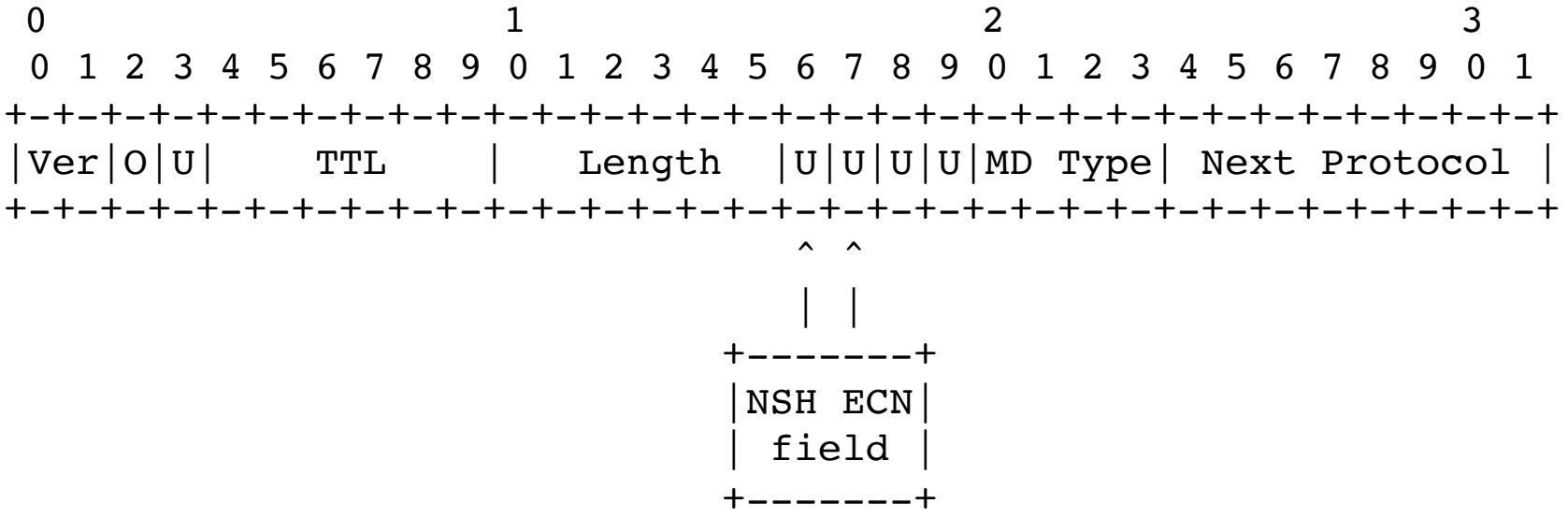
- Congestion encountered is communicated downstream towards the SFC domain egress by Explicit Congestion Notification (ECN, RFC 3168) bits in the Network Service Header (NSH, RFC 8300).
- Congestion information is communicated back upstream to the Classifier using IP Flow Information Export (IPFIX, RFC 7011).

High Level Overview



Downstream ECN

- Congestion information is conveyed downstream by two ECN bits in the NSH. Only in severe cases (or where the end-to-end transport does not support ECN) are packets dropped.



Upstream IPFIX

- IPFIX, as extended by draft-ietf-tsvwg-tunnel-congestion-feedback provides mechanisms for communicating, from an egress to a classifier, statistics from which congestions can be determined.
  - Such statistics are cumulative so occasional lost upstream packets are tolerable.

Possible Classifier Actions

- Possible classifier actions on learning of congestion include:
  - Traffic throttling.
  - Congestion feedback further upstream.
  - Traffic re-direction.
    - Yes, you have to be very careful to avoid oscillation. For example if you have long lived flows, the Classifier can choose less congested paths but only for newly appearing flows.

Some Details

- This all works better if ECN is implemented throughout the SFC Domain. If an SF does not support NSH or ECN it will have a proxy which should support ECN but even then it is better if the non-NSH supporting SF supports ECN. Basically, any bottleneck where there might be congestion that does not support ECN means that congestion is unmanaged.

Problems with Alternative Mechanisms

- Using ECN trivially integrates with end-to-end ECN use for congestion notification.

- Use of telemetry
  - Use of delay requires time synchronization
  - Use of delay or jitter requires noise filtering to extract congestion and so is significantly more complex than ECN.

Next Step

- Call for WG Adoption.

END

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BACK UP SLIDES

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Some Details

- If the end of an NSH hop (SFF <-> SF, SFF -> SFF) can properly combine Information from the outer transport header into the NSH, then the ingress of such a hop copies the NSH ECN to that transport header. Otherwise, it leaves the outer transport header showing no ECN support and congestion is indicated by packet drop.
  - This requires adding one bit of configuration in each entry at an SFF under a SPI/Index. This bit indicating whether or not the end of the next hop supports ECN when it de-encapsulates.

Some Details

- More graphically