Tunnel congestion Feedback simulation

(draft-wei-tunnel-congestion-feedback)

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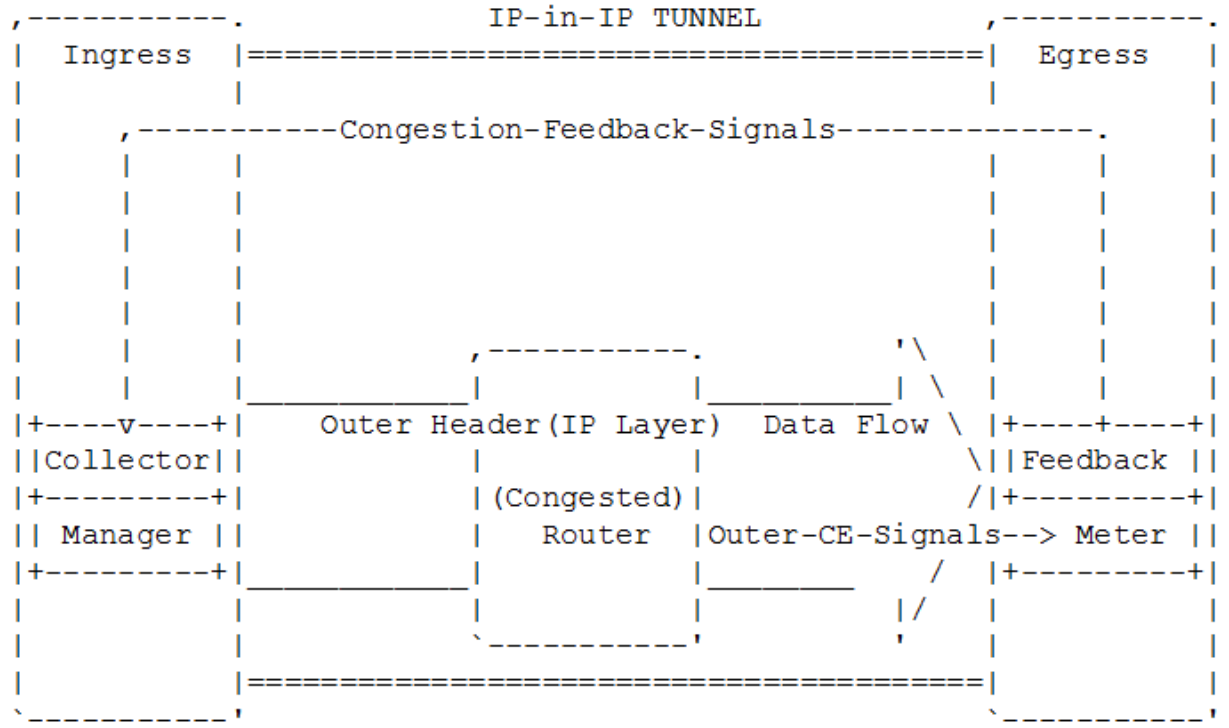
Background: Problem Statement

- Nature of end user flows, length of sessions can lead to significant variability in aggregated bandwidth demands and latency in managed networks such as the mobile backhaul, and DC networks.
- Tunnels are widely deployed to carry end user flows in network (both backhaul networks and DC networks), and the congestion experienced in a tunnel can be calculated according to RFC 6040, Appendix C.
- However, there is no standard feedback mechanism for congestion information from the Egress router/ switch to the Ingress router/switch.

Background: Congestion Feedback Model



- Egress collects congestion information (e.g. volume) experienced in the tunnel;
- Egress feeds back congestion information (e.g. volume) to Ingress;
- Ingress controls traffic entering the tunnel accordingly to reduce tunnel congestion.

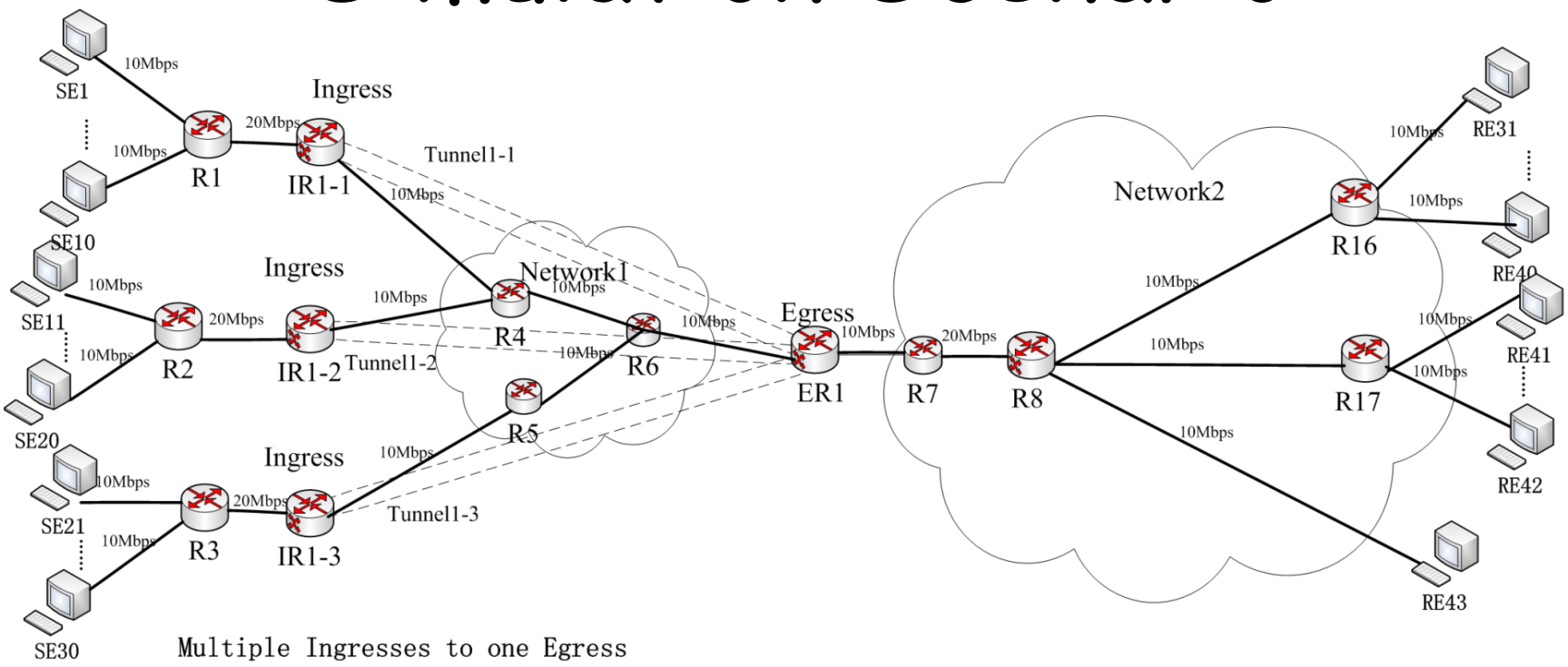
The solution aims to provide a network-based congestion control.

Purpose of the Simulation

- Whether the network-based congestion control has undesirable impacts on e2e TCP congestion control?

- If any impact exists, in which aspects and how does it affect the e2e TCP CC?

Simulation Scenario



Testbed: NS3.

SEx: Sender, Rate: 1Mbps.

REx: Receiver.

IR1-x: Tunnel Ingress.

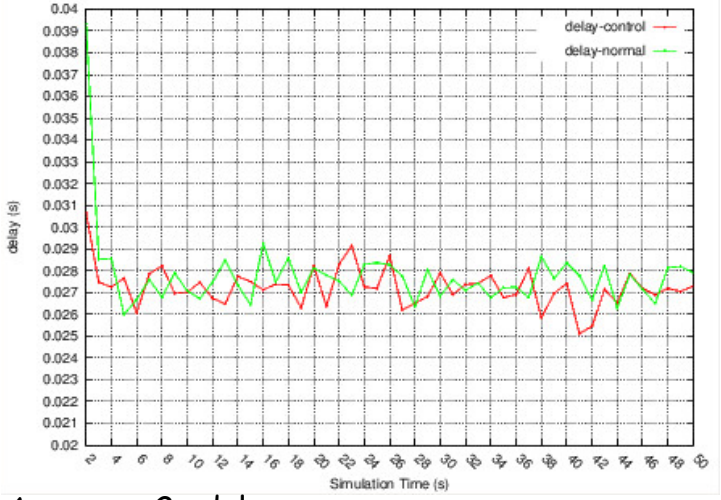
ER1: Tunnel Egress.

Rx: Router, ECN-enabled.

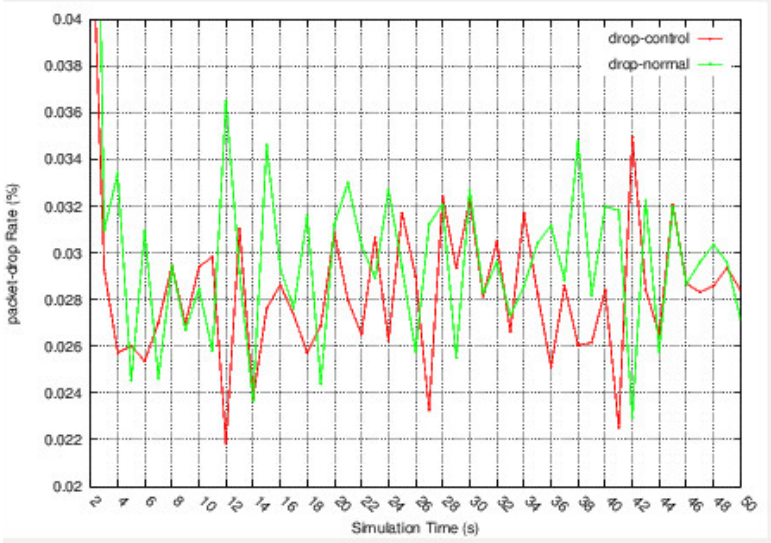
Manager action: Random Drop.

IPFIX is used for congestion information feedback.

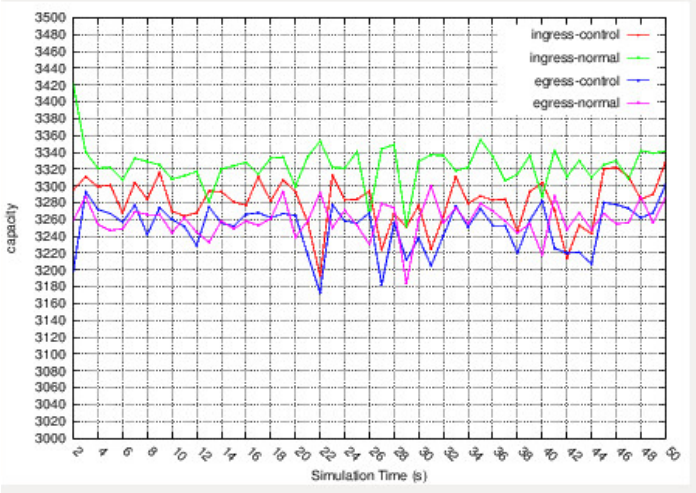
Simulation Result: e2e delay, Packet loss and throughput



Average e2e delay:
In case of tunnel control: 0.027071s.
In case of no tunnel control: 0.027615s.



Average packet loss:
In case of tunnel control: 0.028127%.
In case of no tunnel control: 0.029859%.



Packet throughput (per second):
In case of tunnel control: Ingress=3300, Egress=3260.
In case of no tunnel control: Ingress=3320, Egress=3260.

Conclusion

- Tunnel-based congestion control doesn't change the behavior of e2e congestion control.
- The tunnel congestion control is complementary with e2e ECN control.
- The tunnel congestion feedback provides network administrator with network congestion level information that can be used as an input for network management.

Next Steps

- Continue to collect feedback from TSVWG community.
- Seek adoption as a working group document.