CSE 322
PROJECT PROPOSAL

1705036

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TCP with Faster Recovery (FR-TCP & GFR-TCP)

A modified mechanism for Congestion Control

An improvement on the already existing TCP Reno algorithm in ns-3

Reference:
Casetti, Claudio & Geria, M. & Lee, S.S. & Sanadidi, M.Y.. (2000). TCP with faster recovery. 1. 320 - 324 vol.1. 10.1109/MILCOM.2000.904968.
Source: IEEE Xplore
Conference: MILCOM 2000

MODIFICATIONS

FR-TCP

- Introduce a new concept of “Bandwidth Estimate” by looking at the reception rate of ACK

- Use the estimated available Bandwidth **(BWE)** to set the **Slow Start Threshold** (*ssthresh*) and compute **Congestion Window** (C_{win})

```
if (ACK is received) {
 sample_BWE = pkt_size*8/(now - lastacktime);
 BWE = BWE*alpha + sample_BWE*(1 - alpha);
}
```

- triple duplicate ACKS:
  $ssthresh = (BWE * RTT_{min})/a$
  $CWIN = ssthresh$
- coarse timeout expiration:
  $ssthresh = (BWE * RTT_{min})/a$
  $CWIN = 1$

GFR–TCP

- In congestion avoidance phase, it takes longer to reach the maximum available Bandwidth.
- A way to recognize when the Output Rate can be safely increased
- Monitor the Bandwidth in congestion avoidance phase and *periodically* increase the Slow Start Threshold

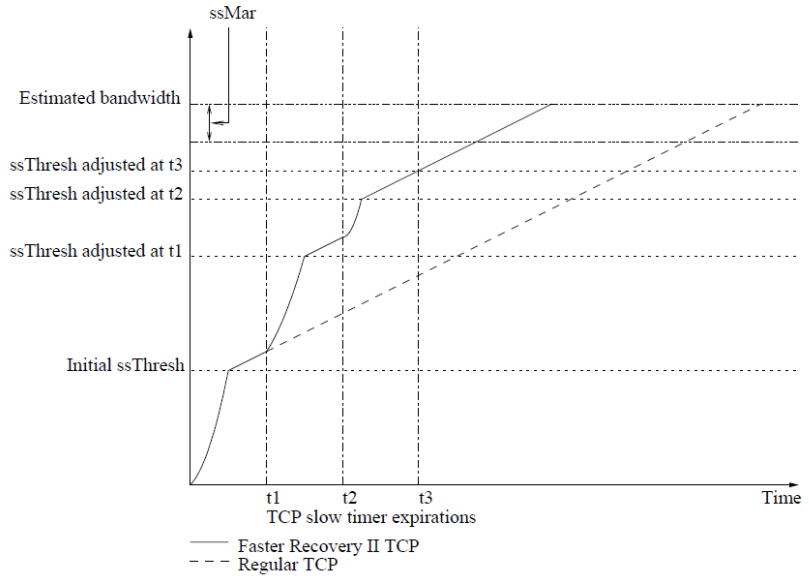

Fig. 1. GFR-TCP behavior.

```
If (CWIN > ssthresh) AND (CWIN < BWE*RTT_min)
then
  ssthresh += (BWE*RTT_min-ssthresh)/2;
```

MOTIVATION

Major Advantages:

- Avoid unnecessarily small windows during the “blind” congestion window decrease phase in TCP Reno. Bandwidth is not underutilized since estimated available bandwidth is taken into account.

- Source-side Implementation is enough. No need to think about receiver or intermediate routers or network devices.

- Network can reach the available bandwidth more quickly during congestion avoidance phase

Reference:

Casetti, Claudio & Geria, M. & Lee, S.S. & Sanadidi, M.Y.. (2000). TCP with faster recovery. 1. 320 - 324 vol.1. 10.1109/MILCOM.2000.904968.

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Questions?