Effects of pause and QCN on TCP sources

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Overview

• Analyze the behavior of the TCP sources
  – With and without Pause and/or QCN
  – Scenario: Baseline
TCP: Discussion

- TCP is very sensitive to drops
- When many drops occur, TCP doesn’t use Fast Re-transmit; instead it waits for a timer to expire before resending packets and increasing window size

- Default TCP RTO parameters:
  - Initial RTO: 3s; Minimum RTO: 1s
  - This is too large for our setting

- Our TCP RTO parameters
  - Initial RTO: 0.6s; Minimum RTO: 0.1s
  - Following: au-sim-geisler-cm-tcp-effects-1107-v1.pdf

- Maximum window size: 65536 bytes
- TCP version: TCP Reno
- Other parameters have default values
QCN and pause parameters

• W = 2.0
• Q_EQ = 26 Kbytes
• Gd = 1/128 = 0.0078125
• Base marking: once every 150kbytes
• Jitter on marking: 30%
• MIN_RATE = 10Mb/s
• BC_LIMIT = 150kbytes
• TIMER_PERIOD = 15ms
• R_AI = 5Mbps
• R_HAI = 50Mbps
• FAST_RECOVERY_TH = 5
• Quantized_Fb: 6 bits
• Jitter at RP: 30% (byte counter and timer)

• Pause threshold: 120Kbytes
• Pause interval: 96usec
Scenario: OG Hotspot

• Baseline scenario
  – 10 nodes connected through a single switch
  – TCP connection from nodes 1--9 to node 0
  – All connections start at time 0s
  – Each link is 10Gb/s
  – Simulation duration: 0--3 seconds
  – RTT: 25us, 250us

• Switch o/p buffer size: 225Kbytes

• RL buffer size: Unlimited

• Hotspot
  – Service at one link is decreased to 2 Gb/s
  – Hotspot duration: 1sec -- 2 sec

• Simulations
  – No Pause, no QCN
  – Pause only
  – QCN only
  – Both QCN and pause
No Pause, no QCN; RTT = 25us
(Buffer overflows result in dropped packets)
Pause Only, RTT = 25us

Net Throughput

Queue Length

Individual Rates
QCN Only, RTT = 25us

Net Throughput

Queue Length

Individual Rates
QCN and Pause, RTT = 25us

Net Throughput

Queue Length

Individual Rates
No Pause, no QCN; RTT = 250us
(Packets dropped due to buffer overflows)

Net Throughput

Queue Length

Individual Rates
Pause Only, RTT = 250us

Net Throughput

Queue Length

Individual Rates
QCN Only, RTT = 250us

Net Throughput

Queue Length

Individual Rates
QCN and Pause, RTT = 250us

Net Throughput

Queue Length

Individual Rates
Conclusion

• It is important to have some Layer-2 CM (in this case QCN) to get good, reliable TCP performance

• Delay (RTT) makes little difference
  – Downward transience longer when RTT is longer

• Fairness looks good
  – Maximum--minimum source rate ratio is tight

• Next
  – More extensive scenarios
  – Use BIC TCP at the hosts
  – TCP flow completion times