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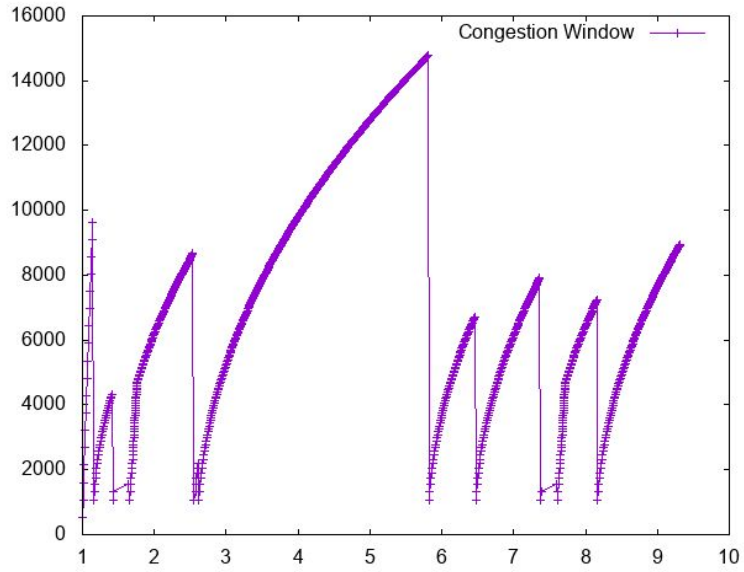
CMPE 206

Homework 6

- Question 1
  - Slow start interval: [1,6] and [23,26]
  - Congestion avoidance interval: [7,16] and [18,22]
  - Triple duplicate Ack because congestion window shrinks by half
  - Slow start threshold ends at transmission round 6, initial slow start threshold is 32.
  - At round 18, ssthreshold is 22.
  - At round 24, it's 13
  - At round 7, the 70th segment is sent
  - The congestion window will be halved, so it will be 4
- Question 2
  - 2.1
    - Advantages:
      - TCP would not have slow start so it does not have to start from scratch and it would not have the congestion avoidance which is the value at t1.
    - Disadvantages
      - Network conditions change between t1 and t2 by using TCP and would make use of ssthresh and cwnd inaccurate.
      - If path between t1 and t2 gets more congested, larger window segments might be sent in small congested paths as TCP might not be aware of the new network conditions.
  - 2.2
    - Start slowly, keep congestion in mind. Avoid loss of data.
    - TCP could maybe split the work.
    - Would be more efficient if the network conditions do not change.

- Question 3



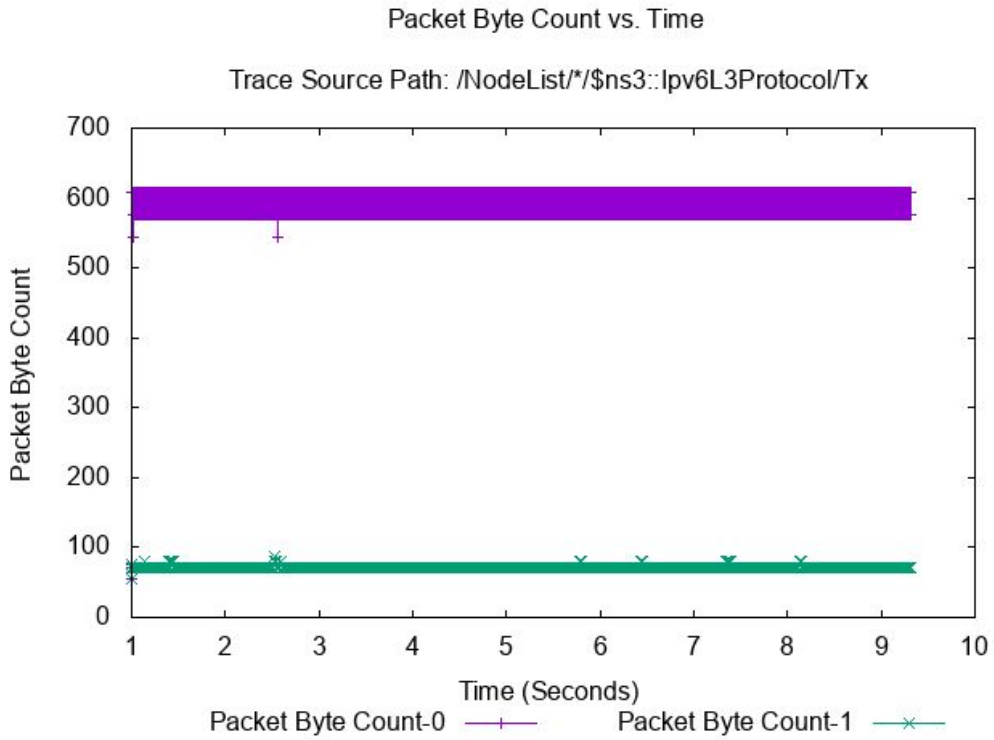
Congestion window increases at a definite rate as packets are sent unless a timeout or packet loss occurs. Packets rate decreases as they grow larger in size.

- 3.2
    - Output of TCP dump

```
reading from file sixth.pcap, link-type PPP (PPP)
-7:-59:-59.136956 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 17177:17681, ack 1, win 32768, options [TS val 1133 ecr 1127,eol], length 504: HTTP
-7:-59:-59.403196 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 33280:33784, ack 1, win 32768, options [TS val 1399 ecr 1394,eol], length 504: HTTP
-7:-59:-59.436476 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 37440:37944, ack 1, win 32768, options [TS val 1432 ecr 1428,eol], length 504: HTTP
-7:-59:-58.533823 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 174184:174720, ack 1, win 32768, options [TS val 2530 ecr 2525,eol], length 536: HTTP
-7:-59:-58.543036 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 175760:176264, ack 1, win 32768, options [TS val 2539 ecr 2534,eol], length 504: HTTP
-7:-59:-58.608703 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 183544:184080, ack 1, win 32768, options [TS val 2605 ecr 2600,eol], length 536: HTTP
-7:-59:-55.804476 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 583440:583944, ack 1, win 32768, options [TS val 5800 ecr 5796,eol], length 504: HTTP
-7:-59:-54.453436 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 664560:665064, ack 1, win 32768, options [TS val 6449 ecr 6445,eol], length 504: HTTP
-7:-59:-53.367743 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 778424:778960, ack 1, win 32768, options [TS val 7364 ecr 7360,eol], length 536: HTTP
-7:-59:-53.393596 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 782080:782584, ack 1, win 32768, options [TS val 7389 ecr 7386,eol], length 504: HTTP
-7:-59:-52.158143 IP 10.1.1.1.49153 > 10.1.1.2.http-alt: Flags [.], seq 877224:877760, ack 1, win 32768, options [TS val 8155 ecr 8149,eol], length 536: HTTP
```

Pcap file is analysed using TCP dump. It displays the time at which packet is sent and also the protocol used. It provides some vital information about the segment.

- 3.3
    - Plot



Packet byte count seems to be constant.

    - Tcp dump

```
reading from file seventh.pcap, link-type PPP (PPP)
-7:-59:-59.127775 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 15601:16137, ack 1, win 32768, options [TS val 1124 ecr 1119,eol], length 536: HTTP
-7:-59:-59.394015 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 33280:33816, ack 1, win 32768, options [TS val 1391 ecr 1386,eol], length 536: HTTP
-7:-59:-59.427295 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 37440:37976, ack 1, win 32768, options [TS val 1424 ecr 1419,eol], length 536: HTTP
-7:-59:-58.509820 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 173176:173680, ack 1, win 32768, options [TS val 2505 ecr 2501,eol], length 504: HTTP
-7:-59:-58.525535 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 174720:175256, ack 1, win 32768, options [TS val 2522 ecr 2518,eol], length 536: HTTP
-7:-59:-58.584700 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 182536:183040, ack 1, win 32768, options [TS val 2580 ecr 2576,eol], length 504: HTTP
-7:-59:-55.786975 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 582400:582936, ack 1, win 32768, options [TS val 5783 ecr 5779,eol], length 536: HTTP
-7:-59:-54.435935 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 663520:664056, ack 1, win 32768, options [TS val 6432 ecr 6428,eol], length 536: HTTP
-7:-59:-53.343740 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 777416:777920, ack 1, win 32768, options [TS val 7339 ecr 7335,eol], length 504: HTTP
-7:-59:-53.376095 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 781040:781576, ack 1, win 32768, options [TS val 7373 ecr 7369,eol], length 536: HTTP
-7:-59:-52.125819 IP6 2001:0:f00d:cafe:200:ff:fe00:1.49153 > 2001:0:f00d:cafe:200:ff:fe00:2.http-alt: Flags [.], seq 875176:875680, ack 1, win 32768, options [TS val 8121 ecr 8117,eol], length 504: HTTP
```

Pcap file is analysed using TCP dump. It displays the time at which packet is sent and also the protocol used. It provides some vital information about the segment.

- Files produced

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seventh-packet-byte-count-0.txt
seventh-packet-byte-count-1.txt
seventh-packet-byte-count.dat
seventh-packet-byte-count.plt
seventh-packet-byte-count.png
seventh-packet-byte-count.sh
seventh.cwnd
seventh.pcap
```

Citations

Professor slides and notes
Some discussion with fellow classmate Sibirajan Sadhasivam