

Assignment-02

CS 433 Computer Networks (2023-24)

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For code pls refer [here](#)

- a. **Implementation** of the custom topology using mininet. **(10 pts)** (Every host should be able to send packets to every other host. You are to submit the code, as well as provide screenshots as proof of its working)

Proof of its implementation:

```
mininet> pingall
*** Ping: testing ping reachability ***
h1 → h2 h3 h4 h5 h6 r0 r1 r2
h2 → h1 h3 h4 h5 h6 r0 r1 r2
h3 → h1 h2 h4 h5 h6 r0 r1 r2
h4 → h1 h2 h3 h5 h6 r0 r1 r2
h5 → h1 h2 h3 h4 h6 r0 r1 r2
h6 → h1 h2 h3 h4 h5 r0 r1 r2
r0 → h1 h2 h3 h4 h5 h6 r1 r2
r1 → h1 h2 h3 h4 h5 h6 r0 r2
r2 → h1 h2 h3 h4 h5 h6 r0 r1
*** Results: 0% dropped (72/72 received) ***
```

- b. **Observations:** Capture and show the wireshark/tcpdump (packets) for the route setup on any one of the routers. **(10 pts)**

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=20/5120, ttl=64 (req)
2	0.000176580	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=20/5120, ttl=62 (rep)
3	1.020277438	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=21/5376, ttl=64 (req)
4	1.020403935	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=21/5376, ttl=62 (rep)
5	2.045970587	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=22/5632, ttl=64 (req)
6	2.046023419	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=22/5632, ttl=62 (rep)
7	3.068161732	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=23/5888, ttl=64 (req)
8	3.068213064	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=23/5888, ttl=62 (rep)
9	4.095912042	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=24/6144, ttl=64 (req)
10	4.095953916	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=24/6144, ttl=62 (rep)
11	5.119665905	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=25/6400, ttl=64 (req)
12	5.119718192	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=25/6400, ttl=62 (rep)
13	6.139912674	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=26/6656, ttl=64 (req)
14	6.139971339	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=26/6656, ttl=62 (rep)
15	7.135770747	16:5e:6c:b4:8d:0d	da:98:7a:4d:3a:7c	ARP	42	who has 10.0.0.1? Tell 10.0.0.2
16	7.135809538	da:98:7a:4d:3a:7c	16:5e:6c:b4:8d:0d	ARP	42	10.0.0.1 is at da:98:7a:4d:3a:7c
17	7.163760489	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=27/6912, ttl=64 (req)
18	7.163839279	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=27/6912, ttl=62 (rep)
19	8.188240416	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=28/7168, ttl=64 (req)
20	8.188283081	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=28/7168, ttl=62 (rep)
21	9.212579887	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=29/7424, ttl=64 (req)
22	9.212717342	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=29/7424, ttl=62 (rep)
23	10.236343829	10.0.0.2	10.0.1.2	ICMP	98	Echo (ping) request id=0x6036, seq=30/7680, ttl=64 (req)
24	10.236384912	10.0.1.2	10.0.0.2	ICMP	98	Echo (ping) reply id=0x6036, seq=30/7680, ttl=62 (rep)

- c. Vary the default routing and measure the latency difference. (i.e. the default route for a packet from h1 to h6 would be h1 -> r_a -> r_c -> h6. Try to vary the path so that it takes the path h1-> r_a -> r_b -> r_c -> h6. Provide the screenshots as proof for the latency difference, both ping as well as iperf) **(10 pts)**

The route and result via ping:

```
mininet> h1 ping -R h6
PING 10.0.2.3 (10.0.2.3) 56(124) bytes of data.
64 bytes from 10.0.2.3: icmp_seq=1 ttl=62 time=0.387 ms
RR: 10.0.0.2
    10.0.5.1
    10.0.2.1
    10.0.2.3
    10.0.2.3
    10.0.5.2
    10.0.0.1
    10.0.0.2
64 bytes from 10.0.2.3: icmp_seq=2 ttl=62 time=0.124 ms (same route)
64 bytes from 10.0.2.3: icmp_seq=3 ttl=62 time=0.118 ms (same route)
64 bytes from 10.0.2.3: icmp_seq=4 ttl=62 time=0.153 ms (same route)
```

Via iperf:

```

(Node: h6)
(root@kali)~/Documents/assignment2/Part_a
# iperf3 -c 10.0.0.2
Connecting to host 10.0.0.2, port 5201
[ 7] local 10.0.2.3 port 35320 connected to 10.0.0.2 port 5201
[ ID] Interval           Transfer     Bitrate      Retr  Cwnd
[ 7]  0.00-1.00   sec    4.98 GBytes  42.8 Gbits/sec    9   6.54 MBytes
[ 7]  1.00-2.00   sec    5.05 GBytes  43.4 Gbits/sec    0   6.54 MBytes
[ 7]  2.00-3.00   sec    5.09 GBytes  43.7 Gbits/sec    0   6.54 MBytes
[ 7]  3.00-4.00   sec    5.27 GBytes  45.2 Gbits/sec    0   6.54 MBytes
[ 7]  4.00-5.00   sec    5.30 GBytes  45.5 Gbits/sec    0   6.54 MBytes
[ 7]  5.00-6.00   sec    5.15 GBytes  44.2 Gbits/sec    0   6.54 MBytes
[ 7]  6.00-7.00   sec    5.07 GBytes  43.6 Gbits/sec    0   6.54 MBytes
[ 7]  7.00-8.00   sec    5.34 GBytes  45.9 Gbits/sec    1   6.54 MBytes
[ 7]  8.00-9.00   sec    4.69 GBytes  40.3 Gbits/sec    0   6.54 MBytes
[ 7]  9.00-10.00  sec    4.84 GBytes  41.6 Gbits/sec    1   6.54 MBytes

[ ID] Interval           Transfer     Bitrate      Retr
[ 7]  0.00-10.00  sec    50.8 GBytes  43.6 Gbits/sec    11
[ 7]  0.00-10.00  sec    50.8 GBytes  43.6 Gbits/sec

iperf Done.

(root@kali)~/Documents/assignment2/Part_a
#

```

d. Dump the routing tables for all the routers for both of the above questions. (10 pts)

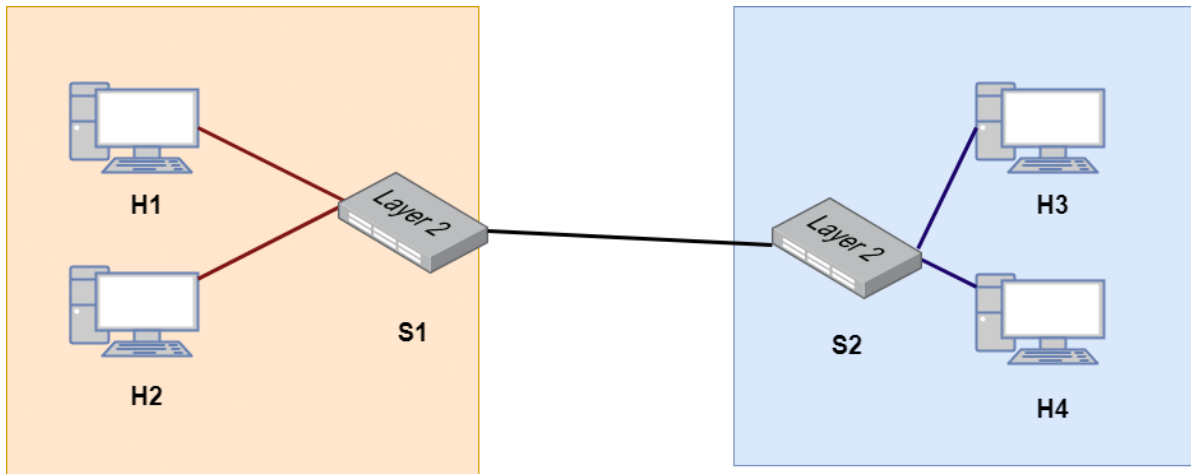
```

mininet> r0 route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 0.0.0.0 255.255.255.0 U 0 0 0 r0-eth0
10.0.1.0 10.0.3.2 255.255.255.0 UG 0 0 0 r0-eth1
10.0.2.0 10.0.5.2 255.255.255.0 UG 0 0 0 r0-eth2
10.0.3.0 0.0.0.0 255.255.255.0 U 0 0 0 r0-eth1
10.0.5.0 0.0.0.0 255.255.255.0 U 0 0 0 r0-eth2
mininet> r1 route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 10.0.3.1 255.255.255.0 UG 0 0 0 r1-eth1
10.0.1.0 0.0.0.0 255.255.255.0 U 0 0 0 r1-eth0
10.0.2.0 10.0.4.2 255.255.255.0 UG 0 0 0 r1-eth2
10.0.3.0 0.0.0.0 255.255.255.0 U 0 0 0 r1-eth1
10.0.4.0 0.0.0.0 255.255.255.0 U 0 0 0 r1-eth2
mininet> r2 route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 10.0.5.1 255.255.255.0 UG 0 0 0 r2-eth2
10.0.1.0 10.0.4.1 255.255.255.0 UG 0 0 0 r2-eth1
10.0.2.0 0.0.0.0 255.255.255.0 U 0 0 0 r2-eth0
10.0.4.0 0.0.0.0 255.255.255.0 U 0 0 0 r2-eth1
10.0.5.0 0.0.0.0 255.255.255.0 U 0 0 0 r2-eth2

```

Part II: Throughput for different congestion control schemes. (35 points)

Create a mininet topology as shown in the diagram below. H1 to H4 are four hosts connected to switches S1 and S2. Run a TCP Server that accepts data in the H4 system. H1, H2, H3 are the TCP clients that connect with the server (H4) and sends data packets.



- a. Implementation of the mininet topology and TCP client-server program (for packet generation).

```
mininet> pingall
*** Ping: testing ping reachability
h1 → h2 h3 h4
h2 → h1 h3 h4
h3 → h1 h2 h4
h4 → h1 h2 h3
*** Results: 0% dropped (12/12 received)
```

The TCP client-server program should run with the required configuration for question (b) when `--config=b` and with required configuration for question (c) when `--config=c`. Other configurable parameters like congestion control scheme, link loss should also be taken as command line arguments to the program. **(5 points)**

- b. Run the client on H1 and the server on H4. Report and reason the throughput over time for each congestion control scheme. **(10 points)**

For vegas:

```

(Node: h1)
(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
# iperf3 -c 10.0.0.4 -Z vegas
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 44912 connected to 10.0.0.4 port 5201
[ ID] Interval           Transfer     Bitrate      Retr  Cwnd
[ 7]  0.00-1.00    sec   7.50 GBytes  64.4 Gbits/sec  2750   683 KBytes
[ 7]  1.00-2.00    sec   7.98 GBytes  68.5 Gbits/sec  5223   481 KBytes
[ 7]  2.00-3.00    sec   7.99 GBytes  68.6 Gbits/sec  4491   460 KBytes
[ 7]  3.00-4.00    sec   7.33 GBytes  63.0 Gbits/sec  3629   673 KBytes
[ 7]  4.00-5.00    sec   8.20 GBytes  70.5 Gbits/sec  4745   461 KBytes
[ 7]  5.00-6.00    sec   8.15 GBytes  70.0 Gbits/sec  2461   798 KBytes
[ 7]  6.00-7.00    sec   8.27 GBytes  71.0 Gbits/sec  1187   858 KBytes
[ 7]  7.00-8.00    sec   8.28 GBytes  71.1 Gbits/sec  1906   882 KBytes
[ 7]  8.00-9.00    sec   8.37 GBytes  71.9 Gbits/sec  2013   884 KBytes
[ 7]  9.00-10.00   sec   8.35 GBytes  71.7 Gbits/sec  1734   1.28 MBytes
-----
[ ID] Interval           Transfer     Bitrate      Retr
[ 7]  0.00-10.00    sec   80.4 GBytes  69.1 Gbits/sec  30149
[ 7]  0.00-10.00    sec   80.4 GBytes  69.1 Gbits/sec
iperf Done.
(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
#

```

For reno:

```

(Node: h1)
(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
# iperf3 -c 10.0.0.4 -Z reno
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 41844 connected to 10.0.0.4 port 5201
[ ID] Interval           Transfer     Bitrate      Retr  Cwnd
[ 7]  0.00-1.00    sec   7.36 GBytes  63.2 Gbits/sec  1722   1.91 MBytes
[ 7]  1.00-2.00    sec   8.11 GBytes  69.7 Gbits/sec  183    1.91 MBytes
[ 7]  2.00-3.00    sec   8.05 GBytes  69.2 Gbits/sec  1549   962 KBytes
[ 7]  3.00-4.00    sec   7.35 GBytes  63.1 Gbits/sec  2726   594 KBytes
[ 7]  4.00-5.00    sec   7.27 GBytes  62.4 Gbits/sec  3065   619 KBytes
[ 7]  5.00-6.00    sec   7.89 GBytes  67.8 Gbits/sec  779    737 KBytes
[ 7]  6.00-7.00    sec   7.68 GBytes  65.9 Gbits/sec  3122   639 KBytes
[ 7]  7.00-8.00    sec   7.62 GBytes  65.4 Gbits/sec  1024   648 KBytes
[ 7]  8.00-9.00    sec   7.67 GBytes  65.9 Gbits/sec  1878   611 KBytes
[ 7]  9.00-10.00   sec   7.35 GBytes  63.1 Gbits/sec  550    4.04 MBytes
-----
[ ID] Interval           Transfer     Bitrate      Retr
[ 7]  0.00-10.00    sec   76.3 GBytes  65.6 Gbits/sec  16598
[ 7]  0.00-10.00    sec   76.3 GBytes  65.6 Gbits/sec
iperf Done.
(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
#

```

For cubic:

```
"Node: h1"

(root_)[kali]-[/home/harshita/Documents/assignment2/Part_b]
# iperf3 -c 10.0.0.4 -Z cubic
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 47204 connected to 10.0.0.4 port 5201
[ ID] Interval          Transfer          Bitrate          Retr  Cwnd
[ 7] 0.00-1.00    sec   8.30 GBytes    71.3 Gbits/sec    279   1.30 MBytes
[ 7] 1.00-2.00    sec   8.47 GBytes    72.8 Gbits/sec     65   1.31 MBytes
[ 7] 2.00-3.00    sec   8.21 GBytes    70.5 Gbits/sec      2   990 KBytes
[ 7] 3.00-4.00    sec   8.06 GBytes    69.2 Gbits/sec    176  1008 KBytes
[ 7] 4.00-5.00    sec   8.35 GBytes    71.7 Gbits/sec    629   1.00 MBytes
[ 7] 5.00-6.00    sec   8.23 GBytes    70.7 Gbits/sec    288   1.04 MBytes
[ 7] 6.00-7.00    sec   7.34 GBytes    63.0 Gbits/sec    477   1.13 MBytes
[ 7] 7.00-8.00    sec   7.86 GBytes    67.6 Gbits/sec      1   1.15 MBytes
[ 7] 8.00-9.00    sec   7.85 GBytes    67.4 Gbits/sec     25   1.21 MBytes
[ 7] 9.00-10.00   sec   7.47 GBytes    64.2 Gbits/sec    322   1.25 MBytes
-----
[ ID] Interval          Transfer          Bitrate          Retr
[ 7] 0.00-10.00   sec   80.1 GBytes    68.8 Gbits/sec    2264
[ 7] 0.00-10.00   sec   80.1 GBytes    68.8 Gbits/sec
                                     sender
                                     receiver

iperf Done.

(root_)[kali]-[/home/harshita/Documents/assignment2/Part_b]
```

For BBR:

```
"Node: h1"

(root_)[kali]-[/home/harshita/Documents/assignment2/Part_b]
# iperf3 -c 10.0.0.4 -Z bbr
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 36688 connected to 10.0.0.4 port 5201
[ ID] Interval          Transfer          Bitrate          Retr  Cwnd
[ 7] 0.00-1.00    sec   7.04 GBytes    60.5 Gbits/sec   1328   1.30 MBytes
[ 7] 1.00-2.00    sec   7.15 GBytes    61.5 Gbits/sec    763   933 KBytes
[ 7] 2.00-3.00    sec   7.95 GBytes    68.3 Gbits/sec    841   954 KBytes
[ 7] 3.00-4.00    sec   7.23 GBytes    62.1 Gbits/sec   2562   790 KBytes
[ 7] 4.00-5.00    sec   7.37 GBytes    63.3 Gbits/sec   2400   806 KBytes
[ 7] 5.00-6.00    sec   7.45 GBytes    64.0 Gbits/sec   2252   675 KBytes
[ 7] 6.00-7.00    sec   7.65 GBytes    65.7 Gbits/sec   1944   822 KBytes
[ 7] 7.00-8.00    sec   6.72 GBytes    57.7 Gbits/sec   2773   1.32 MBytes
[ 7] 8.00-9.00    sec   7.86 GBytes    67.5 Gbits/sec    144   1.34 MBytes
[ 7] 9.00-10.00   sec   7.80 GBytes    67.0 Gbits/sec    206   980 KBytes
-----
[ ID] Interval          Transfer          Bitrate          Retr
[ 7] 0.00-10.00   sec   74.2 GBytes    63.8 Gbits/sec   15213
[ 7] 0.00-10.00   sec   74.2 GBytes    63.8 Gbits/sec
                                     sender
                                     receiver

iperf Done.

(root_)[kali]-[/home/harshita/Documents/assignment2/Part_b]
```

- c. Run the client on H1, H2, H3 simultaneously and the server on H4. Report and reason the throughput over time for each host, each congestion control scheme. **(10 points)**
- d. Configure the link loss parameter of the middle link (s1 - s2) to 1% and 3% and run the experiment in (b). Report and compare the throughput over time for each congestion control scheme. **(10 points)**

For vegas:

```

(Node: h1)
(root@kali)~/Documents/assignment2/Part_b
# iperf3 -c 10.0.0.4 -Z vegas
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 54488 connected to 10.0.0.4 port 5201
[ ID] Interval      Transfer    Bitrate    Retr  Cwnd
[ 7]  0.00-1.00    sec  7.85 GBytes  67.4 Gbits/sec  954   923 KBytes
[ 7]  1.00-2.00    sec  7.89 GBytes  67.8 Gbits/sec  637   950 KBytes
[ 7]  2.00-3.00    sec  7.07 GBytes  60.7 Gbits/sec  224  1005 KBytes
[ 7]  3.00-4.00    sec  2.21 GBytes  19.0 Gbits/sec   78  1.17 MBytes
[ 7]  4.00-5.00    sec  5.05 GBytes  43.3 Gbits/sec  276  1.32 MBytes
[ 7]  5.00-6.00    sec  5.22 GBytes  44.9 Gbits/sec  153  1.45 MBytes
[ 7]  6.00-7.00    sec  6.87 GBytes  59.0 Gbits/sec  461  1.46 MBytes
[ 7]  7.00-8.00    sec  6.34 GBytes  54.5 Gbits/sec   65  1.15 MBytes
[ 7]  8.00-9.00    sec  5.26 GBytes  45.2 Gbits/sec    5  1.34 MBytes
[ 7]  9.00-10.00   sec  7.38 GBytes  63.4 Gbits/sec    3  1.49 MBytes
-----
[ ID] Interval      Transfer    Bitrate    Retr
[ 7]  0.00-10.00   sec  61.1 GBytes  52.5 Gbits/sec  2856
[ 7]  0.00-10.00   sec  61.1 GBytes  52.5 Gbits/sec
iperf Done.
(root@kali)~/Documents/assignment2/Part_b

```

For reno:

```
"Node: h1"

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
* iperf3 -c 10.0.0.4 -Z reno
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 34468 connected to 10.0.0.4 port 5201
[ ID] Interval            Transfer          Bitrate          Retr  Cwnd
[ 7]  0.00-1.00    sec   7.95 GBytes    68.3 Gbits/sec   1093   1.13 MBytes
[ 7]  1.00-2.00    sec   7.99 GBytes    68.6 Gbits/sec    357   1.14 MBytes
[ 7]  2.00-3.00    sec   7.98 GBytes    68.6 Gbits/sec    386   1.15 MBytes
[ 7]  3.00-4.00    sec   7.93 GBytes    68.1 Gbits/sec     56   1.16 MBytes
[ 7]  4.00-5.00    sec   7.86 GBytes    67.5 Gbits/sec     18   1.19 MBytes
[ 7]  5.00-6.00    sec   8.13 GBytes    69.8 Gbits/sec      4   1.21 MBytes
[ 7]  6.00-7.00    sec   7.92 GBytes    68.0 Gbits/sec      5   1.22 MBytes
[ 7]  7.00-8.00    sec   8.05 GBytes    69.1 Gbits/sec     22   1.23 MBytes
[ 7]  8.00-9.00    sec   7.55 GBytes    64.8 Gbits/sec    262   1.28 MBytes
[ 7]  9.00-10.00   sec   8.00 GBytes    68.7 Gbits/sec     43   1.01 MBytes
-----
[ ID] Interval            Transfer          Bitrate          Retr
[ 7]  0.00-10.00   sec   79.3 GBytes    68.2 Gbits/sec   2246
[ 7]  0.00-10.00   sec   79.3 GBytes    68.2 Gbits/sec
                                     sender
                                     receiver

iperf Done.

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
* 
```

For cubic:

```
"Node: h1"

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
* iperf3 -c 10.0.0.4 -Z cubic
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 34416 connected to 10.0.0.4 port 5201
[ ID] Interval            Transfer          Bitrate          Retr  Cwnd
[ 7]  0.00-1.00    sec   8.15 GBytes    70.0 Gbits/sec    228   15.0 MBytes
[ 7]  1.00-2.00    sec   7.73 GBytes    66.4 Gbits/sec   111   15.6 MBytes
[ 7]  2.00-3.00    sec   7.50 GBytes    64.4 Gbits/sec    51   17.0 MBytes
[ 7]  3.00-4.00    sec   7.47 GBytes    64.2 Gbits/sec     8   17.3 MBytes
[ 7]  4.00-5.00    sec   6.55 GBytes    56.3 Gbits/sec    14   17.3 MBytes
[ 7]  5.00-6.00    sec   8.17 GBytes    70.2 Gbits/sec    47   12.1 MBytes
[ 7]  6.00-7.00    sec   8.07 GBytes    69.3 Gbits/sec     1   12.1 MBytes
[ 7]  7.00-8.00    sec   7.60 GBytes    65.3 Gbits/sec     7   12.1 MBytes
[ 7]  8.00-9.00    sec   7.82 GBytes    67.2 Gbits/sec    24   12.1 MBytes
[ 7]  9.00-10.00   sec   7.25 GBytes    62.3 Gbits/sec     2   12.1 MBytes
-----
[ ID] Interval            Transfer          Bitrate          Retr
[ 7]  0.00-10.00   sec   76.3 GBytes    65.6 Gbits/sec   493
[ 7]  0.00-10.00   sec   76.3 GBytes    65.6 Gbits/sec
                                     sender
                                     receiver

iperf Done.

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
* 
```

For BBR:


```
"Node: h1"

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
└─$ iperf3 -c 10.0.0.4 -Z bbr
Connecting to host 10.0.0.4, port 5201
[ 7] local 10.0.0.1 port 49698 connected to 10.0.0.4 port 5201
[ ID] Interval      Transfer    Bitrate      Retr  Cwnd
[ 7]  0.00-1.00    sec  7.66 GBytes  65.8 Gbits/sec  326  3.30 MBytes
[ 7]  1.00-2.00    sec  7.72 GBytes  66.3 Gbits/sec  107  3.30 MBytes
[ 7]  2.00-3.00    sec  7.55 GBytes  64.9 Gbits/sec  795  1.62 MBytes
[ 7]  3.00-4.00    sec  7.56 GBytes  64.9 Gbits/sec   0  1.65 MBytes
[ 7]  4.00-5.00    sec  8.21 GBytes  70.5 Gbits/sec   67  1.65 MBytes
[ 7]  5.00-6.00    sec  6.98 GBytes  59.9 Gbits/sec   42  1.69 MBytes
[ 7]  6.00-7.00    sec  7.96 GBytes  68.4 Gbits/sec  556  1.19 MBytes
[ 7]  7.00-8.00    sec  8.06 GBytes  69.2 Gbits/sec   0  1.19 MBytes
[ 7]  8.00-9.00    sec  7.97 GBytes  68.5 Gbits/sec   0  1.19 MBytes
[ 7]  9.00-10.00   sec  7.78 GBytes  66.8 Gbits/sec   18  1.22 MBytes
-----
[ ID] Interval      Transfer    Bitrate      Retr
[ 7]  0.00-10.00   sec  77.5 GBytes  66.5 Gbits/sec  1911
[ 7]  0.00-10.00   sec  77.5 GBytes  66.5 Gbits/sec
                                     sender
                                     receiver

iperf Done.

(root@kali)-[/home/harshita/Documents/assignment2/Part_b]
└─$
```