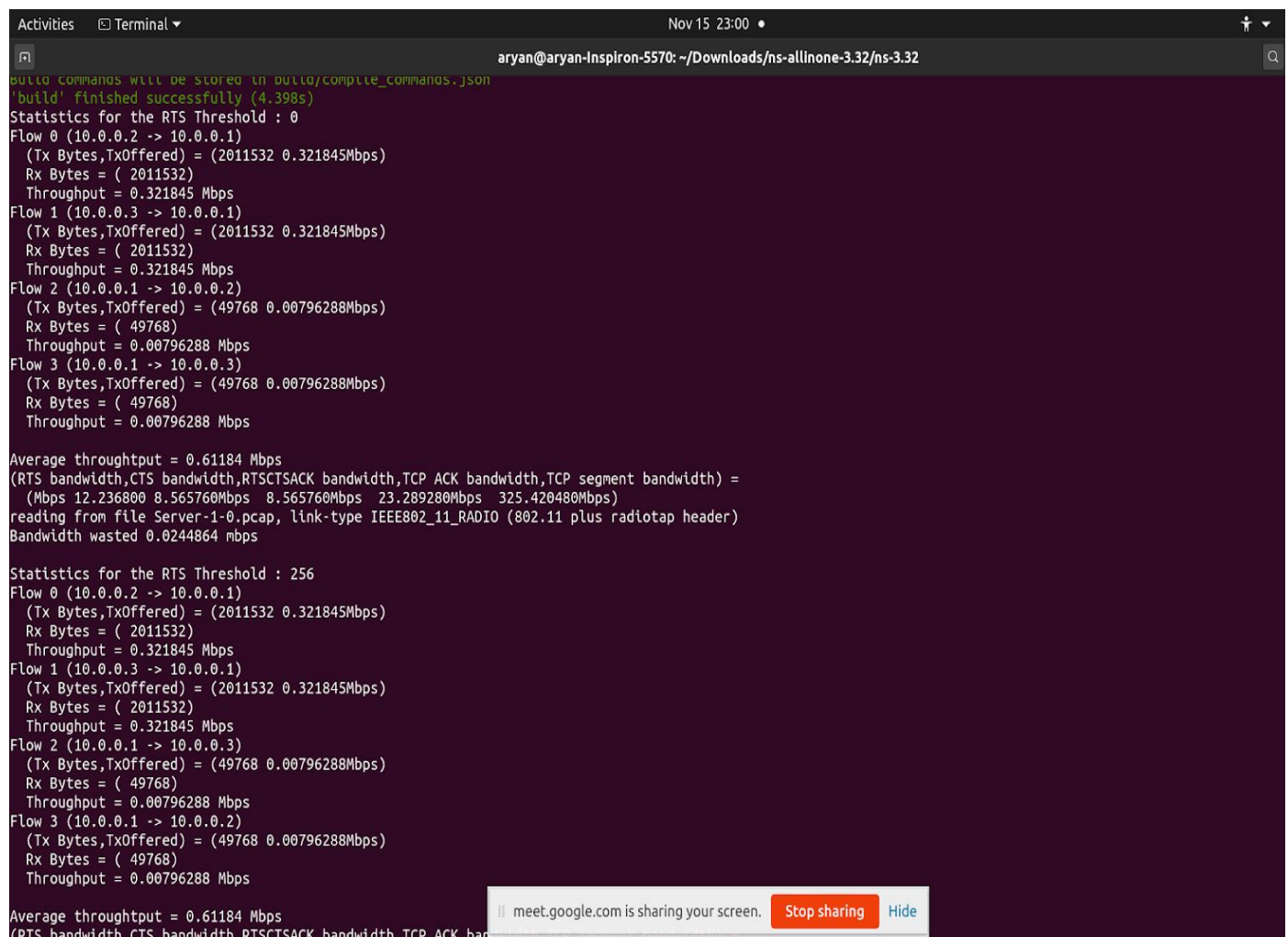# Group 78
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This is a report for lab assignment 4 in which an ns3 simulator is used along with script group78.cc to generate various stats and graphs.

In the experiment, we created 3 nodes 1 2 3 where 1 node acts as an access point, and 2 other nodes are used to record traffic.

RTS Threshold Limit 0 and 256

RTS Threshold Limit 512 and 1000


```
(RTS bandwidth,CTS bandwidth,RTSCTSACK bandwidth,TCP ACK bandwidth,TCP segment bandwidth) =
  (Mbps 18.521600 12.871040Mbps  12.965120Mbps  22.661760Mbps  316.652160Mbps)
reading from file Server-1-0.pcap, link-type IEEE802_11_RADIO (802.11 plus radiotap header)
Bandwidth wasted 0.0236224 mbps

Statistics for the RTS Threshold : 512
Flow 0 (10.0.0.2 -> 10.0.0.1)
  (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
  Rx Bytes = ( 2011532)
  Throughput = 0.321845 Mbps
Flow 1 (10.0.0.3 -> 10.0.0.1)
  (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
  Rx Bytes = ( 2011532)
  Throughput = 0.321845 Mbps
Flow 2 (10.0.0.1 -> 10.0.0.3)
  (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
  Rx Bytes = ( 49768)
  Throughput = 0.00796288 Mbps
Flow 3 (10.0.0.1 -> 10.0.0.2)
  (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
  Rx Bytes = ( 49768)
  Throughput = 0.00796288 Mbps

Average throughtput = 0.61184 Mbps
(RTS bandwidth,CTS bandwidth,RTSCTSACK bandwidth,TCP ACK bandwidth,TCP segment bandwidth) =
  (Mbps 12.236800 8.565760Mbps  8.565760Mbps  23.253760Mbps  324.924160Mbps)
reading from file Server-1-0.pcap, link-type IEEE802_11_RADIO (802.11 plus radiotap header)
Bandwidth wasted 0.0238432 mbps

Statistics for the RTS Threshold : 1000
Flow 0 (10.0.0.2 -> 10.0.0.1)
  (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
  Rx Bytes = ( 2011532)
  Throughput = 0.321845 Mbps
Flow 1 (10.0.0.3 -> 10.0.0.1)
  (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
  Rx Bytes = ( 2011532)
  Throughput = 0.321845 Mbps
Flow 2 (10.0.0.1 -> 10.0.0.2)
  (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
  Rx Bytes = ( 49768)
  Throughput = 0.00796288 Mbps
Flow 3 (10.0.0.1 -> 10.0.0.3)
  (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
  Rx Bytes = ( 49768)
  Throughput = 0.00796288 Mbps
```

```
 Throughput = 0.321845 Mbps
Flow 1 (10.0.0.3 -> 10.0.0.1)
 (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
 Rx Bytes = ( 2011532)
 Throughput = 0.321845 Mbps
Flow 2 (10.0.0.1 -> 10.0.0.3)
 (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
 Rx Bytes = ( 49768)
 Throughput = 0.00796288 Mbps
Flow 3 (10.0.0.1 -> 10.0.0.2)
 (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
 Rx Bytes = ( 49768)
 Throughput = 0.00796288 Mbps

Average throughtput = 0.61184 Mbps
(RTS bandwidth,CTS bandwidth,RTSCTSACK bandwidth,TCP ACK bandwidth,TCP segment bandwidth) =
 (Mbps 12.236800 8.565760Mbps  8.565760Mbps  23.253760Mbps  324.924160Mbps)
reading from file Server-1-0.pcap, link-type IEEE802_11_RADIO (802.11 plus radiotap header)
Bandwidth wasted 0.0238432 mbps

Statistics for the RTS Threshold : 1000
Flow 0 (10.0.0.2 -> 10.0.0.1)
 (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
 Rx Bytes = ( 2011532)
 Throughput = 0.321845 Mbps
Flow 1 (10.0.0.3 -> 10.0.0.1)
 (Tx Bytes,TxOffered) = (2011532 0.321845Mbps)
 Rx Bytes = ( 2011532)
 Throughput = 0.321845 Mbps
Flow 2 (10.0.0.1 -> 10.0.0.2)
 (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
 Rx Bytes = ( 49768)
 Throughput = 0.00796288 Mbps
Flow 3 (10.0.0.1 -> 10.0.0.3)
 (Tx Bytes,TxOffered) = (49768 0.00796288Mbps)
 Rx Bytes = ( 49768)
 Throughput = 0.00796288 Mbps

Average throughtput = 0.61184 Mbps
(RTS bandwidth,CTS bandwidth,RTSCTSACK bandwidth,TCP ACK bandwidth,TCP segment bandwidth) =
 (Mbps 12.236800 8.565760Mbps  8.565760Mbps  23.289280Mbps  325.420480Mbps)
reading from file Server-1-0.pcap, link-type IEEE802_11_RADIO (802.11 plus radiotap header)
Bandwidth wasted 0.0244192 mbps

(base) aryan@aryan-Inspiron-5570:~/Downloads/ns-allinone-3.3
```

We have attached graphs of bandwidth used for RTS, CTS, RTS & CTS ACK, TCP Segment, TCP ACK and bandwidth wasted along with the report. To analyze the TCP throughput at each node, we have printed the stats for each flow of type from node 1 to 2, node 1 to 3, node 2 to 1, node 3 to 1 for each RTS throughput limit. In each such flow, we have printed throughput in that flow. Using that, we can analyze throughput at respective nodes.