

2a. I created a network with the following command:

```
sudo mn -link tc,bw=10,delay=10ms
```

and ran iperf, giving the results:

9.49 Mbits/sec, 10.7 Mbits/sec

I then exited mininet and ran a `sudo mn -c`.

I then repeated the process with 20, 30, 40, 50 and 60 millisecond delays, giving the following results:

20      9.32, 10.8

30      9.09, 11.1

40      8.86, 10.6

50      8.74, 11.3

60      8.37, 10.7

Throughput between two nodes is affected by latency because the latency affects the window size and ramp up of that window size. The longer it takes for packets to be ACK'd the longer it takes for the next wave of packets to be sent. The window size may even collapse because the ACKs take too long even though there is available throughput.

2b.

The image displays a Wireshark packet capture window and a terminal window. The Wireshark window shows a list of captured packets, with the filter set to 'http'. The terminal window shows the output of a 'wget' command, which successfully retrieves a directory listing from a web server.

**Wireshark Packet Capture:**

No.	Time	Source	Destination	Protocol	Length	Info
1416	6.528951000	10.0.0.2	10.0.0.1	HTTP	174	GET / HTTP/1.1
1417	6.528954000	10.0.0.2	10.0.0.1	HTTP	174	[TCP Retransmission] GET / HTTP/1.1
1428	6.529334000	10.0.0.1	10.0.0.2	HTTP	105	Continuation or non-HTTP traffic
1429	6.529335000	10.0.0.1	10.0.0.2	HTTP	105	[TCP Retransmission] Continuation or non-HTTP traffic
1432	6.529345000	10.0.0.1	10.0.0.2	HTTP	108	Continuation or non-HTTP traffic
1433	6.529346000	10.0.0.1	10.0.0.2	HTTP	108	[TCP Retransmission] Continuation or non-HTTP traffic
1436	6.529354000	10.0.0.1	10.0.0.2	HTTP	89	Continuation or non-HTTP traffic
1437	6.529355000	10.0.0.1	10.0.0.2	HTTP	89	[TCP Retransmission] Continuation or non-HTTP traffic
1440	6.529363000	10.0.0.1	10.0.0.2	HTTP	70	Continuation or non-HTTP traffic
1441	6.529363000	10.0.0.1	10.0.0.2	HTTP	70	[TCP Retransmission] Continuation or non-HTTP traffic
1444	6.529374000	10.0.0.1	10.0.0.2	HTTP	870	Continuation or non-HTTP traffic
1445	6.529375000	10.0.0.1	10.0.0.2	HTTP	870	[TCP Retransmission] Continuation or non-HTTP traffic

**Terminal Output:**

```
mininet@mininet-vm: ~  
10.0.0.2 -- [02/Nov/2014 01:50:07] "GET / HTTP/1.1" 200 -  
mininet> h2 wget -O - h1  
--2014-11-02 01:51:11-- http://10.0.0.1/  
Connecting to 10.0.0.1:80... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 802 [text/html]  
Saving to: 'STDOUT'  
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 3.2 Final//EN"><html>  
<title>Directory listing for /</title>  
<body>  
<h2>Directory listing for /</h2>  
<hr>  
<ul>  
<li><a href=".bash_history">.bash_history</a>  
<li><a href=".bash_logout">.bash_logout</a>  
<li><a href=".bashrc">.bashrc</a>  
<li><a href=".cache/">.cache/</a>  
<li><a href=".gitconfig">.gitconfig</a>  
<li><a href=".profile">.profile</a>  
<li><a href=".rnd">.rnd</a>  
<li><a href=".wireshark">.wireshark</a>  
<li><a href=".Xauthority">.Xauthority</a>  
<li><a href="install-mininet-vm.sh">install-mininet-vm.sh</a>  
<li><a href="mininet/">mininet/</a>  
<li><a href="of-dissector/">of-dissector/</a>  
<li><a href="oflops/">oflops/</a>  
<li><a href="oftest/">oftest/</a>  
<li><a href="openflow/">openflow/</a>  
<li><a href="pox/">pox/</a>  
</ul>  
<hr>  
</body>  
</html>  
  
OK 100% 10.8G=0s
```