Computer Networks Fall 2016
Problem Sheet #4

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1 Problem 1

The following systems and interfaces are being simulated:

System	Interface	IPv4 address	Description
h1	h1-eth0	10.0.0.1	Ethernet connecting h1 to s1
h2	h2-eth0	10.0.0.2	Ethernet connecting h2 to s1
s1	s1	(none)	Unconnected ethernet interface of switch s1
s1	s1-eth0	192.168.101.15	Ethernet connecting S1 to NATed interface with host machine
s1	s1-eth1	(none)	Ethernet connecting s1 to h1
s1	s1-eth2	(none)	Ethernet connecting s1 to h2
(all)	lo	127.0.0.1	Local loopback interface connecting each node to itself

2 Problem 2

The following results were achieved with iperf:

Link config	Transfer	Data Rate
	1.32 Gbits/sec	1.32 Gbits/sec
`bw=10`	9.57 Mbits/sec	10.6 Mbits/sec
`bw=10,delay='10ms'`	9.51 Mbits/sec	11.5 Mbits/sec
`bw=10,delay='10ms',loss=1`	3.30 Mbits/sec	3.60 Mbits/sec
`bw=10,delay='10ms',loss=5`	168 Kbits/sec	197 Kbits/sec
`bw=10,delay='10ms',loss=10`	27.0 Kbits/sec	39.4 Kbits/sec

3 Problem 3

We use the following Python script to configure and test the required topology:

```
#!/usr/bin/python2
from mininet import net, cli

def main():
    mn = net.Mininet()

    # Add a switch and controller
    s1 = mn.addSwitch('s1')
    s1.cmd("sysctl net.ipv6.conf.all.disable_ipv6=1")
    c0 = mn.addController('c0')

    # Add hosts h1 - h3
    h1 = mn.addHost('h1')
```

```
    h2 = mn.addHost('h2')
    h3 = mn.addHost('h3')

    # add the links
    mn.addLink(h1, s1)
    mn.addLink(h2, s1)
    mn.addLink(h3, s1)

    # we assign /8 prefixes to h1 and h3
    h1.cmd('ifconfig h1-eth0 inet6 add 2001:638:709:a:1::/8')
    h3.cmd('ifconfig h3-eth0 inet6 add 2001:638:709:b:1::/8')

    # we give h2 the bigger /64 prefixes
    h2.cmd('sysctl -w net.ipv6.conf.all.forwarding=1')
    h2.cmd('ifconfig h2-eth0 inet6 add 2001:638:709:a::/64')
    h2.cmd('ifconfig h2-eth0 inet6 add 2001:638:709:b::/64')

    # START the network
    mn.start()

    # PING TESTS

    print('h1 ping h2')
    print(h1.cmd('ping6 -c5 2001:638:709:a::'))
    print('h1 ping h3')
    print(h1.cmd('ping6 -c5 2001:638:709:b:1::'))


    print('h2 ping h1')
    print(h2.cmd('ping6 -c5 2001:638:709:a:1::'))
    print('h2 ping h3')
    print(h2.cmd('ping6 -c5 2001:638:709:b:1::'))


    print('h3 ping h1')
    print(h3.cmd('ping6 -c5 2001:638:709:a:1::'))
    print('h3 ping h2')
    print(h3.cmd('ping6 -c5 2001:638:709:b::'))


    # and clean up
    mn.stop()

if __name__ == '__main__':
    main()
```