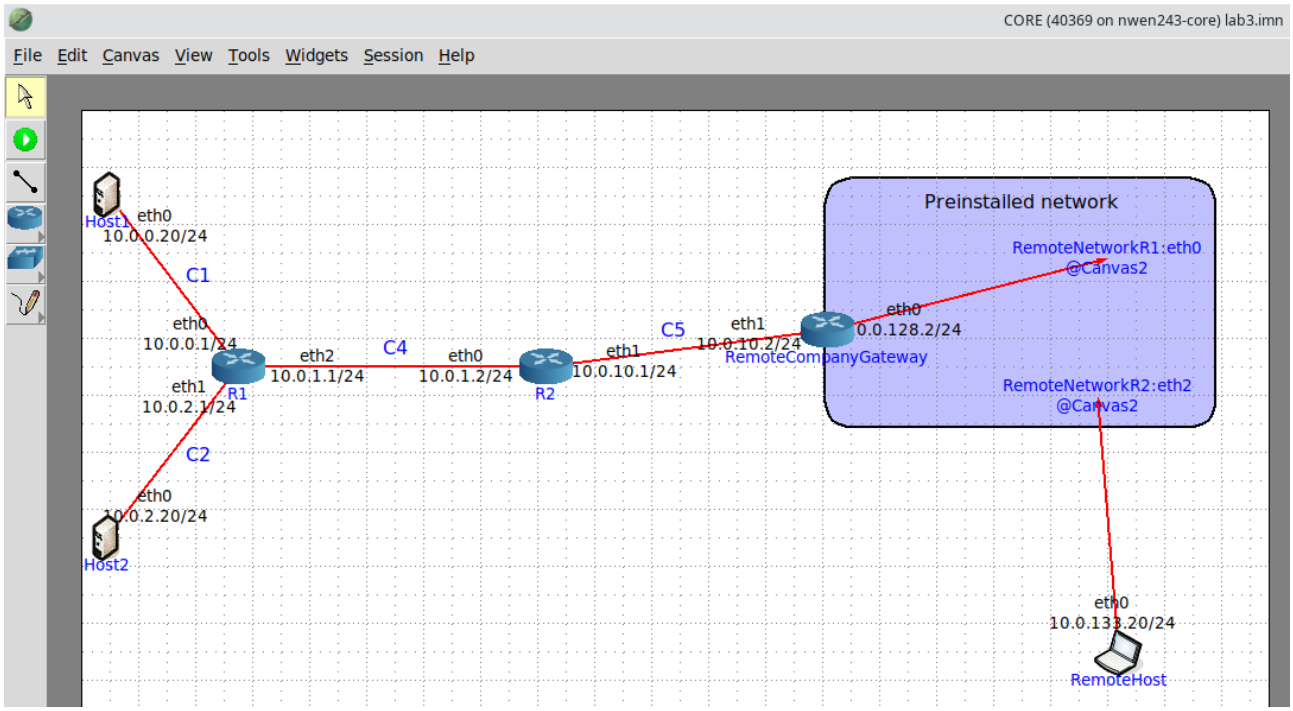
PART 1: A Simple Network

T2(a)

Device	Port	Cable	IPv4 Address	IPv4 Netmask	IPv6 Address
R1	eth2	C4	10.0.1.1	255.255.255.0	2001:1::1/64
R1	eth0	C1	10.0.0.1	255.255.255.0	2001:0::1/64
R1	eth1	C2	10.0.2.1	255.255.255.0	2001:2::1/64
R2	eth0	C4	10.0.1.2	255.255.255.0	2001:1::2/64
R2	eth1	C5	10.0.10.1	255.255.255.0	2001:10::1/64
Remote Company Gateway	eth1	C5	10.0.10.2	255.255.255.0	2001:10::2/64
Host1	eth0	C1	10.0.0.20	255.255.255.0	2001:0::20/64
Host2	eth0	C2	10.0.2.20	255.255.255.0	2001:2::20/64
Remote Host	NA	NA	10.0.133.20	255.255.255.0	2001:133::20/64

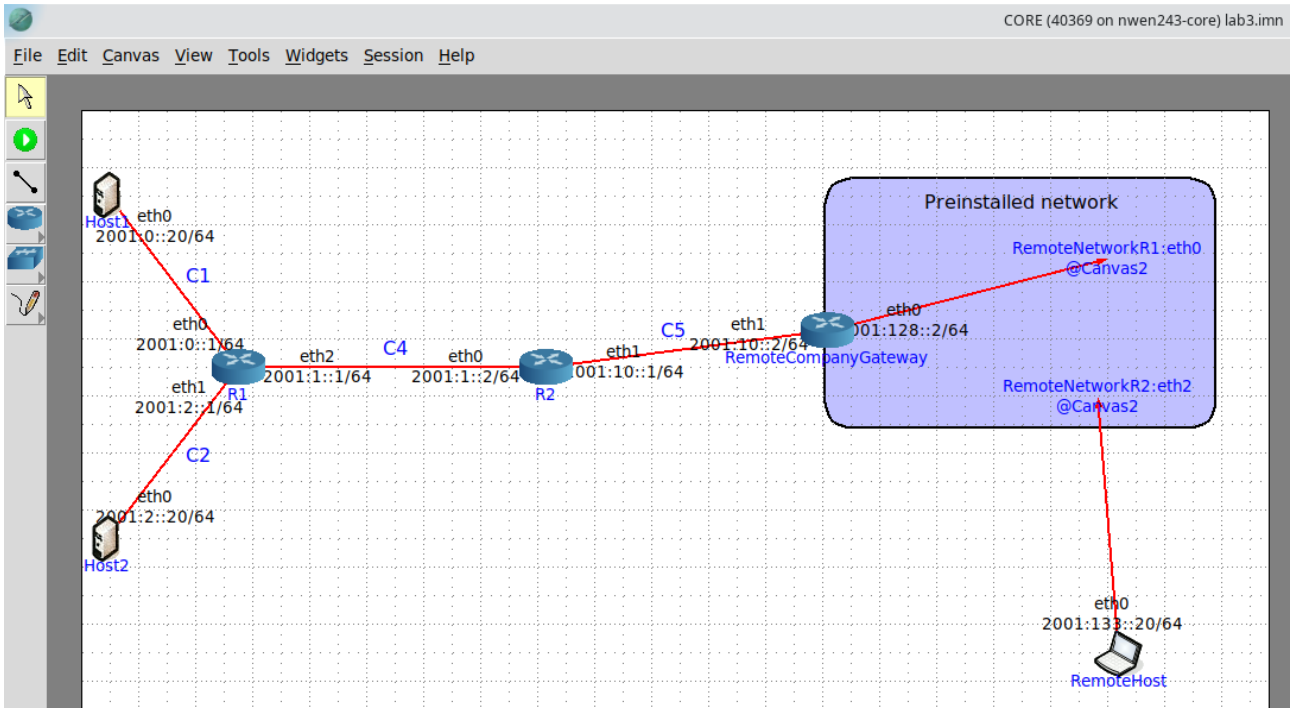
T2(b)

CORE network with interface names and IPv4 Addresses:



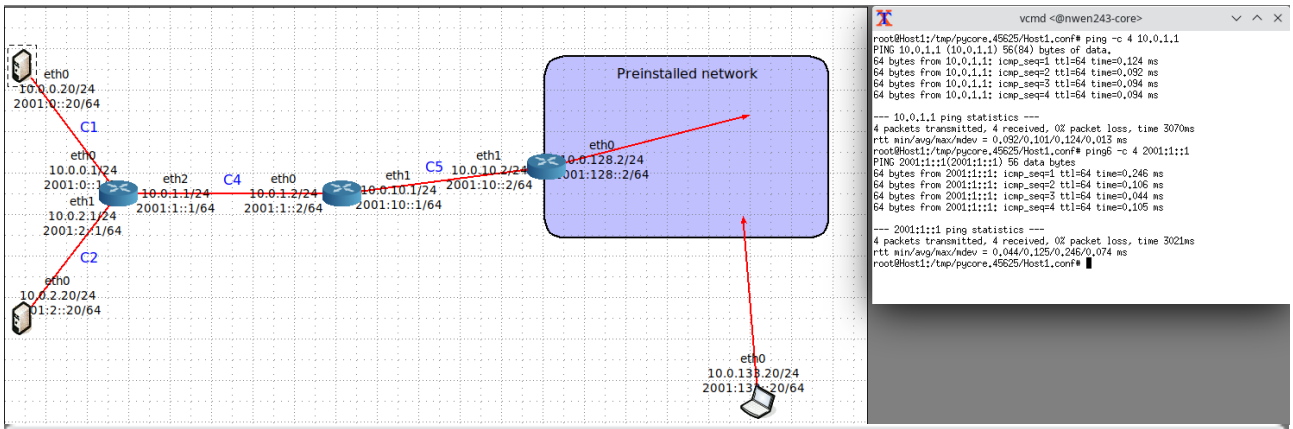
T2(c)

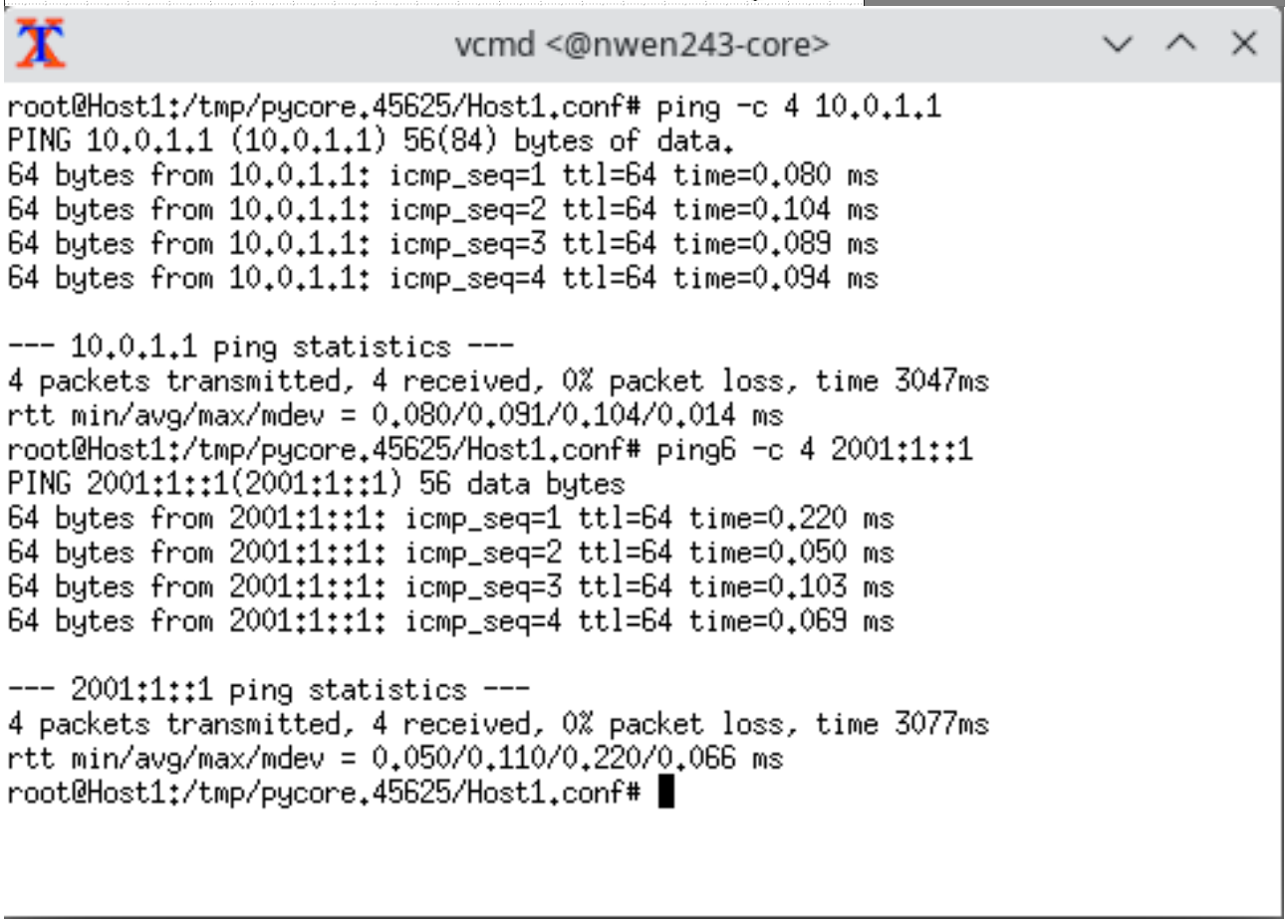
CORE network with interface names and IPv6 Addresses:



T4 (a)

Host1 is able to ping Router1:

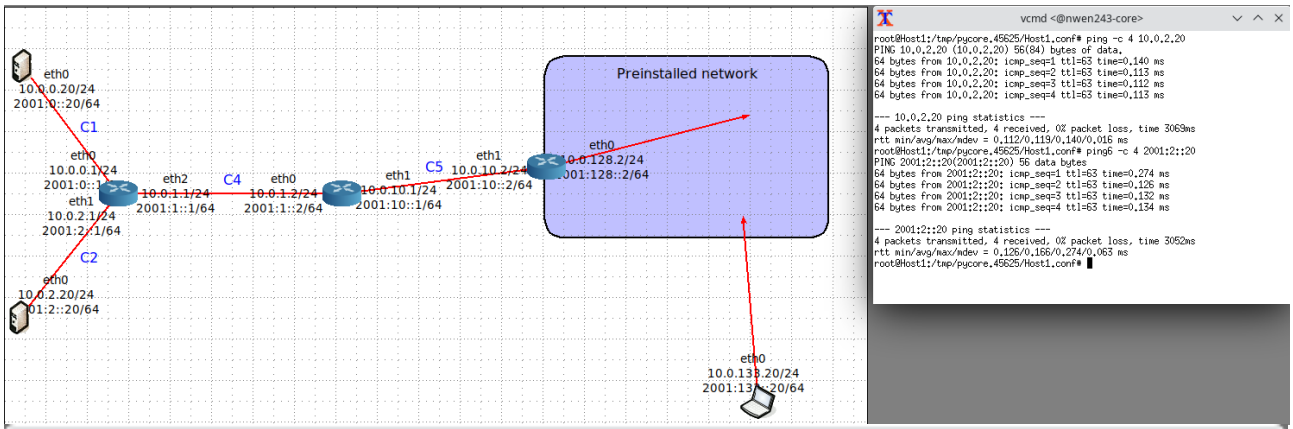




```
vcmd <@nwen243-core>
root@Host1:/tmp/pycore.45625/Host1.conf# ping -c 4 10.0.1.1
PING 10.0.1.1 (10.0.1.1) 56(84) bytes of data.
64 bytes from 10.0.1.1: icmp_seq=1 ttl=64 time=0.080 ms
64 bytes from 10.0.1.1: icmp_seq=2 ttl=64 time=0.104 ms
64 bytes from 10.0.1.1: icmp_seq=3 ttl=64 time=0.089 ms
64 bytes from 10.0.1.1: icmp_seq=4 ttl=64 time=0.094 ms

--- 10.0.1.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3047ms
rtt min/avg/max/mdev = 0.080/0.091/0.104/0.014 ms
root@Host1:/tmp/pycore.45625/Host1.conf# ping6 -c 4 2001:1::1
PING 2001:1::1(2001:1::1) 56 data bytes
64 bytes from 2001:1::1: icmp_seq=1 ttl=64 time=0.220 ms
64 bytes from 2001:1::1: icmp_seq=2 ttl=64 time=0.050 ms
64 bytes from 2001:1::1: icmp_seq=3 ttl=64 time=0.103 ms
64 bytes from 2001:1::1: icmp_seq=4 ttl=64 time=0.069 ms

--- 2001:1::1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3077ms
rtt min/avg/max/mdev = 0.050/0.110/0.220/0.066 ms
root@Host1:/tmp/pycore.45625/Host1.conf#
```

T4 (b)

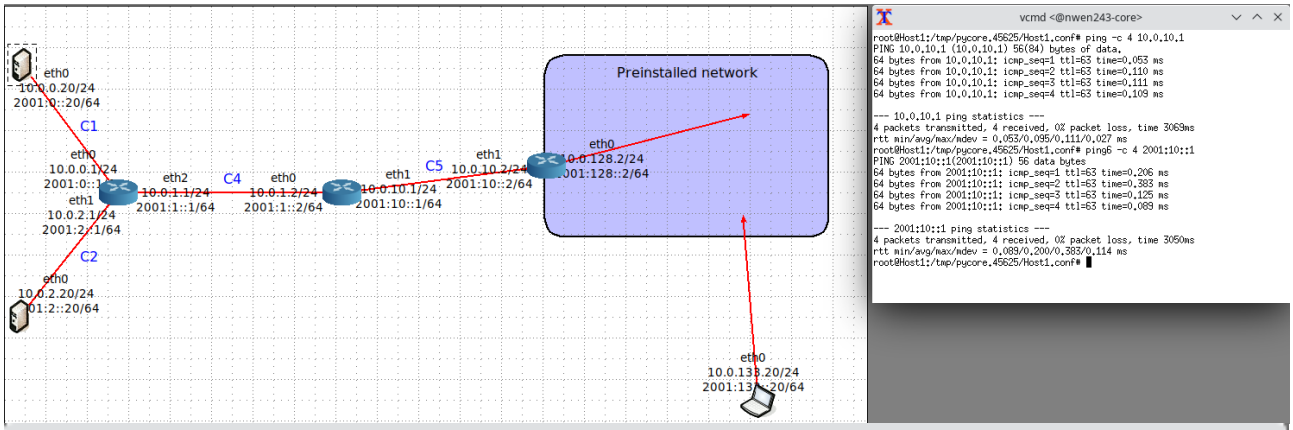
Host1 is able to ping Host2:



vcmd <@nwen243-core>

```
root@Host1:/tmp/pycore.45625/Host1.conf# ping -c 4 10.0.2.20
PING 10.0.2.20 (10.0.2.20) 56(84) bytes of data.
64 bytes from 10.0.2.20: icmp_seq=1 ttl=63 time=0.182 ms
64 bytes from 10.0.2.20: icmp_seq=2 ttl=63 time=0.114 ms
64 bytes from 10.0.2.20: icmp_seq=3 ttl=63 time=0.113 ms
64 bytes from 10.0.2.20: icmp_seq=4 ttl=63 time=0.116 ms

--- 10.0.2.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3030ms
rtt min/avg/max/mdev = 0.113/0.131/0.182/0.030 ms
root@Host1:/tmp/pycore.45625/Host1.conf# ping6 -c 4 2001:2::20
PING 2001:2::20(2001:2::20) 56 data bytes
64 bytes from 2001:2::20: icmp_seq=1 ttl=63 time=0.248 ms
64 bytes from 2001:2::20: icmp_seq=2 ttl=63 time=0.125 ms
64 bytes from 2001:2::20: icmp_seq=3 ttl=63 time=0.126 ms
64 bytes from 2001:2::20: icmp_seq=4 ttl=63 time=0.134 ms

--- 2001:2::20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3046ms
rtt min/avg/max/mdev = 0.125/0.158/0.248/0.052 ms
root@Host1:/tmp/pycore.45625/Host1.conf#
```

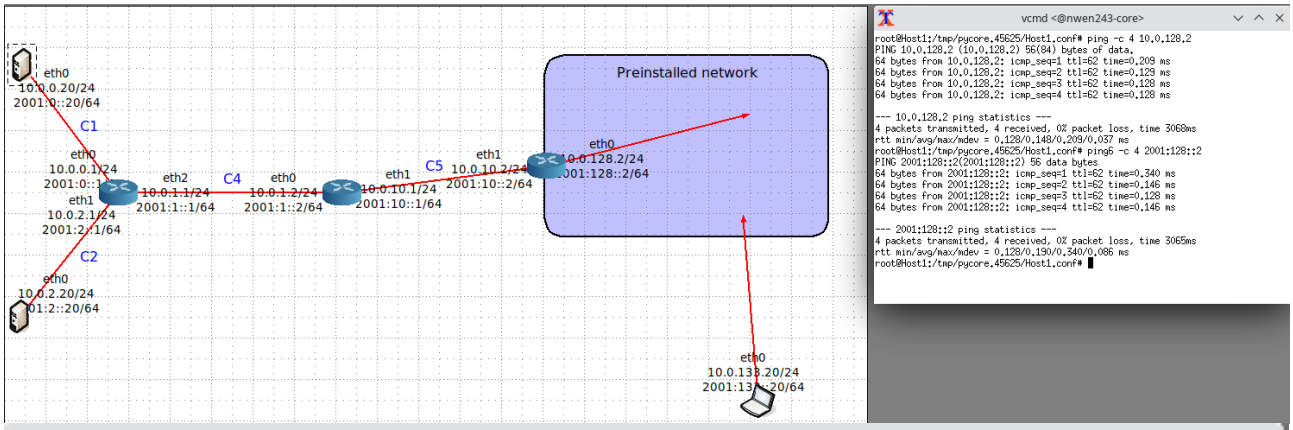
Host1 is able to ping Router2:



vcmd <@nwen243-core>

```
root@Host1:/tmp/pycore.45625/Host1.conf# ping -c 4 10.0.10.1
PING 10.0.10.1 (10.0.10.1) 56(84) bytes of data.
64 bytes from 10.0.10.1: icmp_seq=1 ttl=63 time=0.219 ms
64 bytes from 10.0.10.1: icmp_seq=2 ttl=63 time=0.129 ms
64 bytes from 10.0.10.1: icmp_seq=3 ttl=63 time=0.110 ms
64 bytes from 10.0.10.1: icmp_seq=4 ttl=63 time=0.110 ms

--- 10.0.10.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3077ms
rtt min/avg/max/mdev = 0.110/0.142/0.219/0.045 ms
root@Host1:/tmp/pycore.45625/Host1.conf# ping6 -c 4 2001:10::1
PING 2001:10::1(2001:10::1) 56 data bytes
64 bytes from 2001:10::1: icmp_seq=1 ttl=63 time=0.249 ms
64 bytes from 2001:10::1: icmp_seq=2 ttl=63 time=0.121 ms
64 bytes from 2001:10::1: icmp_seq=3 ttl=63 time=0.131 ms
64 bytes from 2001:10::1: icmp_seq=4 ttl=63 time=0.162 ms

--- 2001:10::1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3046ms
rtt min/avg/max/mdev = 0.121/0.165/0.249/0.052 ms
root@Host1:/tmp/pycore.45625/Host1.conf#
```

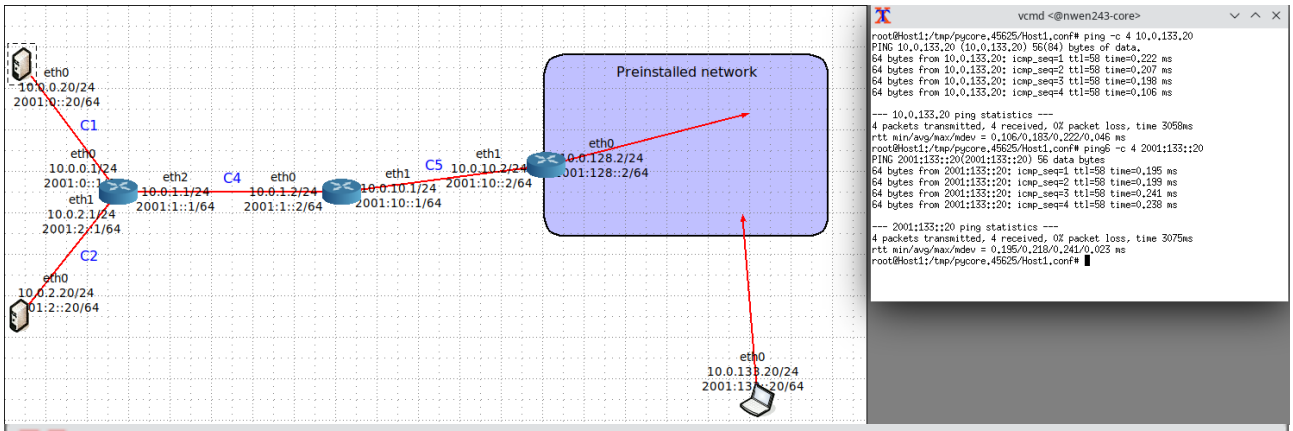
Host1 is able to ping Remote Company Gateway:



vcmd <@nwen243-core>

```
root@Host1:/tmp/pycore.45625/Host1.conf# ping -c 4 10.0.128.2
PING 10.0.128.2 (10.0.128.2) 56(84) bytes of data.
64 bytes from 10.0.128.2: icmp_seq=1 ttl=62 time=0.116 ms
64 bytes from 10.0.128.2: icmp_seq=2 ttl=62 time=0.119 ms
64 bytes from 10.0.128.2: icmp_seq=3 ttl=62 time=0.131 ms
64 bytes from 10.0.128.2: icmp_seq=4 ttl=62 time=0.106 ms

--- 10.0.128.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3062ms
rtt min/avg/max/mdev = 0.106/0.118/0.131/0.008 ms
root@Host1:/tmp/pycore.45625/Host1.conf# ping6 -c 4 2001:128::2
PING 2001:128::2(2001:128::2) 56 data bytes
64 bytes from 2001:128::2: icmp_seq=1 ttl=62 time=0.379 ms
64 bytes from 2001:128::2: icmp_seq=2 ttl=62 time=0.146 ms
64 bytes from 2001:128::2: icmp_seq=3 ttl=62 time=0.155 ms
64 bytes from 2001:128::2: icmp_seq=4 ttl=62 time=0.153 ms

--- 2001:128::2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3029ms
rtt min/avg/max/mdev = 0.146/0.208/0.379/0.099 ms
root@Host1:/tmp/pycore.45625/Host1.conf#
```

Host1 is able to ping Remote Host:



vcmd <@nwen243-core>
root@Host1:/tmp/pycore.45625/Host1.conf# ping -c 4 10.0.133.20
PING 10.0.133.20 (10.0.133.20) 56(84) bytes of data.
64 bytes from 10.0.133.20: icmp_seq=1 ttl=58 time=0.222 ms
64 bytes from 10.0.133.20: icmp_seq=2 ttl=58 time=0.207 ms
64 bytes from 10.0.133.20: icmp_seq=3 ttl=58 time=0.198 ms
64 bytes from 10.0.133.20: icmp_seq=4 ttl=58 time=0.106 ms
--- 10.0.133.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3058ms
rtt min/avg/max/mdev = 0.106/0.183/0.222/0.046 ms
root@Host1:/tmp/pycore.45625/Host1.conf# ping6 -c 4 2001:133::20
PING 2001:133::20(2001:133::20) 56 data bytes
64 bytes from 2001:133::20: icmp_seq=1 ttl=58 time=0.195 ms
64 bytes from 2001:133::20: icmp_seq=2 ttl=58 time=0.199 ms
64 bytes from 2001:133::20: icmp_seq=3 ttl=58 time=0.241 ms
64 bytes from 2001:133::20: icmp_seq=4 ttl=58 time=0.238 ms
--- 2001:133::20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3075ms
rtt min/avg/max/mdev = 0.195/0.218/0.241/0.023 ms
root@Host1:/tmp/pycore.45625/Host1.conf#

Questions:

1. What does the default route do ?

A default route is used when another route is not available for an IP address. When a routing device receives a packet, it checks to see if the destination IP address belongs to one of its local subnets. The device checks its routing table if the destination address is not local. In cases where the remote destination subnet is not listed in the routing table, the packet is forwarded using the default route toward the destination. The default route generally has a next-hop address for another routing device that performs the same function. This process is repeated until the packet reaches its destination.

2. Why do the IPv4 addresses all start with 10.0 ?

IPv4 addresses that start with 10.0 are considered to be class A addresses (A to E in descending order of size). Class A addresses reserve the first byte for the network address and the remaining three bytes are used for the node addresses.

Class A network addresses are one byte long with the first bit of this byte reserved as an identifier bit. This leaves 7 bits for addressing. Thus the largest number of class A networks that can be made is $2^7 – 2$ (we subtract two as two of the addresses found in this range are reserved for the default route as well as diagnostics), which is equal to 126. Therefore, the range of values that class A IPv4 network addresses can take is between 1 and 126. Class B and C networks apportion the first 16 and 24 bits for the network addresses respectively (with their corresponding value ranges). Evidently, it can be inferred that the range of values an IPv4 address can take for network addresses is not limited to 10.0 only.

A possible reason as to why all IPv4 network addresses begin with a 10.0, in this particular case, could be because we are designing a computer network for a business that has the potential to grow and expand larger in the future. Class A network addresses provide the most flexibility in terms of growth. For example, if we used the 10.0.0.0 network address with a /24 mask, then we would have 65,536 networks, each with 254 hosts. This is a very generous allocation for potential growth.

3. What is the IPv6 equivalent ?

The IPv6 equivalent is 2001.

4. What is a netmask and why does IPv4 need one ?

A netmask determines the number of bits that represent the subnet number and the host number in the host address space – ie. the purpose of the subnet mask is to determine which hosts are on the local network and which are outside of the network. Hosts can communicate directly to hosts on the same network, but will require a router to direct its communication to hosts on external networks. This allows the subnet address scheme to work.

IPv4 needs a netmask in order to facilitate this scheme. One of the benefits that come from this scheme is overall reduced network traffic. By employing the use of routers, most of the traffic and activity will remain on the local network. Packets that are meant to reach other networks (external networks) will be directed by the router. These routers make broadcast domains. The smaller the broadcast domains created, the less activity and traffic will be on that particular network component.

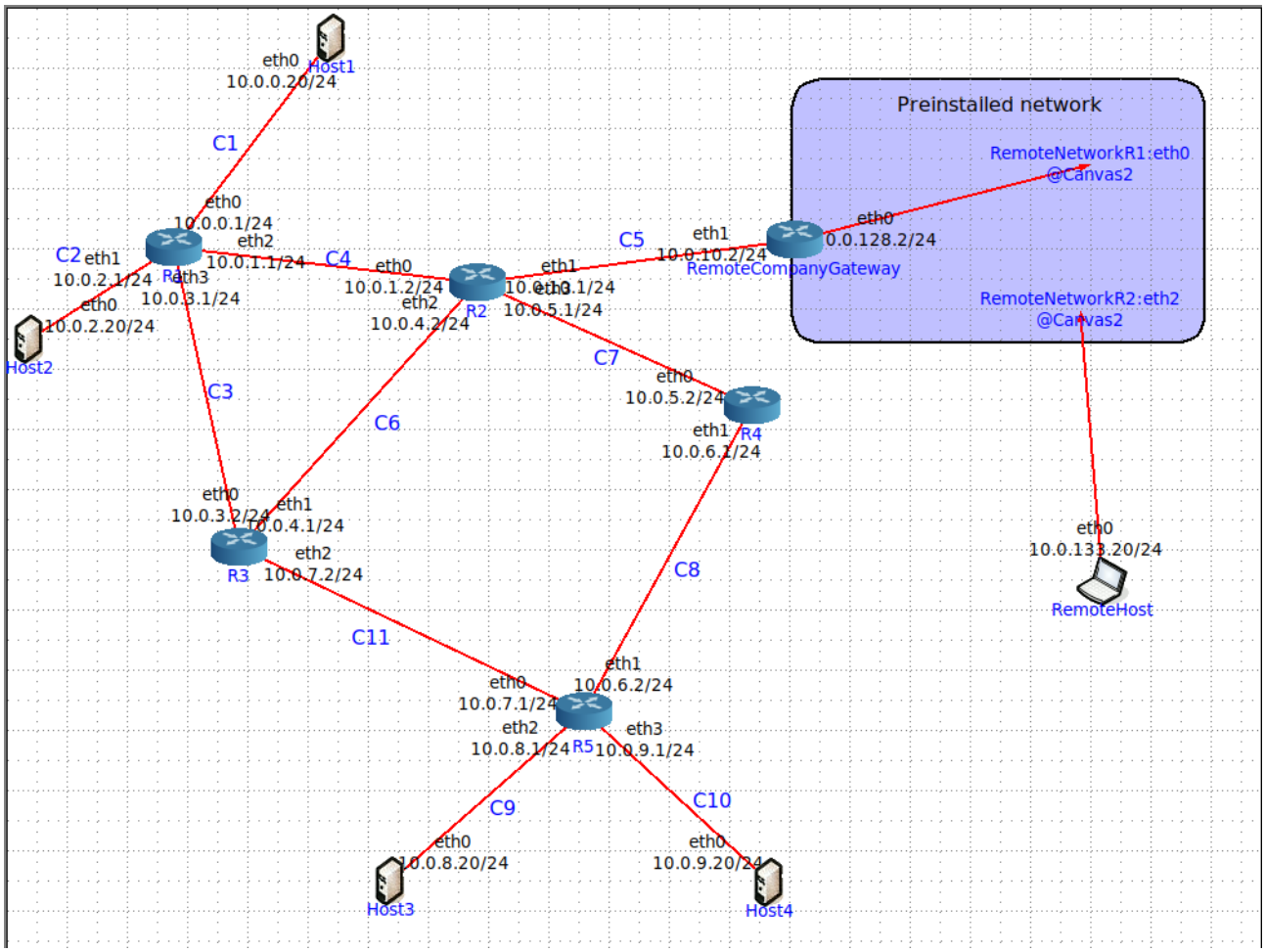
PART 2: Expansion

T5 (a)

Router	Port	Cable	IPv4 Addresses	IPv4 Netmask	IPv6 Addresses
R1	eth3	C3	10.0.3.1	255.255.255.0	2001:3::1/64
R2	eth2	C6	10.0.4.2	255.255.255.0	2001:4::2/64
R2	eth3	C7	10.0.5.1	255.255.255.0	2001:5::1/64
R3	eth0	C3	10.0.3.2	255.255.255.0	2001:3::2/64
R3	eth1	C6	10.0.4.1	255.255.255.0	2001:4::1/64
R3	eth2	C11	10.0.7.2	255.255.255.0	2001:7::2/64
R4	eth0	C7	10.0.5.2	255.255.255.0	2001:5::2/64
R4	eth1	C8	10.0.6.1	255.255.255.0	2001:6::1/64
R5	eth0	C11	10.0.7.1	255.255.255.0	2001:7::1/64
R5	eth1	C8	10.0.6.2	255.255.255.0	2001:6::2/64
R5	eth2	C9	10.0.8.1	255.255.255.0	2001:8::1/64
R5	eth3	C10	10.0.9.1	255.255.255.0	2001:9::1/64
Host3	eth0	C9	10.0.8.20	255.255.255.0	2001:8::20/64
Host4	eth0	C10	10.0.9.20	255.255.255.0	2001:9::20/64

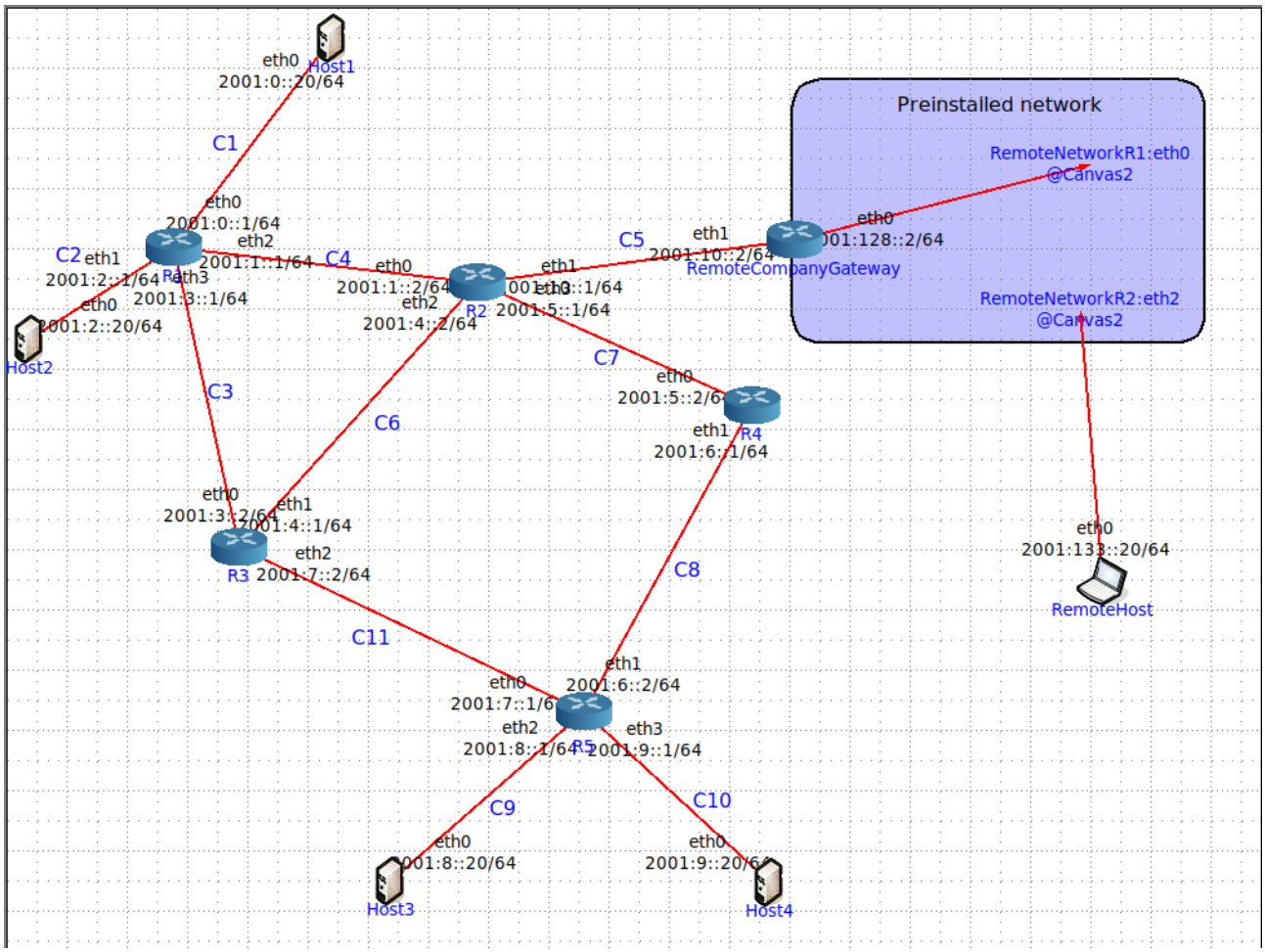
T5 (b)

CORE network with interface names and IPv4 addresses:



T5 (c)

CORE network with interface names and IPv6 addresses:



T7 (a)

Pings to IPv4 addresses:

```
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.0.20
PING 10.0.0.20 (10.0.0.20) 56(84) bytes of data.
64 bytes from 10.0.0.20: icmp_seq=1 ttl=61 time=0.131 ms
64 bytes from 10.0.0.20: icmp_seq=2 ttl=61 time=0.140 ms
64 bytes from 10.0.0.20: icmp_seq=3 ttl=61 time=0.141 ms
64 bytes from 10.0.0.20: icmp_seq=4 ttl=61 time=0.141 ms

--- 10.0.0.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3072ms
rtt min/avg/max/mdev = 0.131/0.138/0.141/0.009 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.1.2
PING 10.0.1.2 (10.0.1.2) 56(84) bytes of data.
64 bytes from 10.0.1.2: icmp_seq=1 ttl=62 time=0.098 ms
64 bytes from 10.0.1.2: icmp_seq=2 ttl=62 time=0.125 ms
64 bytes from 10.0.1.2: icmp_seq=3 ttl=62 time=0.157 ms
64 bytes from 10.0.1.2: icmp_seq=4 ttl=62 time=0.048 ms

--- 10.0.1.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.048/0.107/0.157/0.039 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.2.20
PING 10.0.2.20 (10.0.2.20) 56(84) bytes of data.
64 bytes from 10.0.2.20: icmp_seq=1 ttl=61 time=0.298 ms
64 bytes from 10.0.2.20: icmp_seq=2 ttl=61 time=0.064 ms
64 bytes from 10.0.2.20: icmp_seq=3 ttl=61 time=0.083 ms
64 bytes from 10.0.2.20: icmp_seq=4 ttl=61 time=0.142 ms

--- 10.0.2.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3055ms
rtt min/avg/max/mdev = 0.064/0.146/0.298/0.093 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.3.1
PING 10.0.3.1 (10.0.3.1) 56(84) bytes of data.
64 bytes from 10.0.3.1: icmp_seq=1 ttl=62 time=0.339 ms
64 bytes from 10.0.3.1: icmp_seq=2 ttl=62 time=0.127 ms
64 bytes from 10.0.3.1: icmp_seq=3 ttl=62 time=0.158 ms
64 bytes from 10.0.3.1: icmp_seq=4 ttl=62 time=0.125 ms


--- 10.0.3.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.125/0.187/0.339/0.089 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.4.2
PING 10.0.4.2 (10.0.4.2) 56(84) bytes of data.
64 bytes from 10.0.4.2: icmp_seq=1 ttl=62 time=0.055 ms
64 bytes from 10.0.4.2: icmp_seq=2 ttl=62 time=0.127 ms
64 bytes from 10.0.4.2: icmp_seq=3 ttl=62 time=0.123 ms
64 bytes from 10.0.4.2: icmp_seq=4 ttl=62 time=0.126 ms

--- 10.0.4.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3069ms
rtt min/avg/max/mdev = 0.055/0.107/0.127/0.033 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.5.2
PING 10.0.5.2 (10.0.5.2) 56(84) bytes of data.
64 bytes from 10.0.5.2: icmp_seq=1 ttl=63 time=0.080 ms
64 bytes from 10.0.5.2: icmp_seq=2 ttl=63 time=0.106 ms
64 bytes from 10.0.5.2: icmp_seq=3 ttl=63 time=0.217 ms
64 bytes from 10.0.5.2: icmp_seq=4 ttl=63 time=0.105 ms

--- 10.0.5.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3053ms
rtt min/avg/max/mdev = 0.080/0.127/0.217/0.053 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.6.1
PING 10.0.6.1 (10.0.6.1) 56(84) bytes of data.
64 bytes from 10.0.6.1: icmp_seq=1 ttl=63 time=0.075 ms
64 bytes from 10.0.6.1: icmp_seq=2 ttl=63 time=0.106 ms
64 bytes from 10.0.6.1: icmp_seq=3 ttl=63 time=0.107 ms
64 bytes from 10.0.6.1: icmp_seq=4 ttl=63 time=0.103 ms

--- 10.0.6.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3053ms
rtt min/avg/max/mdev = 0.075/0.097/0.107/0.017 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping -c 4 10.0.10.2
PING 10.0.10.2 (10.0.10.2) 56(84) bytes of data.
64 bytes from 10.0.10.2: icmp_seq=1 ttl=61 time=0.128 ms
64 bytes from 10.0.10.2: icmp_seq=2 ttl=61 time=0.141 ms
64 bytes from 10.0.10.2: icmp_seq=3 ttl=61 time=0.140 ms
64 bytes from 10.0.10.2: icmp_seq=4 ttl=61 time=0.145 ms

--- 10.0.10.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3068ms
rtt min/avg/max/mdev = 0.128/0.138/0.145/0.013 ms
root@Host3:/tmp/pycore.38795/Host3.conf#
```

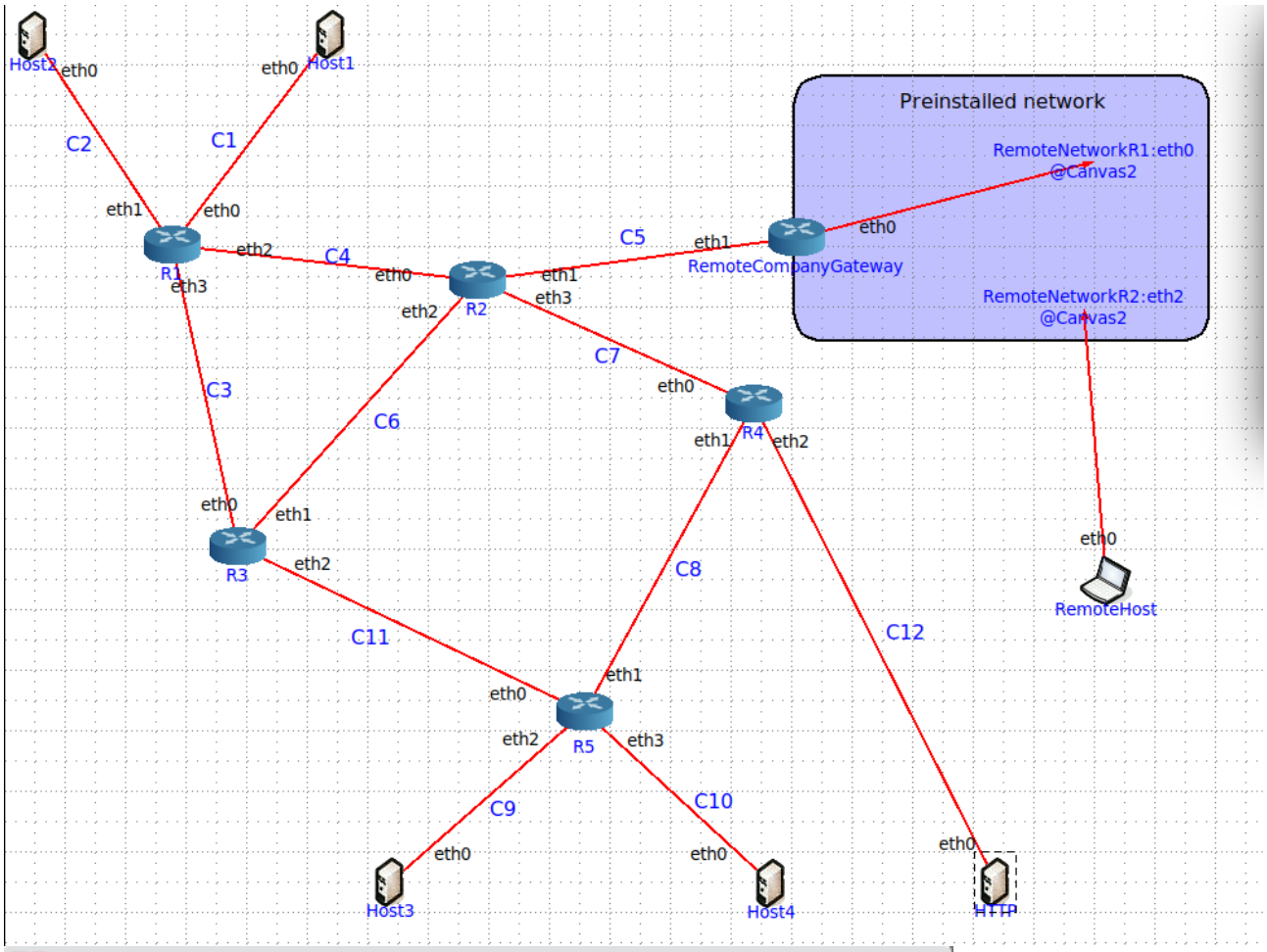
T7 (b)

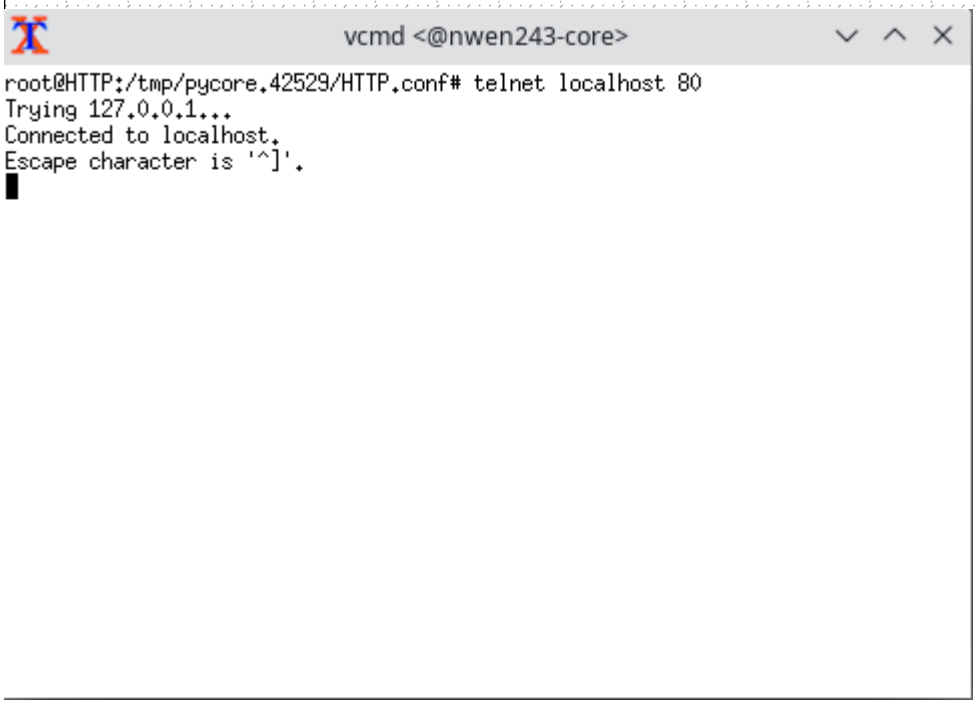
Pings to IPv6 addresses:

```
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:0::20
PING 2001:0::20(2001::20) 56 data bytes
64 bytes from 2001::20: icmp_seq=1 ttl=61 time=0.842 ms
64 bytes from 2001::20: icmp_seq=2 ttl=61 time=0.176 ms
64 bytes from 2001::20: icmp_seq=3 ttl=61 time=0.177 ms
64 bytes from 2001::20: icmp_seq=4 ttl=61 time=0.179 ms

--- 2001:0::20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3041ms
rtt min/avg/max/mdev = 0.176/0.343/0.842/0.288 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:1::2
PING 2001:1::2(2001:1::2) 56 data bytes
64 bytes from 2001:1::2: icmp_seq=1 ttl=62 time=0.152 ms
64 bytes from 2001:1::2: icmp_seq=2 ttl=62 time=0.141 ms
64 bytes from 2001:1::2: icmp_seq=3 ttl=62 time=0.143 ms
64 bytes from 2001:1::2: icmp_seq=4 ttl=62 time=0.147 ms

--- 2001:1::2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3054ms
rtt min/avg/max/mdev = 0.141/0.145/0.152/0.015 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:2::20
PING 2001:2::20(2001:2::20) 56 data bytes
64 bytes from 2001:2::20: icmp_seq=1 ttl=61 time=0.116 ms
64 bytes from 2001:2::20: icmp_seq=2 ttl=61 time=0.170 ms
64 bytes from 2001:2::20: icmp_seq=3 ttl=61 time=0.165 ms
64 bytes from 2001:2::20: icmp_seq=4 ttl=61 time=0.167 ms

--- 2001:2::20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.116/0.154/0.170/0.025 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:3::1
PING 2001:3::1(2001:3::1) 56 data bytes
64 bytes from 2001:3::1: icmp_seq=1 ttl=62 time=0.247 ms
64 bytes from 2001:3::1: icmp_seq=2 ttl=62 time=0.151 ms
64 bytes from 2001:3::1: icmp_seq=3 ttl=62 time=0.150 ms
64 bytes from 2001:3::1: icmp_seq=4 ttl=62 time=0.153 ms

--- 2001:3::1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.150/0.175/0.247/0.042 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:4::2
PING 2001:4::2(2001:4::2) 56 data bytes
64 bytes from 2001:4::2: icmp_seq=1 ttl=62 time=0.115 ms
64 bytes from 2001:4::2: icmp_seq=2 ttl=62 time=0.148 ms
64 bytes from 2001:4::2: icmp_seq=3 ttl=62 time=0.155 ms
64 bytes from 2001:4::2: icmp_seq=4 ttl=62 time=0.152 ms

--- 2001:4::2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3048ms
rtt min/avg/max/mdev = 0.115/0.142/0.155/0.020 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:5::2
PING 2001:5::2(2001:5::2) 56 data bytes
64 bytes from 2001:5::2: icmp_seq=1 ttl=63 time=0.317 ms
64 bytes from 2001:5::2: icmp_seq=2 ttl=63 time=0.124 ms
64 bytes from 2001:5::2: icmp_seq=3 ttl=63 time=0.123 ms
64 bytes from 2001:5::2: icmp_seq=4 ttl=63 time=0.125 ms

--- 2001:5::2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3053ms
rtt min/avg/max/mdev = 0.123/0.172/0.317/0.084 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:6::1
PING 2001:6::1(2001:6::1) 56 data bytes
64 bytes from 2001:6::1: icmp_seq=1 ttl=63 time=0.186 ms
64 bytes from 2001:6::1: icmp_seq=2 ttl=63 time=0.126 ms
64 bytes from 2001:6::1: icmp_seq=3 ttl=63 time=0.123 ms
64 bytes from 2001:6::1: icmp_seq=4 ttl=63 time=0.125 ms

--- 2001:6::1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.123/0.140/0.186/0.026 ms
root@Host3:/tmp/pycore.38795/Host3.conf# ping6 -c 4 2001:10::2
PING 2001:10::2(2001:10::2) 56 data bytes
64 bytes from 2001:10::2: icmp_seq=1 ttl=61 time=0.271 ms
64 bytes from 2001:10::2: icmp_seq=2 ttl=61 time=0.164 ms
64 bytes from 2001:10::2: icmp_seq=3 ttl=61 time=0.164 ms
64 bytes from 2001:10::2: icmp_seq=4 ttl=61 time=0.164 ms

--- 2001:10::2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3069ms
rtt min/avg/max/mdev = 0.164/0.190/0.271/0.049 ms
root@Host3:/tmp/pycore.38795/Host3.conf#
```

Questions:

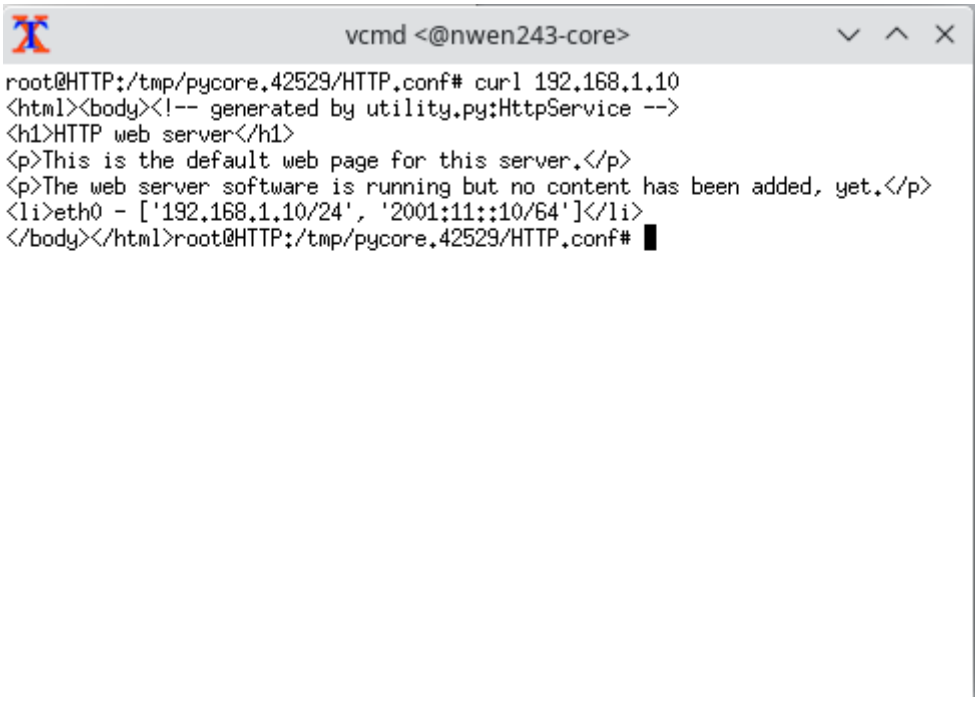
T8 (a)


Host2
eth0
Host1
eth0
C2
C1
eth1
eth0
R1
eth2
eth3
C4
eth0
R2
eth1
eth3
eth2
C5
eth1
RemoteCompanyGateway
eth0
Preinstalled network
RemoteNetworkR1:eth0
@Canvas2
RemoteNetworkR2:eth2
@Canvas2
C7
C3
C6
eth0
R4
eth1
eth2
eth0
eth1
R3
eth2
C8
C11
C12
eth0
eth1
R5
eth2
eth3
C9
C10
eth0
eth0
eth0
Host3
Host4
HTTP
eth0
RemoteHost

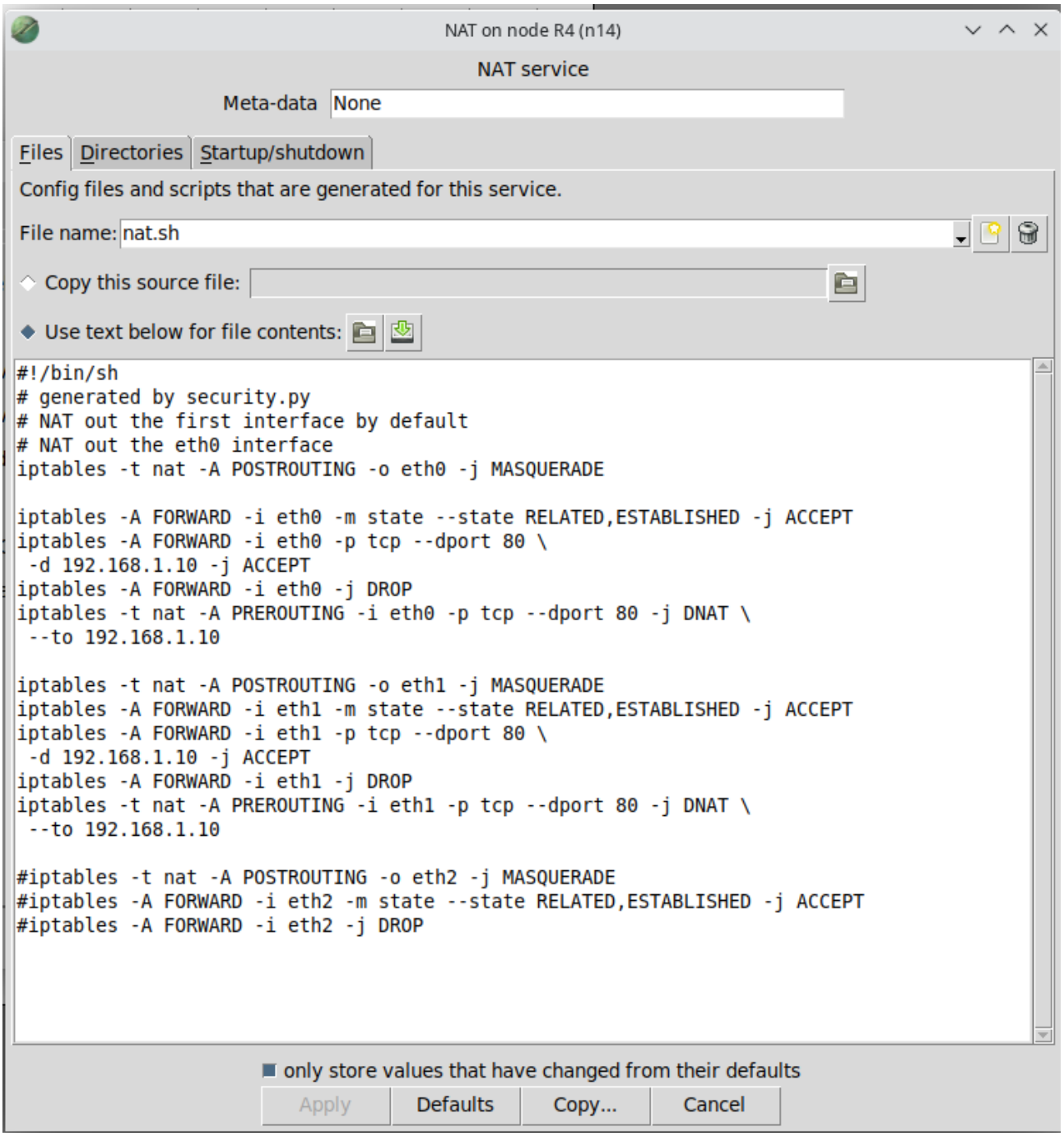

vcmd <@nwen243-core>
root@HTTP:/tmp/pycore.42529/HTTP.conf# telnet localhost 80
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

T9 (a)

raw HTML content returned by the HTTP server, stating that the web server software is running but no content has been added, yet:

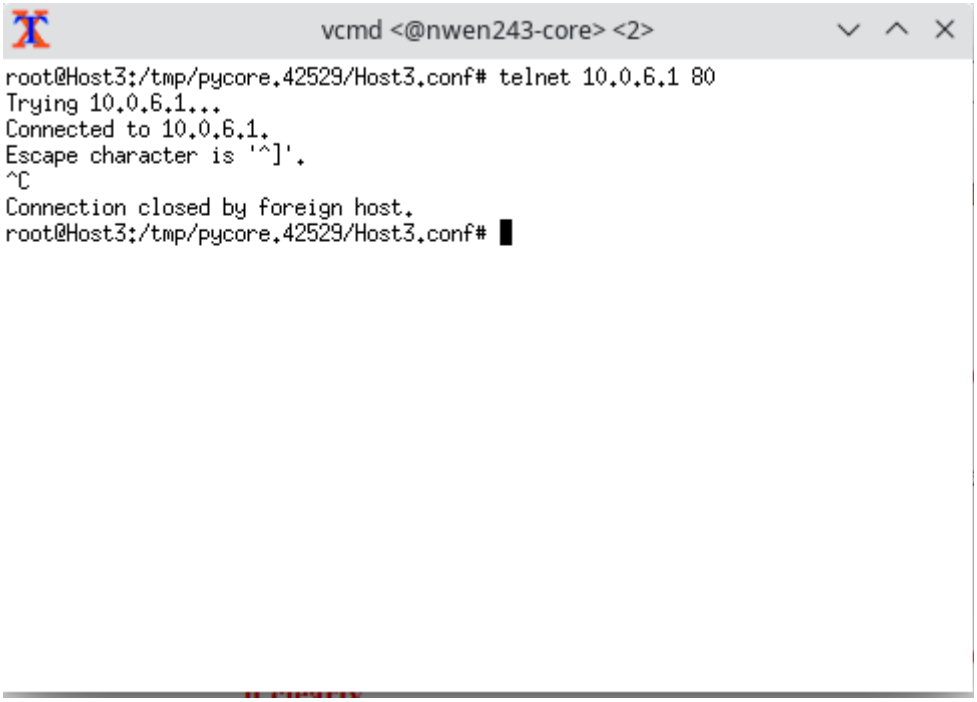


T10 (a)


NAT on node R4 (n14)
NAT service
Meta-data None
Files Directories Startup/shutdown
Config files and scripts that are generated for this service.
File name: nat.sh
Copy this source file:
Use text below for file contents:
#!/bin/sh
generated by security.py
NAT out the first interface by default
NAT out the eth0 interface
iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
iptables -A FORWARD -i eth0 -m state --state RELATED,ESTABLISHED -j ACCEPT
iptables -A FORWARD -i eth0 -p tcp --dport 80 \
-d 192.168.1.10 -j ACCEPT
iptables -A FORWARD -i eth0 -j DROP
iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 80 -j DNAT \
--to 192.168.1.10
iptables -t nat -A POSTROUTING -o eth1 -j MASQUERADE
iptables -A FORWARD -i eth1 -m state --state RELATED,ESTABLISHED -j ACCEPT
iptables -A FORWARD -i eth1 -p tcp --dport 80 \
-d 192.168.1.10 -j ACCEPT
iptables -A FORWARD -i eth1 -j DROP
iptables -t nat -A PREROUTING -i eth1 -p tcp --dport 80 -j DNAT \
--to 192.168.1.10
#iptables -t nat -A POSTROUTING -o eth2 -j MASQUERADE
#iptables -A FORWARD -i eth2 -m state --state RELATED,ESTABLISHED -j ACCEPT
#iptables -A FORWARD -i eth2 -j DROP
only store values that have changed from their defaults
Apply
Defaults
Copy...
Cancel

T10 (b)

Host 3:

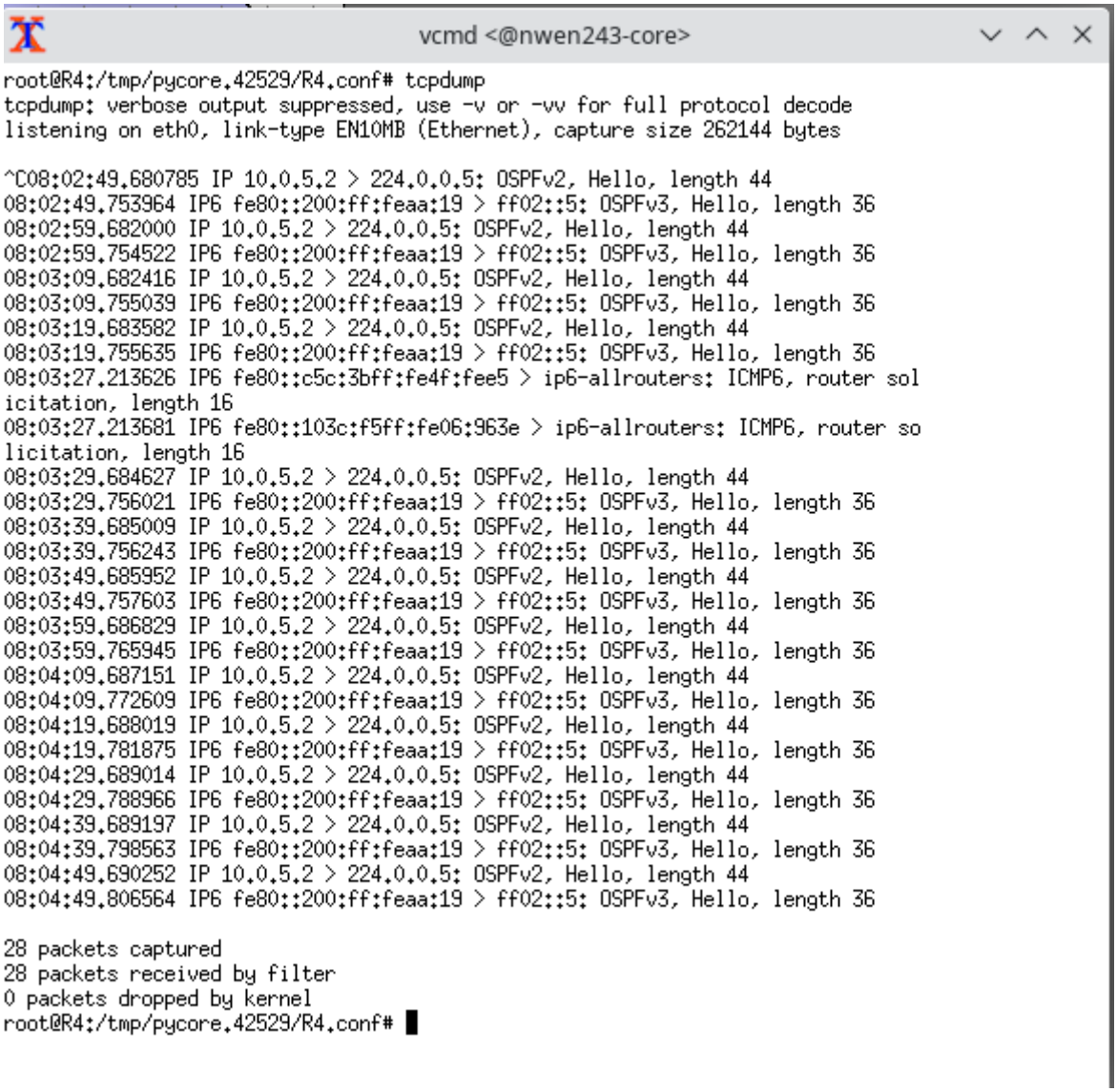


Host 1:

T10 (c) and (d)

Remote Host

T11 (a)


vcmd <@nwen243-core>
root@R4:/tmp/pycore.42529/R4.conf# tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C08:02:49.680785 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:02:49.753964 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:02:59.682000 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:02:59.754522 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:09.682416 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:09.755039 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:19.683582 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:19.755635 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:27.213626 IP6 fe80::c5c:3bff:fe4f:fee5 > ip6-allrouters: ICMP6, router sol
icitation, length 16
08:03:27.213681 IP6 fe80::103c:f5ff:fe06:963e > ip6-allrouters: ICMP6, router so
licitation, length 16
08:03:29.684627 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:29.756021 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:39.685009 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:39.756243 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:49.685952 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:49.757603 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:03:59.686829 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:03:59.765945 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:04:09.687151 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:04:09.772609 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:04:19.688019 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:04:19.781875 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:04:29.689014 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:04:29.788966 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:04:39.689197 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:04:39.798563 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
08:04:49.690252 IP 10.0.5.2 > 224.0.0.5: OSPFv2, Hello, length 44
08:04:49.806564 IP6 fe80::200:ff:feaa:19 > ff02::5: OSPFv3, Hello, length 36
28 packets captured
28 packets received by filter
0 packets dropped by kernel
root@R4:/tmp/pycore.42529/R4.conf#