Computer Networks Lab – Week 10

PES1UG19CS592

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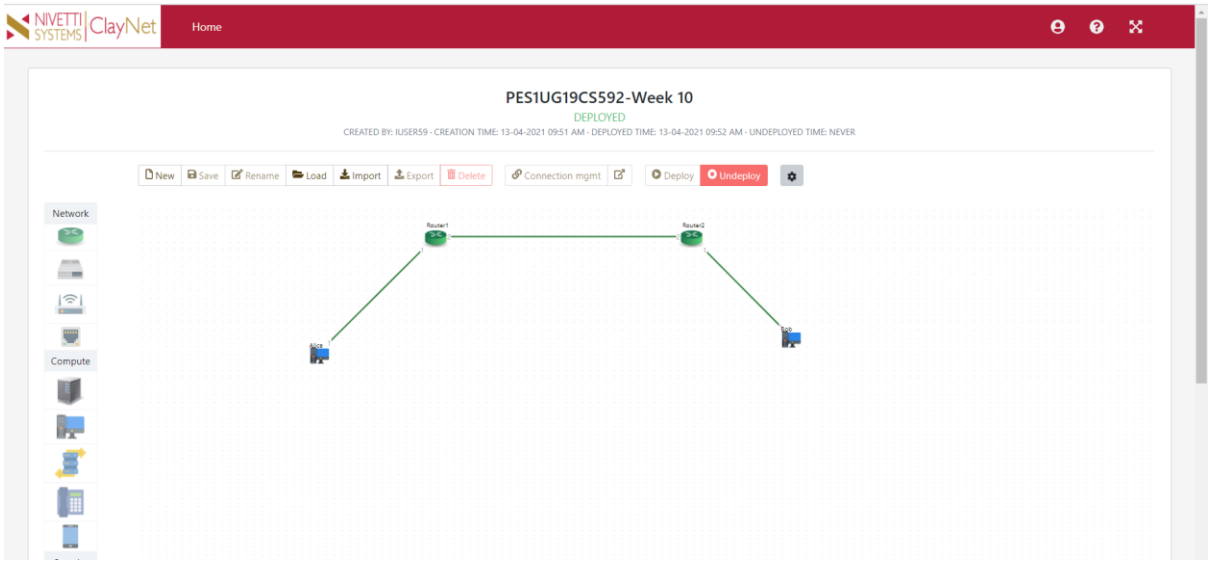
1. IPv6 Address and Topology Creation

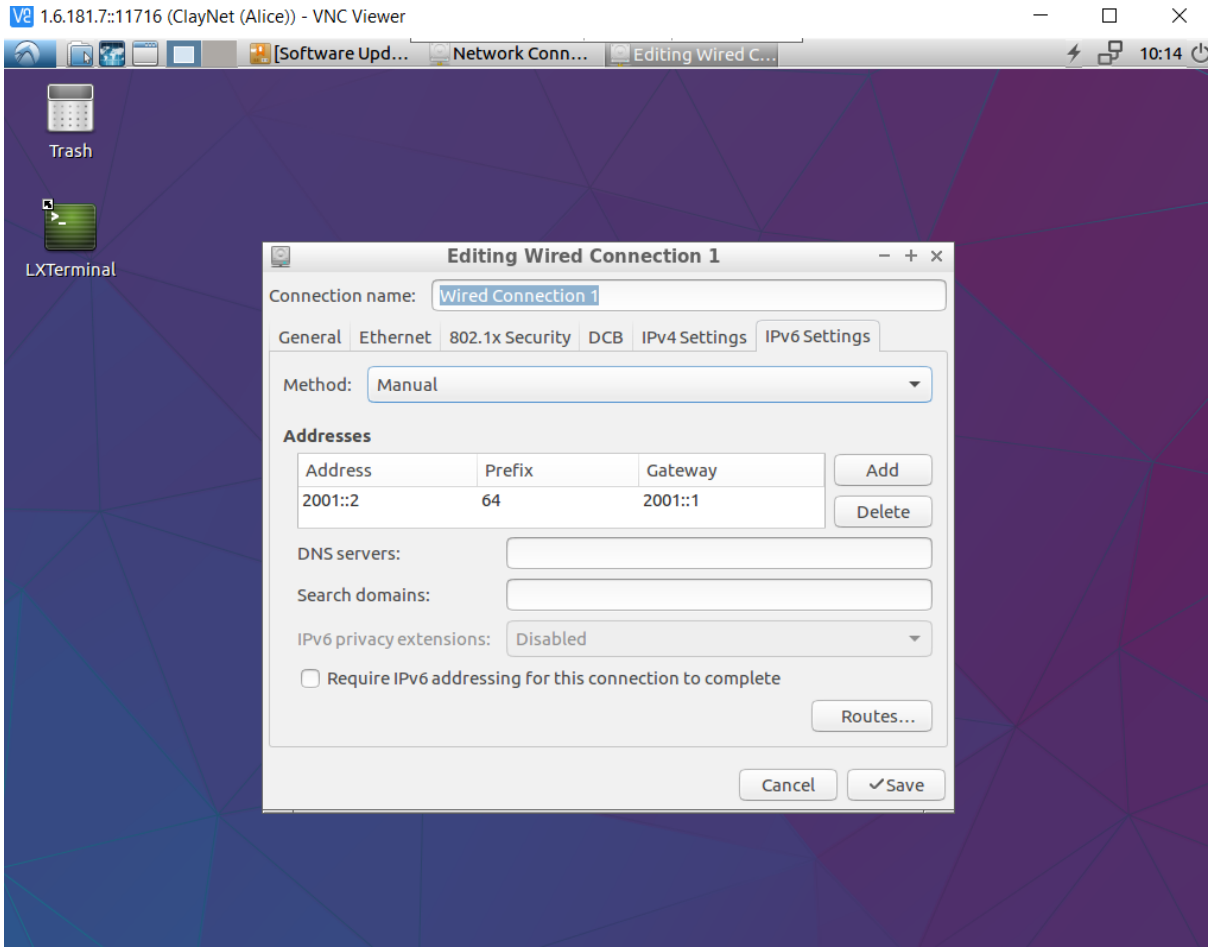
The following topology was created and deployed on Claynet
Alice and Bob are the two workstations for this experiment.



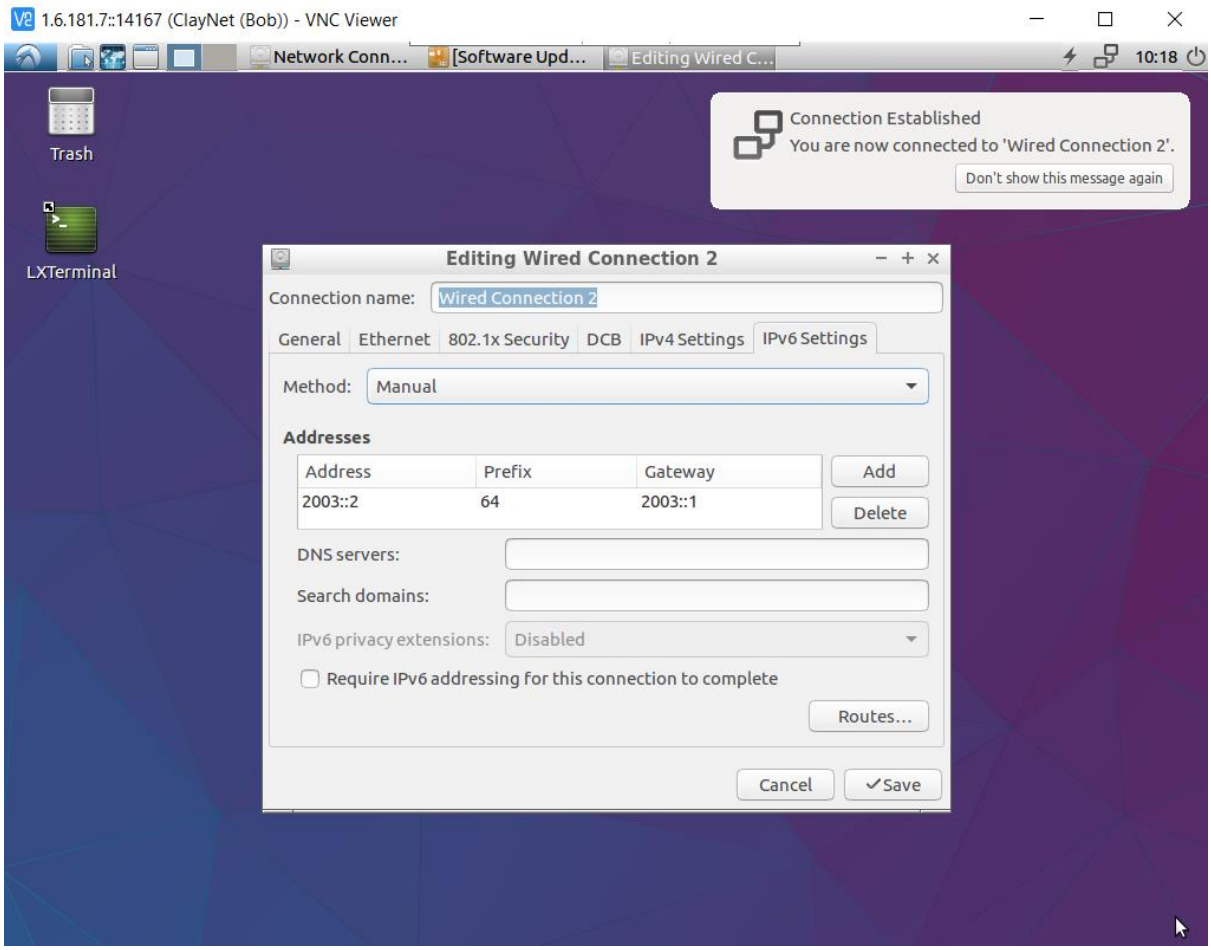
2. Configuring IP address for end systems

The end systems are configured as

End system name	IP address	Gateway
Alice	2001::02/64	2001::01
Bob	2003::02/64	2003::01

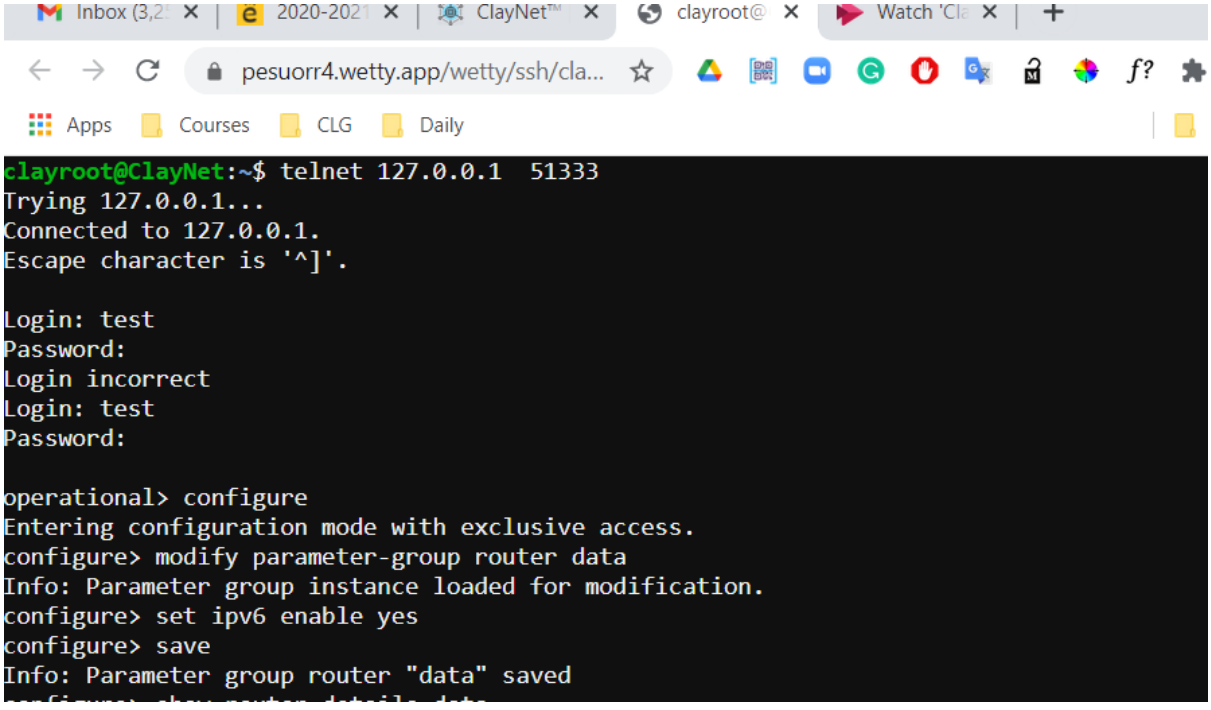

1.6.181.7::11716 (ClayNet (Alice)) - VNC Viewer
[Software Upd...
Network Conn...
Editing Wired C...
10:14
Trash
LXTerminal
Editing Wired Connection 1
Connection name:
Wired Connection 1
General
Ethernet
802.1x Security
DCB
IPv4 Settings
IPv6 Settings
Method:
Manual
Addresses
Address
Prefix
Gateway
2001::2
64
2001::1
Add
Delete
DNS servers:
Search domains:
IPv6 privacy extensions:
Disabled
Require IPv6 addressing for this connection to complete
Routes...
Cancel
Save

Alice



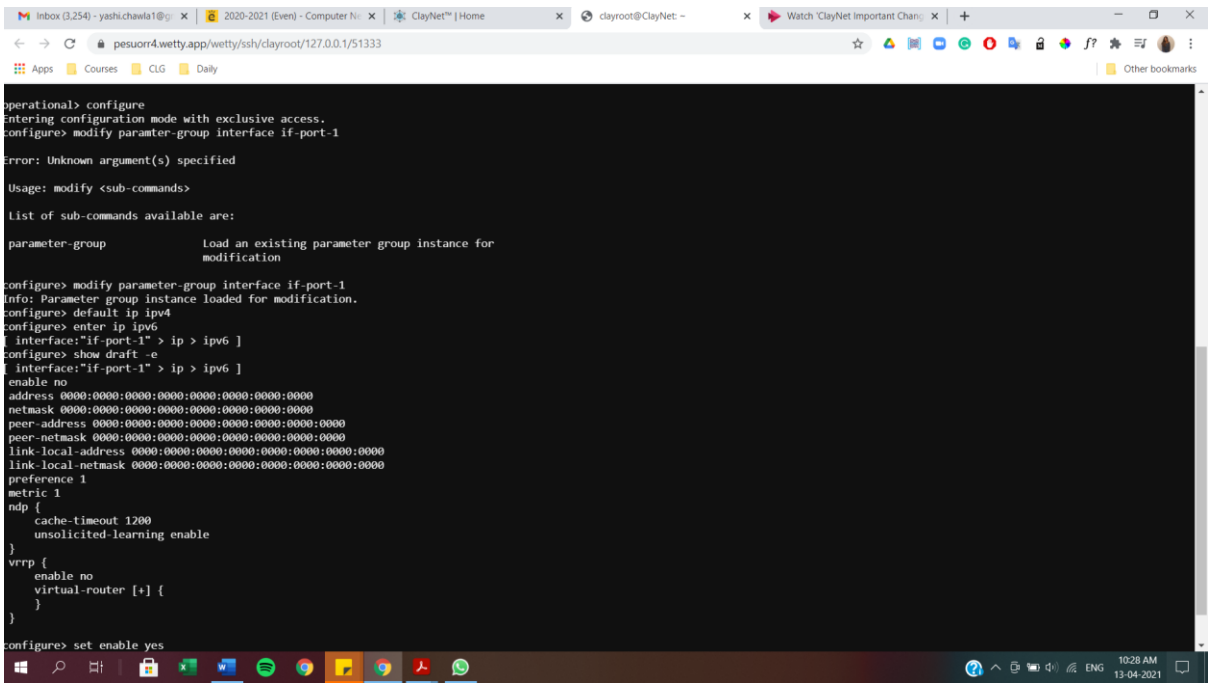
Bob

3. Router 1 Configuration



Enabling IPv6 mode

```
operational> show router details data

> Router : data

General information
-------------------
Router ID                 : 16387
State                     : up
Interfaces                : 9
Routing gateways          : 4
Local addresses           : 2
Sockets                   : 2
Flags                     : ----- -----
Last state transition     : 10:21:23, Tuesday, April 13, 2021 IST

IPv4 information
----------------
Default source address    : 0.0.0.0
Default TTL               : 64
Interfaces                : 9

IPv4 routes
-----------
Active routes             :           3
Line : 1-23, Press 'q' to quit.
```

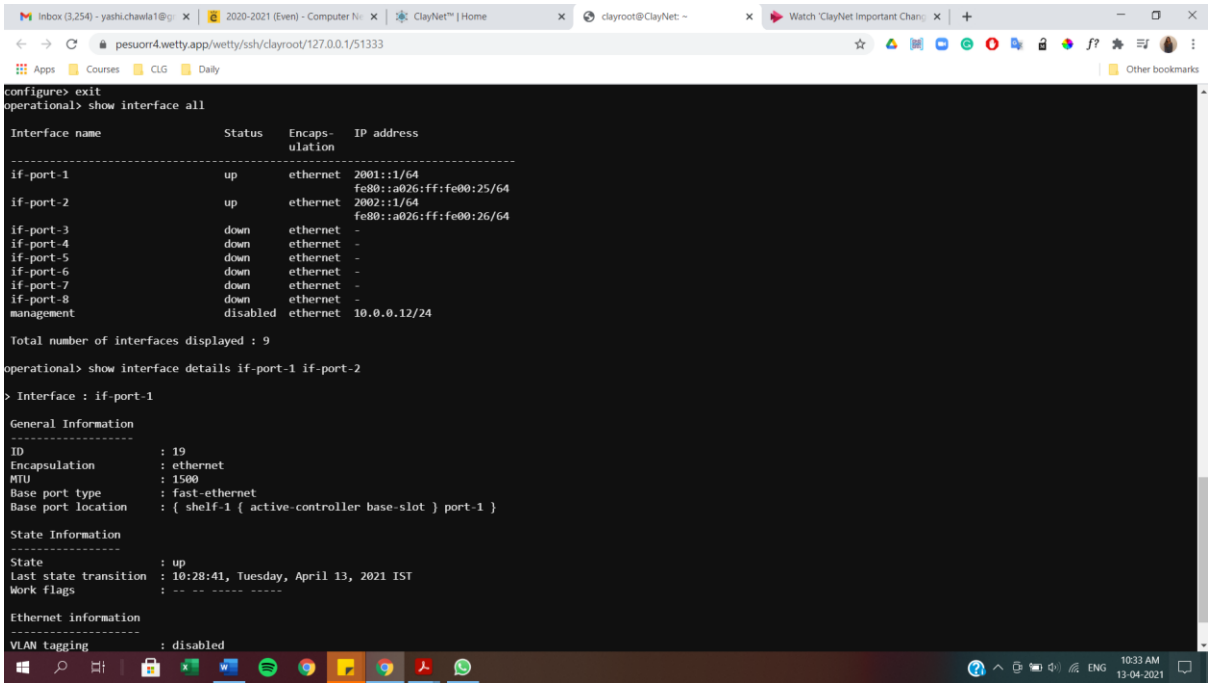


Assigning IPv6 Address 2001::01/64 to the if-port-1 interface

```
configure> set enable yes
configure> set address 2001::01/64
configure> save
Info: Parameter group interface "if-port-1" saved
configure>
```

```
configure> modify parameter-group interface if-port-2
Info: Parameter group instance loaded for modification.
configure> default ip ipv4
configure> set ip ipv6 enable yes
configure> set ip ipv6 address 2002::01/64
configure> save
Info: Parameter group interface "if-port-2" saved
```

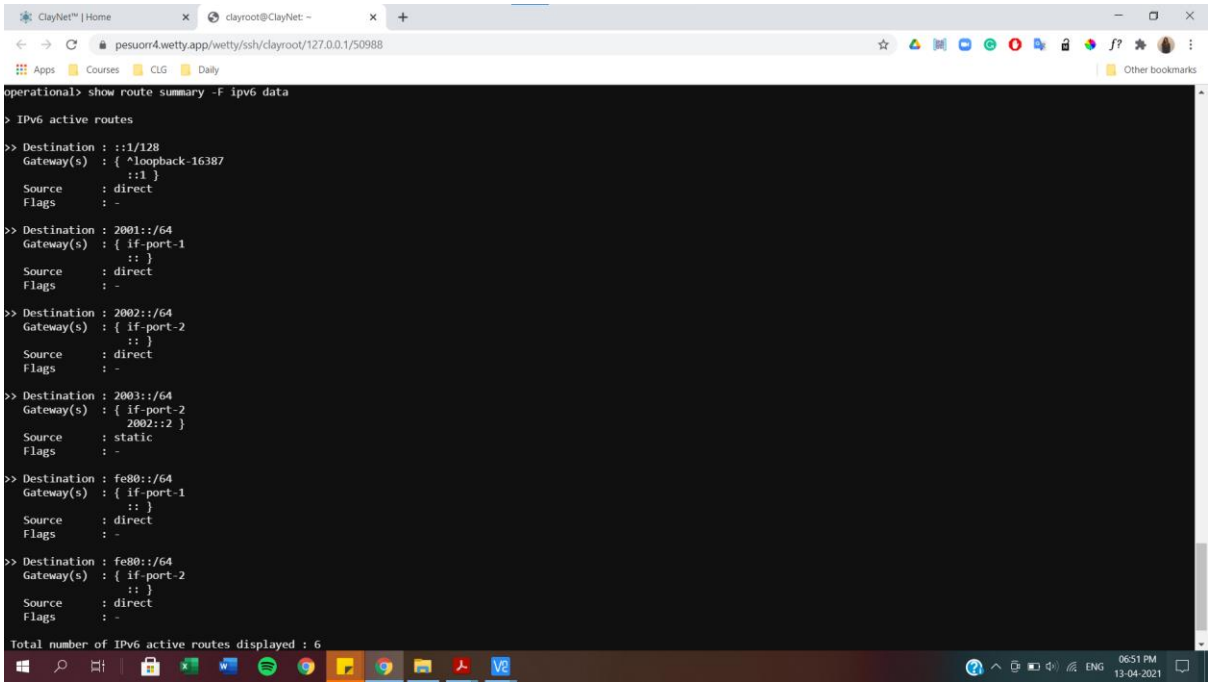
Assigning IPv6 address of 2002::01/64 for the if-port-2 interface



Full interface configuration

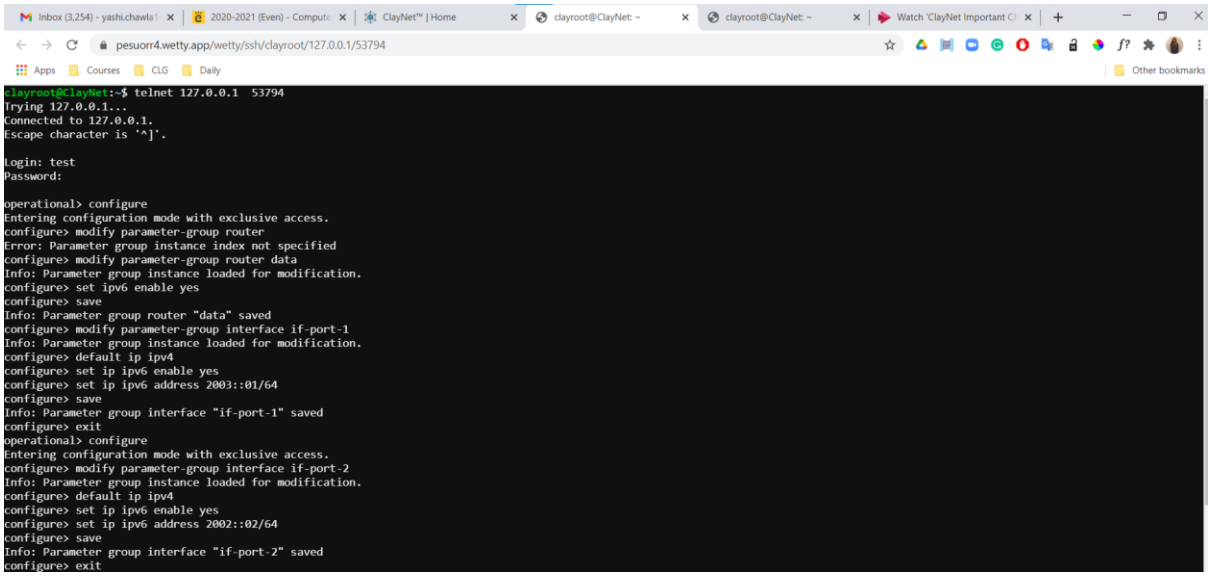
```
operational>
operational> configure
Entering configuration mode with exclusive access.
configure> create parameter-group ip-route v6-route-2003-nw
Info: Parameter group instance created.
configure> show draft -e
[ ip-route:"v6-route-2003-nw" ]
*name "v6-route-2003-nw"
 enable no
 router ""
 destination 0.0.0.0
 netmask 0.0.0.0
 next-hop {
     router ""
     gateway 0.0.0.0
     label-switched-path ""
 }
 preference 30
 metric 2

configure> set enable yes
configure> set router data
configure> set destination 2003::/64
configure> set next-hop gateway 2002::02
configure> save
Info: Parameter group ip-route "v6-route-2003-nw" saved
configure>
```

Configuring a static route to reach 2003::00/64 network(Bob) with gateway as 2002::02(Router 2)



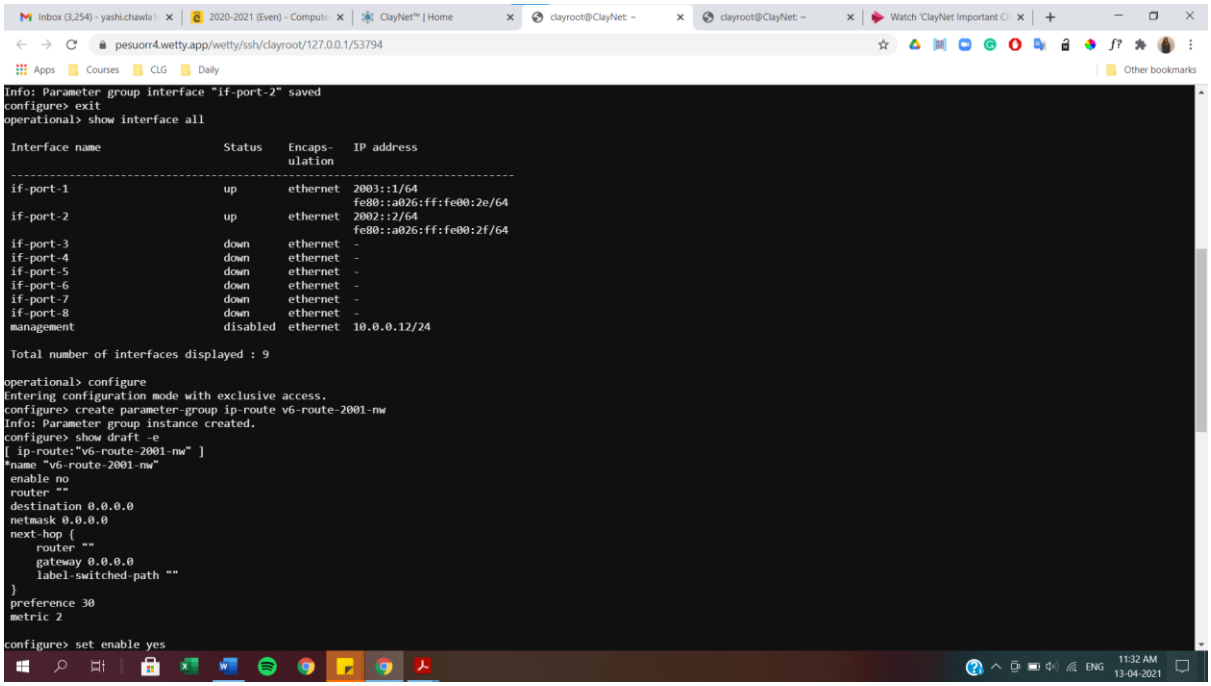
Routing table entries as seen above

4. Router 2 configuration



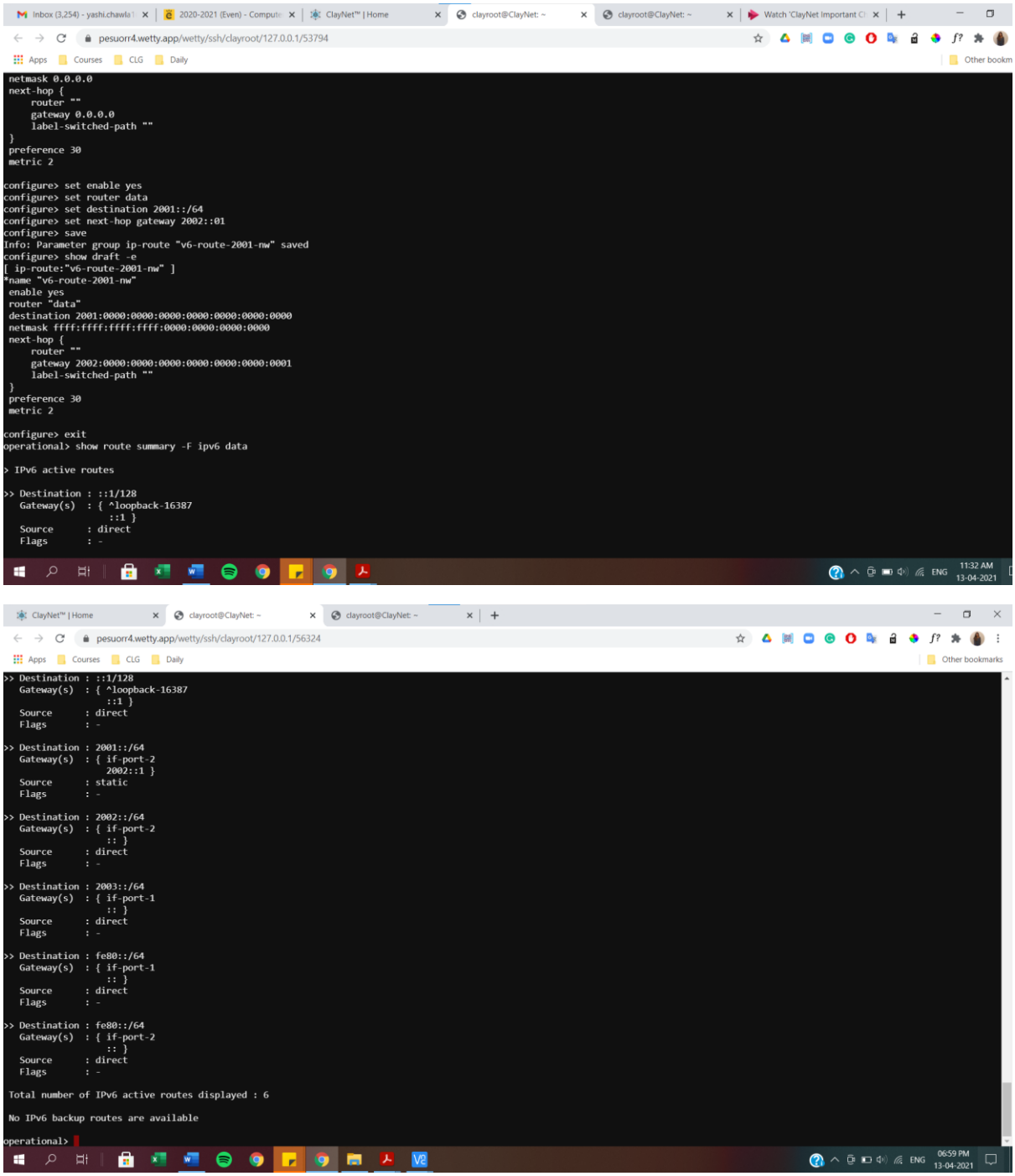
```
clayroot@ClayNet:~$ telnet 127.0.0.1  53794
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.

Login: test
Password:

operational> configure
Entering configuration mode with exclusive access.
configure> modify parameter-group router
Error: Parameter group instance index not specified
configure> modify parameter-group router data
Info: Parameter group instance loaded for modification.
configure> set ipv6 enable yes
configure> save
Info: Parameter group router "data" saved
configure> modify parameter-group interface if-port-1
Info: Parameter group instance loaded for modification.
configure> default ip ipv4
configure> set ip ipv6 enable yes
configure> set ip ipv6 address 2003::01/64
configure> save
Info: Parameter group interface "if-port-1" saved
configure> exit
operational> configure
Entering configuration mode with exclusive access.
configure> modify parameter-group interface if-port-2
Info: Parameter group instance loaded for modification.
configure> default ip ipv4
configure> set ip ipv6 enable yes
configure> set ip ipv6 address 2002::02/64
configure> save
Info: Parameter group interface "if-port-2" saved
configure> exit
```

Assigning IPv6 address 2003::01/64 to interface if-port-1 and 2002::02/64 to interface if-port-2



```
Info: Parameter group interface "if-port-2" saved
configure> exit
operational> show interface all

 Interface name                  Status    Encaps-   IP address
                                           ulation
 ------------------------------------------------------------------------------
 if-port-1                       up        ethernet  2003::1/64
                                                     fe80::a026:ff:fe00:2e/64
 if-port-2                       up        ethernet  2002::2/64
                                                     fe80::a026:ff:fe00:2f/64
 if-port-3                       down      ethernet  -
 if-port-4                       down      ethernet  -
 if-port-5                       down      ethernet  -
 if-port-6                       down      ethernet  -
 if-port-7                       down      ethernet  -
 if-port-8                       down      ethernet  -
 management                      disabled  ethernet  10.0.0.12/24

 Total number of interfaces displayed : 9

operational> configure
Entering configuration mode with exclusive access.
configure> create parameter-group ip-route v6-route-2001-nw
Info: Parameter group instance created.
configure> show draft -e
[ ip-route:"v6-route-2001-nw" ]
*name "v6-route-2001-nw"
 enable no
 router ""
 destination 0.0.0.0
 netmask 0.0.0.0
 next-hop {
     router ""
     gateway 0.0.0.0
     label-switched-path ""
 }
 preference 30
 metric 2

configure> set enable yes
```

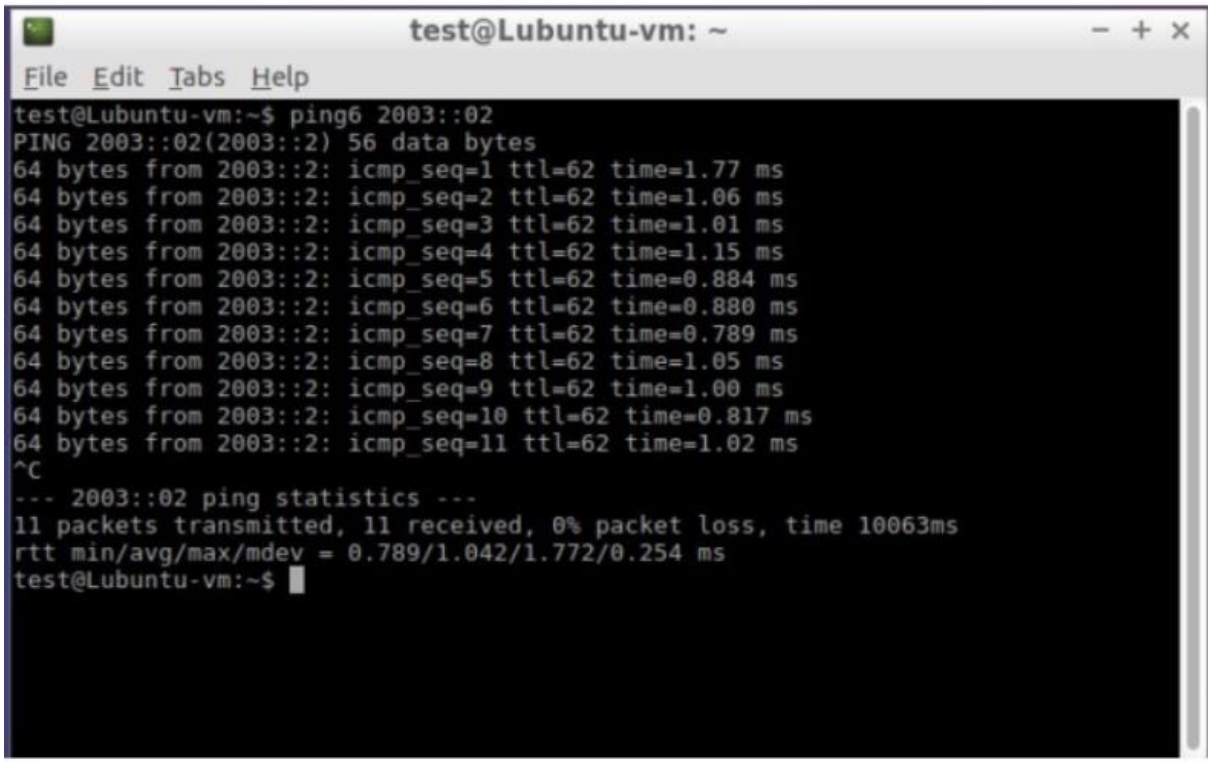
Static route to reach 2001::00/64 network(Alice) with gateway as 2002::01(Router-1)



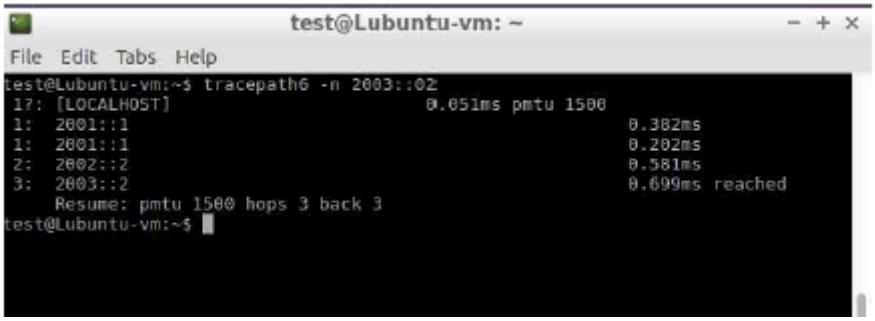
Final routing table

5. Ping Command and Tracepath

Successful ping requests can be sent from Alice to Bob workstations as shown below.



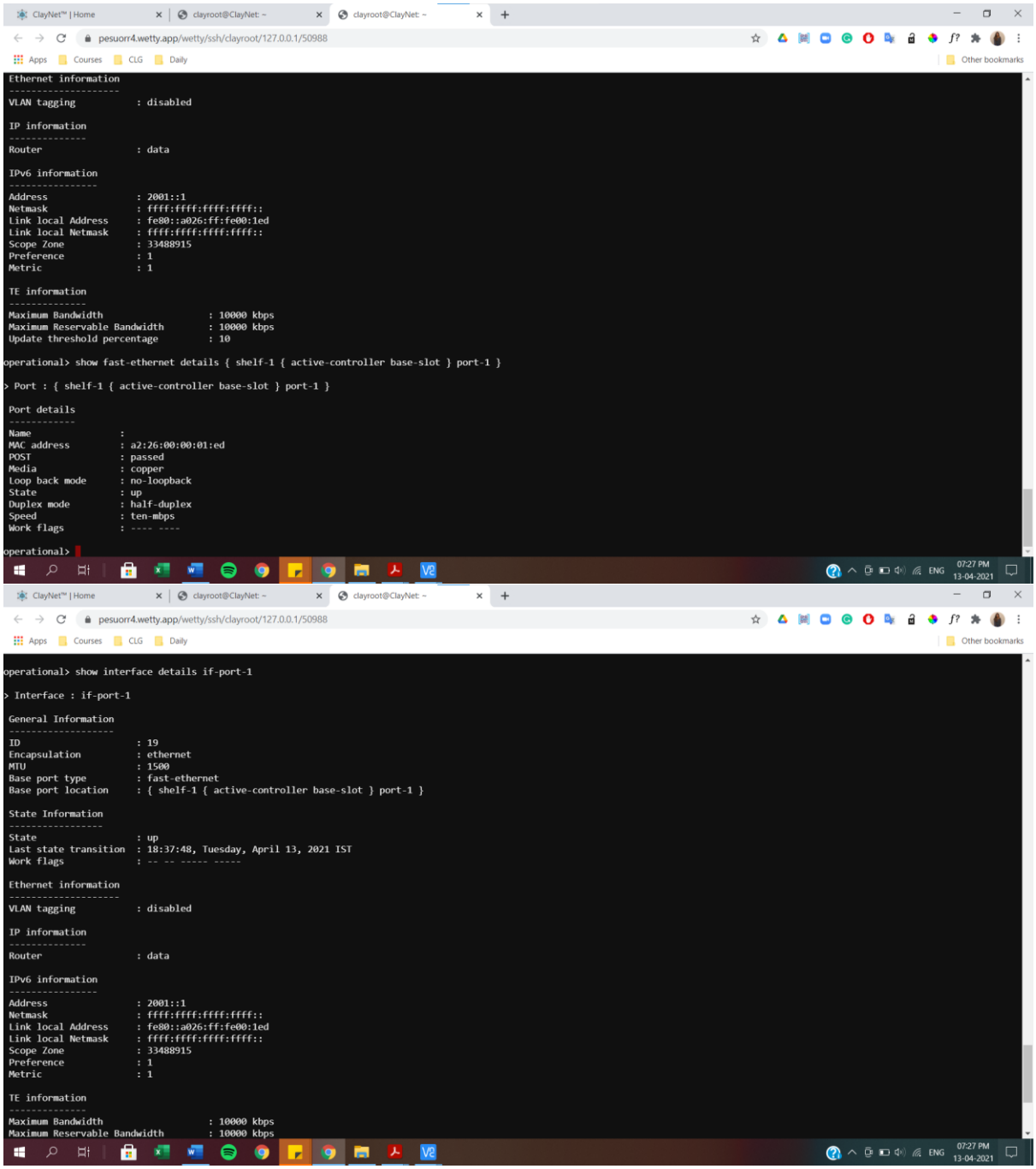
Similarly for tracepath



6. NDP table on Router -1

```
operational> show ipv6 neighbour summary data

 Host address                              MAC address       Interface
 ------------------------------------------------------------------------------
 2001::2                                   a2:26:00:00:15:bb if-port-1
 2002::2                                   a2:26:00:00:01:f7 if-port-2
 fe80::1139:1385:3acc:cb2a                 a2:26:00:00:15:bb if-port-1
 fe80::a026:ff:fe00:1f7                    a2:26:00:00:01:f7 if-port-2

 Total number of NDP entries displayed : 4
```

7. Verifying auto configured link local address on IPv6 interfaces



8. Checking connectivity between Router-1 and Router-2 using link local address

```
operational> ping data:fe80::a026:ff:fe00:1f7%if-port-2
PING fe80:0:1ff:15:a026:ff:fe00:1ee --> fe80::a026:ff:fe00:1f7%33488917
16 bytes from fe80::a026:ff:fe00:1f7%33488917: icmp_seq=0 hoplimit=64 time=0.531 ms
16 bytes from fe80::a026:ff:fe00:1f7%33488917: icmp_seq=1 hoplimit=64 time=0.330 ms
16 bytes from fe80::a026:ff:fe00:1f7%33488917: icmp_seq=2 hoplimit=64 time=0.353 ms
16 bytes from fe80::a026:ff:fe00:1f7%33488917: icmp_seq=3 hoplimit=64 time=0.330 ms
16 bytes from fe80::a026:ff:fe00:1f7%33488917: icmp_seq=4 hoplimit=64 time=0.456 ms
^C
---- PING Statistics----
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 0.000/0.400/0.531/0.080 ms
operational> ping -c 5 data:fe80::a026:ff:fe00:1f7


Error: No source address found for this destination


operational> ping data:fe80::a026:ff:fe00:1f7%if-port-1
PING fe80:0:1ff:13:a026:ff:fe00:1ed --> fe80::a026:ff:fe00:1f7%33488915
^C
---- PING Statistics----
6 packets transmitted, 0 packets received, 100.0% packet loss
operational>
```