



EC CAMPUS, BANGALORE

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WEEK : 9

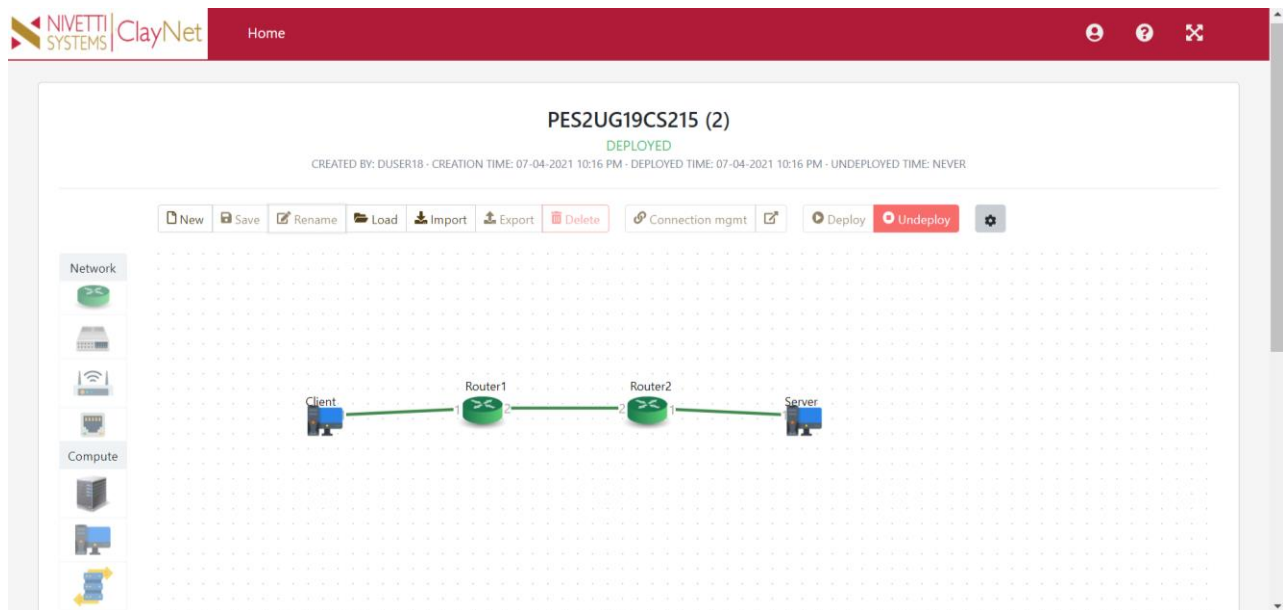
SUBJECT: Computer Network Laboratory

TITLE : Understand the building blocks and usage of ClayNet Network Virtualization platform with reference to OSI Layer.

Week 9

Understand the building blocks and usage of ClayNet Network Virtualization platform with reference to OSI Layer.

Topology:



Execution Tasks:

Task 1: Understand the network and compute components available in ClayNet.

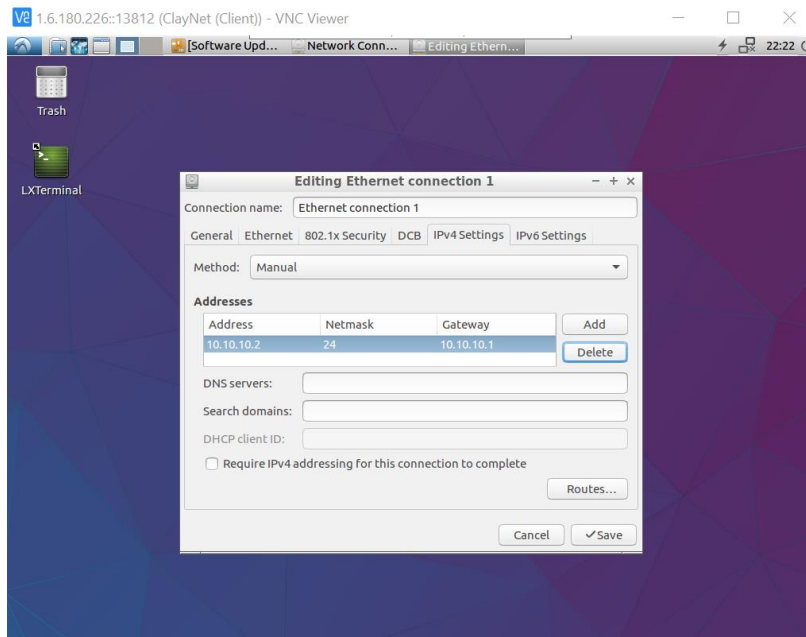
Task 2: Drag and drop the necessary components to create the given topology. Provide the names for compute, select OS (Ubuntu 16.04 – Lite or Ubuntu 16.04 – CLI) and RAM (512 MB) .

Task 3: Drag and drop the Routers and set the IP addresses for all the necessary router ports. (You can also set them later by right clicking on the router icon and selecting 'Device Configuration'.)

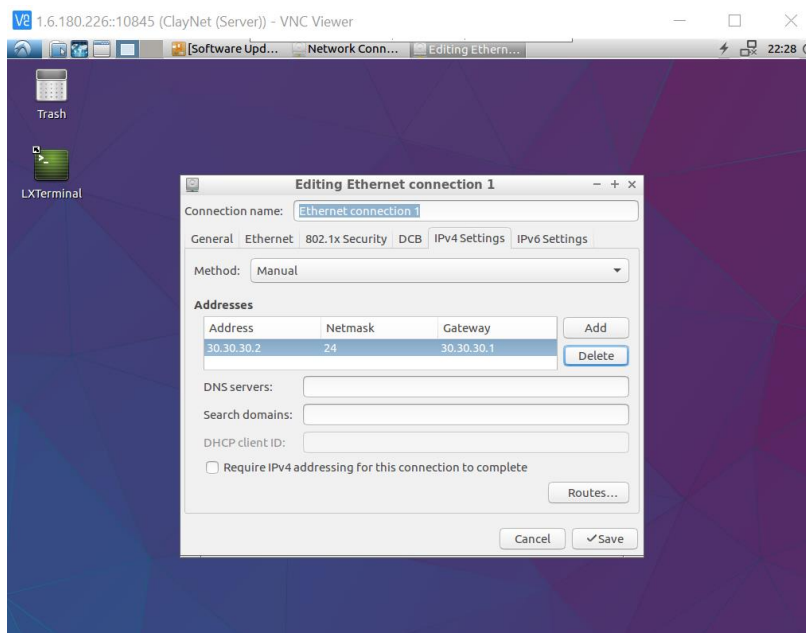
Task 4: Go to connection manager and select appropriate Source, Source ports, Target and Target ports and save the connection.

Task 5: To deploy the topology, save the topology first and deploy it by clicking 'Deploy' button available on the top. (Note: It will take few seconds or even minutes to deploy the topology for the first time).

Task 6: Go to 'Remote Desktop' by right clicking on client and server icons and set the IP addresses accordingly. Also add the gateway address. (Login: user - test, password - test)
Client: IP Address ---> 10.10.10.2 Gateway ---> 10.10.10.1



Server: IP Address ----> 30.30.30.2 Gateway ----> 30.30.30.1



Ping 10.10.10.1 on client

```

test@Lubuntu-vm:~$ ping 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1: icmp_seq=1 ttl=64 time=0.430 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=64 time=0.562 ms
64 bytes from 10.10.10.1: icmp_seq=3 ttl=64 time=0.457 ms
64 bytes from 10.10.10.1: icmp_seq=4 ttl=64 time=0.478 ms
64 bytes from 10.10.10.1: icmp_seq=5 ttl=64 time=0.420 ms
64 bytes from 10.10.10.1: icmp_seq=6 ttl=64 time=0.734 ms
64 bytes from 10.10.10.1: icmp_seq=7 ttl=64 time=0.392 ms
64 bytes from 10.10.10.1: icmp_seq=8 ttl=64 time=0.534 ms
64 bytes from 10.10.10.1: icmp_seq=9 ttl=64 time=0.711 ms
64 bytes from 10.10.10.1: icmp_seq=10 ttl=64 time=0.512 ms
64 bytes from 10.10.10.1: icmp_seq=11 ttl=64 time=0.508 ms
64 bytes from 10.10.10.1: icmp_seq=12 ttl=64 time=0.603 ms
64 bytes from 10.10.10.1: icmp_seq=13 ttl=64 time=0.500 ms
^C
--- 10.10.10.1 ping statistics ---
13 packets transmitted, 13 received, 0% packet loss, time 1227ms
rtt min/avg/max/mdev = 0.392/0.526/0.734/0.101 ms
test@Lubuntu-vm:~$

```

Task 7: From client, ping to server 30.30.30.2. Ping will not be successful and Router1 will reply with 'Destination host unreachable'.

```

test@Lubuntu-vm:~$ ping 30.30.30.2
PING 30.30.30.2 (30.30.30.2) 56(84) bytes of data.
From 10.10.10.1 icmp_seq=1 Destination Host Unreachable
From 10.10.10.1 icmp_seq=2 Destination Host Unreachable
From 10.10.10.1 icmp_seq=3 Destination Host Unreachable
From 10.10.10.1 icmp_seq=4 Destination Host Unreachable
From 10.10.10.1 icmp_seq=5 Destination Host Unreachable
^C
--- 30.30.30.2 ping statistics ---
5 packets transmitted, 0 received, +5 errors, 100% packet loss, time 4067ms
test@Lubuntu-vm:~$

```

Task 8: Steps to add the routing table entries:

Step 1: Login to Router1 by right clicking on Router icon and selecting 'Console Access'.
(Type 'Enter' key once to get into Login screen. Username - admin, Password - admin@12345)

Step 2: Display the routing table to view all static routes using the command.

show route summary -s active data

```

nivappadmin@ClayNet:~$ telnet 127.0.0.1 53263
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^J'.

Login: admin
Password:

operational> show route summary -s active data

> IPv4 active routes

>> Destination : 10.10.10.0/24
  Gateway(s)   : { if-port-1
                  0.0.0.0 }
  Source       : direct
  Flags        : -

>> Destination : 20.20.20.0/24
  Gateway(s)   : { if-port-2
                  0.0.0.0 }
  Source       : direct
  Flags        : -

>> Destination : 127.0.0.0/8
  Gateway(s)   : { ^loopback-1
                  127.0.0.1 }
  Source       : direct
  Flags        : R

>> Destination : 127.0.0.1/32
  Gateway(s)   : { ^loopback-1
Line : 1-23, Press 'q' to quit.

```

Step 3: Configure a static route in Router1 for destination 30.30.30.0/24 with next-hop gateway as 20.20.20.2, which is the IP address of Router2.

```

operational> configure
Entering configuration mode with exclusive access.
configure> create parameter-group ip - route to-n30
Error: 'ip' is not a valid parameter group
configure> create parameter-group ip-route to-n30
Info: Parameter group instance created.
configure> set enable yes
configure> set router data
configure> set destination 30.30.30.0/24
configure> set next-hop gateway 20.20.20.2
configure> save
Info: Parameter group ip-route "to-n30" saved
configure> exit
operational>

```

Step 4: Check routing table again and verify that the route is added.

```

operational> show route summary -s active data

> IPv4 active routes

>> Destination : 10.10.10.0/24
  Gateway(s)   : { if-port-1
                  0.0.0.0 }
  Source       : direct
  Flags        : -

>> Destination : 20.20.20.0/24
  Gateway(s)   : { if-port-2
                  0.0.0.0 }
  Source       : direct
  Flags        : -

>> Destination : 30.30.30.0/24
  Gateway(s)   : { if-port-2
                  20.20.20.2 }
  Source       : static
  Flags        : -

>> Destination : 127.0.0.0/8
  Gateway(s)   : { ^loopback-1
Line : 1-23, Press 'q' to quit.

```

Step 5: Repeat the steps 3 & 4 to configure a static route in Router2 for destination 10.10.10.0/24 with next-hop gateway as 20.20.20.1, which is the IP address of Router1.

```

Info: Parameter group instance created.
configure> set enable yes
configure> set router data
configure> set destination 10.10.10.0/24
configure> set next-hop gateway 20.20.20.1
configure> save
Info: Parameter group ip-route "to-n10" saved
configure> exit

```

Task 8: Now Ping will be successful as all the required routers are now configured. Observe the TTL getting decremented by 2 because two hops/routers are in between. Also keep the Wireshark ready for observation.

```

test@Lubuntu-vm:~$ ping 30.30.30.2
PING 30.30.30.2 (30.30.30.2) 56(84) bytes of data.
64 bytes from 30.30.30.2: icmp_seq=1 ttl=62 time=2.07 ms
64 bytes from 30.30.30.2: icmp_seq=2 ttl=62 time=1.04 ms
64 bytes from 30.30.30.2: icmp_seq=3 ttl=62 time=1.21 ms
64 bytes from 30.30.30.2: icmp_seq=4 ttl=62 time=1.03 ms
64 bytes from 30.30.30.2: icmp_seq=5 ttl=62 time=0.858 ms
64 bytes from 30.30.30.2: icmp_seq=6 ttl=62 time=0.846 ms
64 bytes from 30.30.30.2: icmp_seq=7 ttl=62 time=0.792 ms
64 bytes from 30.30.30.2: icmp_seq=8 ttl=62 time=0.977 ms
64 bytes from 30.30.30.2: icmp_seq=9 ttl=62 time=0.962 ms
64 bytes from 30.30.30.2: icmp_seq=10 ttl=62 time=0.919 ms
64 bytes from 30.30.30.2: icmp_seq=11 ttl=62 time=1.03 ms
64 bytes from 30.30.30.2: icmp_seq=12 ttl=62 time=0.925 ms
64 bytes from 30.30.30.2: icmp_seq=13 ttl=62 time=0.974 ms
^C
Ctrl-C Stopped ping 30.30.30.2

```

*eth0									
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help									
Apply a display filter ... <Ctrl-/> Expression...									
No.	Time	Source	Destination	Protocol	Length	Info			
15	10.722201383	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=6/1536, ttl=64 (re...		
16	10.723021609	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=6/1536, ttl=62 (re...		
17	11.746108433	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=7/1792, ttl=64 (re...		
18	11.746882707	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=7/1792, ttl=62 (re...		
19	12.770263532	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=8/2048, ttl=64 (re...		
20	12.771210876	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=8/2048, ttl=62 (re...		
21	13.771378699	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=9/2304, ttl=64 (re...		
22	13.772322989	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=9/2304, ttl=62 (re...		
23	14.772498133	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=10/2560, ttl=64 (r...		
24	14.773397841	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=10/2560, ttl=62 (r...		
25	15.778191392	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=11/2816, ttl=64 (r...		
26	15.779212146	30.30.30.2	10.10.10.2	ICMP	98	Echo (ping) reply	id=0x0830, seq=11/2816, ttl=62 (r...		
27	16.779466720	10.10.10.2	30.30.30.2	ICMP	98	Echo (ping) request	id=0x0830, seq=12/3072, ttl=64 (r...		

▶ Frame 15: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0
 ▶ Ethernet II, Src: 2a:26:00:00:0f:7d (2a:26:00:00:0f:7d), Dst: 2a:26:00:00:05:bc (2a:26:00:00:05:bc)
 ▶ Internet Protocol Version 4, Src: 10.10.10.2, Dst: 30.30.30.2
 ▼ Internet Control Message Protocol

Task 9: Also observe the output of `tracert -n 30.30.30.2` command on Client

```

est@Lubuntu-vm:~$ ping 30.30.30.2
PING 30.30.30.2 (30.30.30.2) 56(84) bytes of data:
 4 bytes from 30.30.30.2: icmp_seq=1 ttl=62 time=1.49 ms
 4 bytes from 30.30.30.2: icmp_seq=2 ttl=62 time=1.28 ms
 4 bytes from 30.30.30.2: icmp_seq=3 ttl=62 time=1.06 ms
 4 bytes from 30.30.30.2: icmp_seq=4 ttl=62 time=1.03 ms
 4 bytes from 30.30.30.2: icmp_seq=5 ttl=62 time=1.15 ms
 4 bytes from 30.30.30.2: icmp_seq=6 ttl=62 time=1.20 ms
 4 bytes from 30.30.30.2: icmp_seq=7 ttl=62 time=1.04 ms
C
-- 30.30.30.2 ping statistics --
 packets transmitted, 7 received, 0% packet loss, time 6008ms
 tt min/avg/max/mdev = 1.034/1.182/1.499/0.155 ms
est@Lubuntu-vm:~$ tracert -n 30.30.30.2
 1?: [LOCALHOST] pmtu 1500
 1: 10.10.10.1 0.440ms
 1: 10.10.10.1 0.186ms
 2: 20.20.20.2 0.425ms
 3: 30.30.30.2 0.904ms reached
 Resume: pmtu 1500 hops 3 back 3
est@Lubuntu-vm:~$
  
```