



**Department of Computer  
Science and Engineering**

# **Advanced Computer Networks**

**UE16CS346**

## **Lab Assignment 5: VLAN**

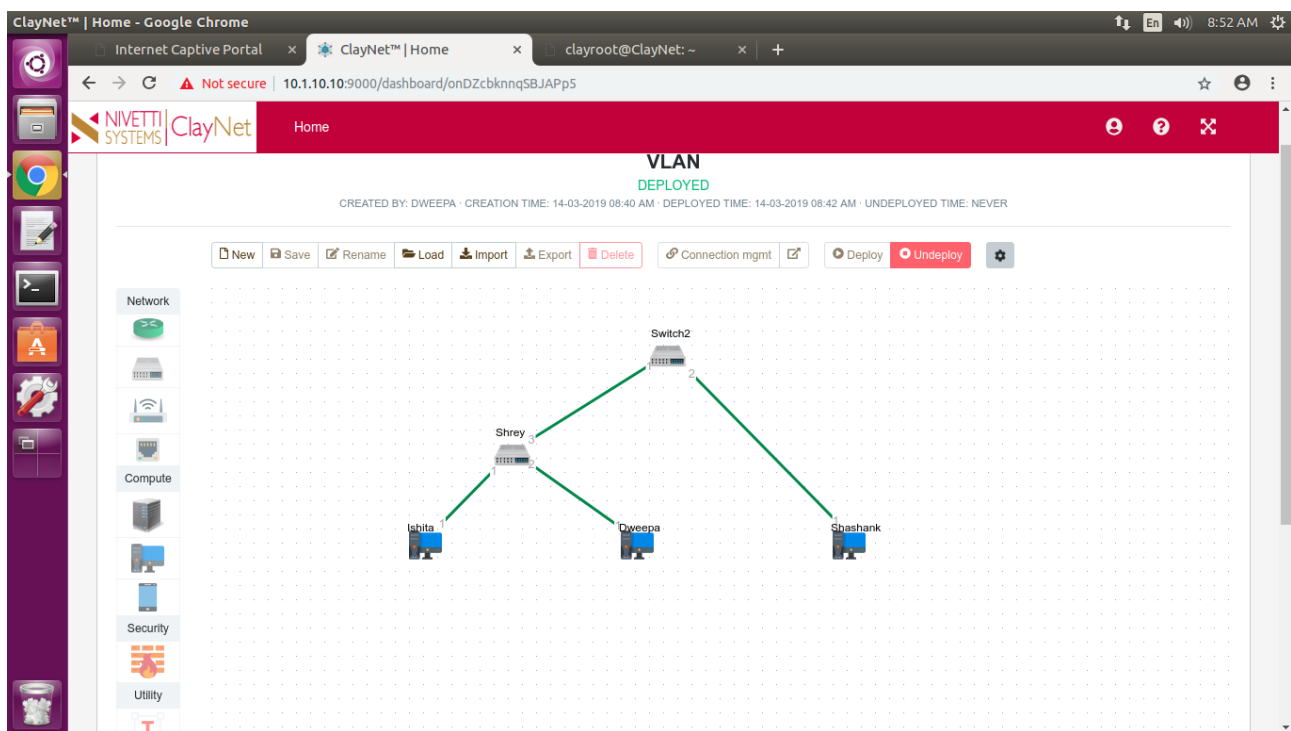
Dweepa Prasad	01FB16ECS138
Ishita Bhandari	01FB16ECS143
Shashank Prabhakar	01FB16ECS356
Shrey Tiwari	01FB16ECS368

# Introduction

A Virtual Local Area Network (VLAN) allows for several networks to work virtually as one single Local Area Network (LAN), despite their geographical distribution. VLANs are implemented to achieve scalability, security and ease of network management and can quickly adapt to changes in network requirements and relocation of workstations and server nodes.

Through this experiment, we wish to perform basic VLAN configurations on a switch, learn about trunk and access ports and L2 and L3 switch functionality. There are 2 VLAN segments, VLAN-10 and VLAN-20. Desktops Ishita and Shashank (refer topology below) belong to VLAN-10 and desktop Dweepa belong to VLAN-20.

## • Topology



Desktop 1 - Ishita - 10.10.10.1

Desktop 2 - Dweepa - 10.10.20.2

Desktop 3 - Shashank - 10.10.10.2

Switch 1 - Shrey

Switch 2

## Screenshots

- Configuring VLAN-10 on port 1 of Switch Shrey (Switch 1)

```
clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
← → ↻ ⓘ Not secure | 10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552 ☆ ⓘ ⋮
clayroot@ClayNet:~$ telnet 127.0.0.1 50552
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.

Login: test
Password:

Switch-operational> configure
Entering configuration mode with exclusive access.
configure> modify parameter-group
Error: Parameter group name is missing

Usage: modify parameter-group [options] <parameter-group-name> [<index>]

Options:
--force|-f          Execute command without confirmation
configure> modify parameter-group fast-ethernet { shelf-1 { active-controller base-slot } port-1}
Info: Parameter group instance loaded for modification.
configure> enter default-vlan
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-1 } > default-vlan ]
configure> show draft -e
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-1 } > default-vlan ]
enable no
tag 1
send-tagged no

configure> set enable yes
configure> set tag 10
configure> save
Info: Parameter group fast-ethernet { shelf-1 { active-controller base-slot } port-1 } saved
configure>
```

```
clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
← → ↻ ⚠ Not secure | 10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552 ☆ ⓘ ⋮
configure> modify parameter-group fast-ethernet { shelf-1 { active-controller base-slot } port-1}
Info: Parameter group instance loaded for modification.
configure> enter default-vlan
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-1 } > default-vlan ]
configure> show draft -e
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-1 } > default-vlan ]
enable no
tag 1
send-tagged no

configure> set enable yes
configure> set tag 10
configure> save
Info: Parameter group fast-ethernet { shelf-1 { active-controller base-slot } port-1 } saved
configure> exit
Switch-operational> show fast-ethernet details { shelf-1 { active-controller base-slot } port-1 }
> Port : { shelf-1 { active-controller base-slot } port-1 }

Port details
-----
Name          :
MAC address   : 00:a2:26:00:10:91
POST          : passed
Media         : copper
Loop back mode : no-loopback
State         : up
Duplex mode   : half-duplex
Speed         : ten-mbps
Work flags    : ----

Default VLAN information
-----
Default VLAN ID      : 10
Send default VLAN frames with tag : no

Switch-operational>
```

- Creating and verifying interface configuration on port 1 of switch Shrey

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552
configure> exit
Switch-operational> show fast-ethernet details { shelf-1 { active-controller base-slot } port-1 }
> Port : { shelf-1 { active-controller base-slot } port-1 }
Port details
-----
Name          : 
MAC address   : 00:a2:26:00:10:91
POST         : passed
Media         : copper
Loop back mode : no-loopback
State         : up
Duplex mode   : half-duplex
Speed         : ten-mbps
Work flags    : ----
Default VLAN information
-----
Default VLAN ID : 10
Send default VLAN frames with tag : no
Switch-operational> configure
Entering configuration mode with exclusive access.
configure> modify parameter-group interface if-p1
Info: Parameter group instance loaded for modification.
configure> set name if-p1-v10
configure> enter ethernet vlan
[ interface:"if-p1-v10" > ethernet > vlan ]
configure> show draft -e
[ interface:"if-p1-v10" > ethernet > vlan ]
enable no
tag 1
configure> set enable yes
configure> set tag 10
configure> save

```

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552
Work flags : ----
Default VLAN information
-----
Default VLAN ID : 10
Send default VLAN frames with tag : no
Switch-operational> show interface details if-p1-v10
> Interface : if-p1-v10
General Information
-----
ID : 25
Encapsulation : ethernet
MTU : 1500
Base port type : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-1 }
State Information
-----
State : up
Last state transition : 08:50:55, Thursday, March 14, 2019 IST
Work flags : --
Ethernet information
-----
VLAN tagging : enabled
VLAN ID : 10
Bridging information
-----
Bridge : system
Address learning limit : 16
MAC addresses learned : 1
Switch-operational>

```

- Configuring VLAN-20 on port 2 of Switch Shrey (Switch 1)

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
← → ↻ ⓘ Not secure | 10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552 ☆ ⓘ ⋮
configure> modify parameter-group fast-ethernet { shelf-1 { active-controller base-slot } port-2}
Info: Parameter group instance loaded for modification.
configure> enter default-vlan
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-2 } > default-vlan ]
configure> show draft -e
[ fast-ethernet:{ shelf-1 { active-controller base-slot } port-2 } > default-vlan ]
enable no
tag 1
send-tagged no

configure> set enable yes
configure> set tag 20
configure> save
Info: Parameter group fast-ethernet { shelf-1 { active-controller base-slot } port-2 } saved
configure> exit
Switch-operational> show fast-ethernet details { shelf-1 { active-controller base-slot } port-2}

> Port : { shelf-1 { active-controller base-slot } port-2 }

Port details
-----
Name                :
MAC address         : 00:a2:26:00:10:93
POST                : passed
Media               : copper
Loop back mode      : no-loopback
State               : up
Duplex mode         : half-duplex
Speed               : ten-mbps
Work flags           : ----

Default VLAN information
-----
Default VLAN ID      : 20
Send default VLAN frames with tag : no

Switch-operational>

```

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
← → ↻ ⓘ Not secure | 10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552 ☆ ⓘ ⋮
tag 1

configure> set enable yes
configure> set tag 20
configure> save
Info: Parameter group interface "if-p2-v20" saved
configure> exit
Switch-operational> show interface details if-p2-v20

> Interface : if-p2-v20

General Information
-----
ID                : 26
Encapsulation      : ethernet
MTU               : 1500
Base port type     : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-2 }

State Information
-----
State              : up
Last state transition : 09:01:30, Thursday, March 14, 2019 IST
Work flags         : --

Ethernet information
-----
VLAN tagging       : enabled
VLAN ID            : 20

Bridging information
-----
Bridge              : system
Address learning limit : 16
MAC addresses learned : 1

Switch-operational>

```

- Creating and verifying interface configuration on port 2 of switch Shrey

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552
tag 1
configure> set enable yes
configure> set tag 20
configure> save
Info: Parameter group interface "if-p2-v20" saved
configure> exit
Switch-operational> show interface details if-p2-v20

> Interface : if-p2-v20

General Information
-----
ID                : 26
Encapsulation     : ethernet
MTU               : 1500
Base port type    : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-2 }

State Information
-----
State              : up
Last state transition : 09:01:30, Thursday, March 14, 2019 IST
Work flags         : - - - - -

Ethernet information
-----
VLAN tagging       : enabled
VLAN ID            : 20

Bridging information
-----
Bridge             : system
Address learning limit : 16
MAC addresses learned : 1

Switch-operational>

```

- Configuring trunk port on switch Shrey

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552
-----
State              : up
Last state transition : 09:04:04, Thursday, March 14, 2019 IST
Work flags         : - - - - -

Ethernet information
-----
VLAN tagging       : enabled
VLAN ID            : 10

Bridging information
-----
Bridge             : system
Address learning limit : 16
MAC addresses learned : 0

> Interface : if-p3-v20

General Information
-----
ID                : 28
Encapsulation     : ethernet
MTU               : 1500
Base port type    : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-3 }

State Information
-----
State              : up
Last state transition : 09:04:46, Thursday, March 14, 2019 IST
Work flags         : - - - - -

Ethernet information
-----
VLAN tagging       : enabled
VLAN ID            : 20

```

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/50552
-----
MTU               : 1500
Base port type    : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-3 }

State Information
-----
State              : up
Last state transition : 09:04:46, Thursday, March 14, 2019 IST
Work flags         : - - - - -

Ethernet information
-----
VLAN tagging       : enabled
VLAN ID            : 20

Bridging information
-----
Bridge             : system
Address learning limit : 16
MAC addresses learned : 0

Switch-operational> show interface all -s up

Interface name      Status      Encaps-  IP address
-----
if-p1               up          ethernet -
if-p1-v10           up          ethernet -
if-p2               up          ethernet -
if-p2-v20           up          ethernet -
if-p3               up          ethernet -
if-p3-v10           up          ethernet -
if-p3-v20           up          ethernet -

Total number of interfaces displayed : 7

Switch-operational>

```

- Configure VLAN-10 on port 2 of switch 2

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/52250
tag 1
configure> set enable yes
configure> set tag 10
configure> save
Info: Parameter group interface "if-p2-v10" saved
configure> exit
Switch-operational> show interface details if-p2-v10

> Interface : if-p2-v10

General Information
-----
ID : 25
Encapsulation : ethernet
MTU : 1500
Base port type : fast-ethernet
Base port location : { shelf-1 { active-controller base-slot } port-2 }

State Information
-----
State : up
Last state transition : 09:12:29, Thursday, March 14, 2019 IST
Work flags : - - - - -

Ethernet information
-----
VLAN tagging : enabled
VLAN ID : 10

Bridging information
-----
Bridge : system
Address learning limit : 16
MAC addresses learned : 0

Switch-operational>

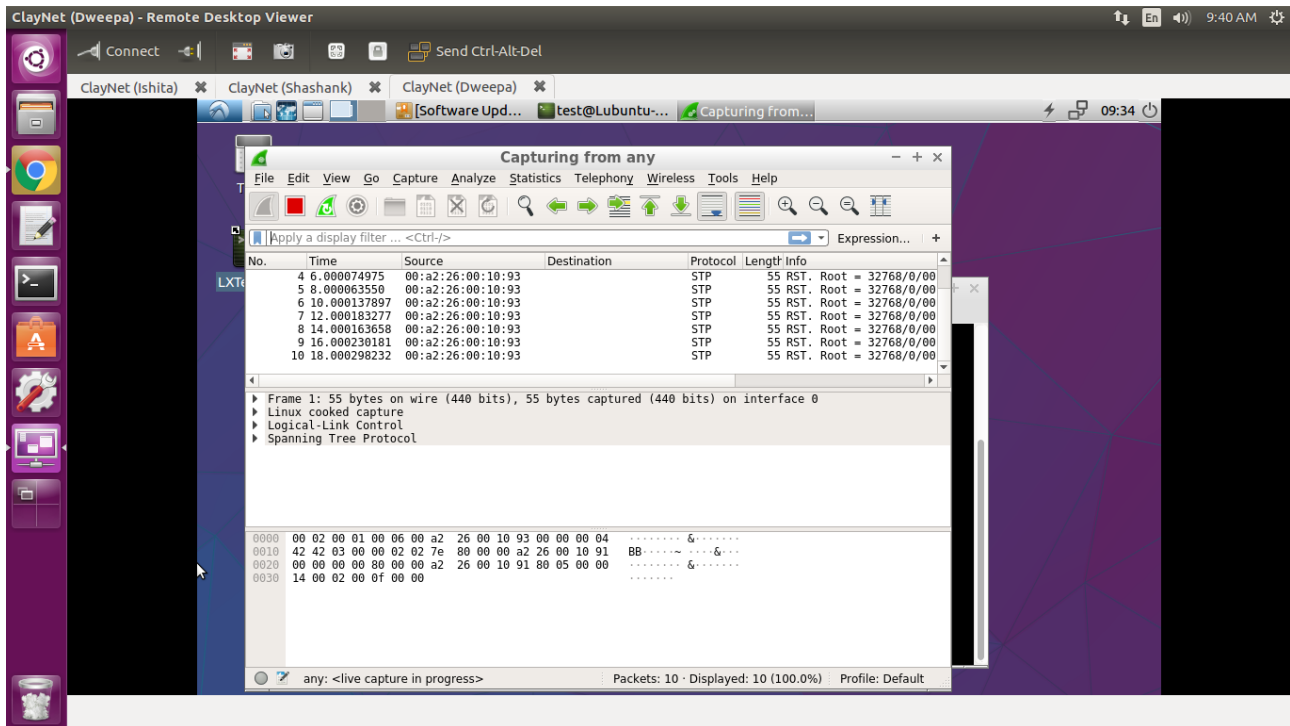
```

- Wireshark captures
  - Desktop Ishita

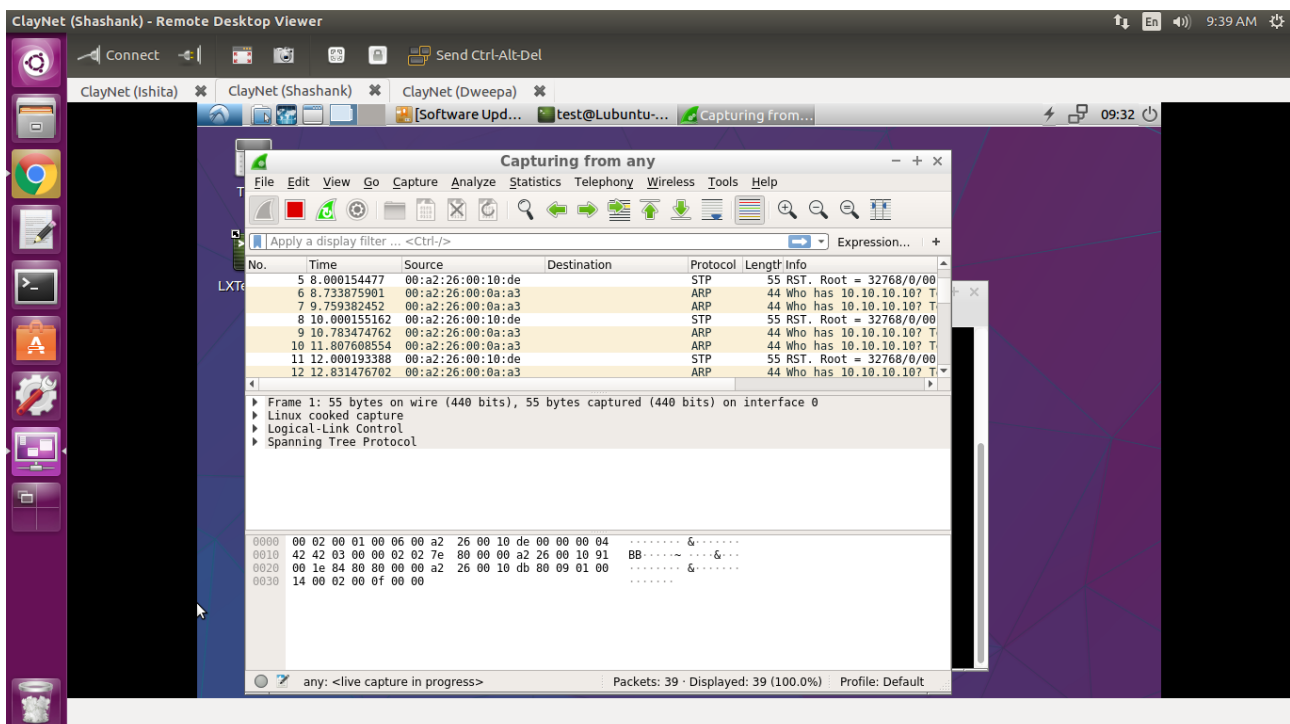
The screenshot displays a Remote Desktop Viewer window titled "ClayNet (Ishita) - Remote Desktop Viewer". Inside, there are two main windows:

- Terminal Window (test@Lubuntu-vm):** Shows the output of a ping command to 10.10.10.10. The output indicates 56(84) bytes of data, 39 packets transmitted, 0 received, and 12 errors (100% packet loss). It also shows the command "sudo wireshark" being executed.
- Wireshark Window:** Shows a network capture on the interface "eth0". The capture filter is "eth0". The packet list shows several ICMP Echo (ping) requests from 10.10.10.1 to 10.10.10.1. The packet details pane shows the structure of an ICMP Echo request, including the type (8), code (0), and sequence number (1).

- Desktop Dweepa



- Desktop Shashank





- Configuring Switch-2 as L3 switch with IVI for Inter-VLAN routing with IP 10.10.10.3/24 (VLAN-10)

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/52250
configure> exit
Switch-operational> show interface details ivi-v10
> Interface : ivi-v10
General Information
-----
ID : 28
Encapsulation : none
MTU : 1500
Base virtual port type : integrated-vlan
Base virtual port name :
State Information
-----
State : up
Last state transition : 09:41:51, Thursday, March 14, 2019 IST
Work flags :
Integrated VLAN information
-----
Bridge : system
VLAN tagging : enabled
VLAN ID : 10
IP information
-----
Router : system
IPv4 information
-----
Address : 10.10.10.3
Netmask : 255.255.255.0
Preference : 1
Metric : 1
Switch-operational>

```

- Configuring Switch-2 as L3 switch with IVI for Inter-VLAN routing with IP 10.10.20.1/24 (VLAN-20)

```

clayroot@ClayNet: ~ - Google Chrome
Internet Captive Portal x ClayNet™ | Home x clayroot@ClayNet: ~ x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/52250
configure> exit
Switch-operational> show interface details ivi-v20
> Interface : ivi-v20
General Information
-----
ID : 30
Encapsulation : none
MTU : 1500
Base virtual port type : integrated-vlan
Base virtual port name :
State Information
-----
State : up
Last state transition : 09:45:22, Thursday, March 14, 2019 IST
Work flags :
Integrated VLAN information
-----
Bridge : system
VLAN tagging : enabled
VLAN ID : 20
IP information
-----
Router : system
IPv4 information
-----
Address : 10.10.20.1
Netmask : 255.255.255.0
Preference : 1
Metric : 1
Switch-operational>

```

- Verifying integrated VLAN configuration

```

State : up
Last state transition : 09:45:22, Thursday, March 14, 2019 IST
Work flags : -----

Integrated VLAN information
-----
Bridge : system
VLAN tagging : enabled
VLAN ID : 20

IP information
-----
Router : system

IPv4 information
-----
Address : 10.10.20.1
Netmask : 255.255.255.0
Preference : 1
Metric : 1

Switch-operational> show interface all -s up

Interface name      Status  Encaps-  IP address
                   ulation
-----
if-p1               up      ethernet -
if-p1-v10           up      ethernet -
if-p1-v20           up      ethernet -
if-p2               up      ethernet -
if-p2-v10           up      ethernet -
ivi-v10             up      none     10.10.10.3/24
ivi-v20             up      none     10.10.20.1/24

Total number of interfaces displayed : 7

Switch-operational>

```

- Ping from Desktop Ishita

```

test@Lubuntu-vm: ~
File Edit Tabs Help

test@Lubuntu-vm:~$ ping 10.10.10.2
PING 10.10.10.2 (10.10.10.2) 56(84) bytes of data:
64 bytes from 10.10.10.2: icmp_seq=1 ttl=64 time=1.36 ms
64 bytes from 10.10.10.2: icmp_seq=2 ttl=64 time=2.94 ms
64 bytes from 10.10.10.2: icmp_seq=3 ttl=64 time=1.42 ms
64 bytes from 10.10.10.2: icmp_seq=4 ttl=64 time=1.44 ms
64 bytes from 10.10.10.2: icmp_seq=5 ttl=64 time=1.24 ms
64 bytes from 10.10.10.2: icmp_seq=6 ttl=64 time=1.46 ms
64 bytes from 10.10.10.2: icmp_seq=7 ttl=64 time=1.17 ms
64 bytes from 10.10.10.2: icmp_seq=8 ttl=64 time=1.33 ms
64 bytes from 10.10.10.2: icmp_seq=9 ttl=64 time=1.30 ms
64 bytes from 10.10.10.2: icmp_seq=10 ttl=64 time=1.08 ms
64 bytes from 10.10.10.2: icmp_seq=11 ttl=64 time=1.37 ms
64 bytes from 10.10.10.2: icmp_seq=12 ttl=64 time=1.28 ms
^[[2-64 bytes from 10.10.10.2: icmp_seq=13 ttl=64 time=1.45 ms
64 bytes from 10.10.10.2: icmp_seq=14 ttl=64 time=1.50 ms
64 bytes from 10.10.10.2: icmp_seq=15 ttl=64 time=1.15 ms
64 bytes from 10.10.10.2: icmp_seq=16 ttl=64 time=1.29 ms
64 bytes from 10.10.10.2: icmp_seq=17 ttl=64 time=1.23 ms
64 bytes from 10.10.10.2: icmp_seq=18 ttl=64 time=1.61 ms

```

Successfully implemented inter-VLAN Routing and Same-VLAN Switching