CSP450 NAA Project 1a

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Project Overview

This document will provide detailed instructions for setting up and implementing a DHCP on an Aruba- 6300 Switch. This is to establish a local network for two clients to be able to communicate with each other. The Project requires deploying two VLANs, each assigned to a client, also DHCP assigning IP addresses to clients that are from pool of specific range of IP addresses. Furthermore, these clients require to be connected to the internet and communicate with the other client through the switch. Clients communicate with each other by using ssh using a key pair.

Key word definitions for this project

VLANs: Virtual Local Area Network(s) are used to create virtual segments within a physical network topology, allowing them to function as separate networks. In this project, VLANs are utilized to differentiate between the two networks.

DHCP: The Dynamic Host Configuration Protocol (DHCP) is used to automatically assign IP addresses to clients. When a client connects to the DHCP server, it receives an IP address from the available pool of addresses. For this project, we set the IP address pools for each VLANs.

IP Routes: IP routes are defined paths that directs network traffic to specified direction. Static routes are defined on each client to help direct the flow of network traffic that is outside of the respective network.

SSH: Secure Shell (SSH) enables clients to remotely log into connected machines and execute commands as if they were physically logged into the machine.

Determining Subnet for this project

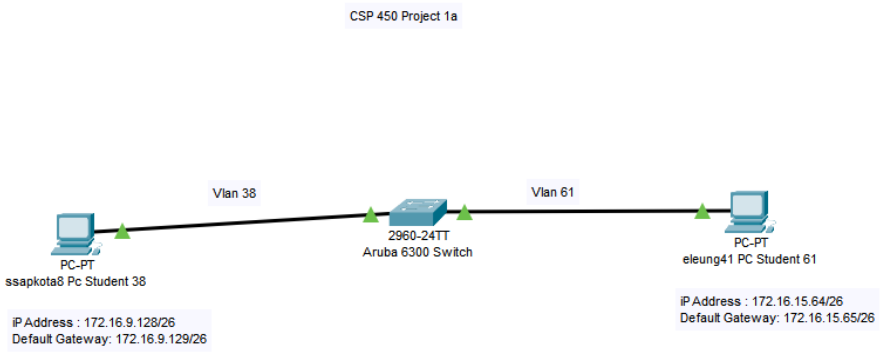
For this project, the subnet was defined as 172.16.X.?/26. X being the unique student ID provided in the course. Determining the subnet is not simple as replacing x with the student ID, rather we must figure out using the subnet mask given to us in the project.

So, we use unique student ID of my as 38.

If we follow the step of subnetting we get it as 172.16.9.128/26.

So, for my partner's subnet with Student ID 61 is 172.16.15.64/26

Network Topology



Implementation

Step 1 Accessing the Switch

Aruba 6300 Switch has two methods of connecting, this documentation will spell out how to connect using SSH established through ethernet connection to the MGMT port.

1. Connect the ethernet cable from the PC to the management port on Aruba 6300 switch. Making sure the port number is same in the lab pc and in the back server room.
2. Open Network configuration and determine which adaptor is connected to the switch
3. Configure IPv4 of the network adaptor in use to be one of the management interface IP address range given.
4. Connect using SSH by entering the IP address of the switch. This can be done through Putty or other methods.

Step 2 VLAN configurations

The project requires two PC to be given different subset of IP addresses from DHCP. For us to set this up, we need to first create a VLAN for the two PCs

1. Create two VLANS using any two number between 1 to 1024 on the switch
2. Give VLANs respective default gateway
3. Assign each VLAN to a distinct interface as an access port.

Step 3 DHCP configurations

DHCP is used to auto assign IP address to devices from a give pool of addresses. We need to create a pool for each VLAN, and in process we need to define the subnet and the range of IP addresses we are going to lease out.

1. Create a virtual routing instance (dhcp-server vrf default)
2. Define DHCP pools in each VLAN, here we need to define the range of IP addresses to lease out and specify the default routing IP address

Step 4 Confirmation on Clients

We need to confirm that DHCP is working properly and check the devices are assigned correct IP address we have set up. Furthermore, we need to make sure we still have internet connection

1. Configure the VM network adaptors as one bridged adaptor to the switch and other as NAT connected to the internet
2. Make sure the network adaptors are all enabled in the Ubuntu VM

3. In the network setting of the adaptor that does not have internet connection, change the IPv4 setting to “Obtain an IP address automatically”
4. We can use the command ip a in the terminal to check that ip address is correctly assigned to the VM

Step 5 IP routes and SSH set up

Currently the pings to other VM will not work as there is not IP routes set up for the other network. We need to define these routes to be directed to the switch so that the switch can redirect the packets to the correct port/PC

1. Set up IP routes by defining range of IP addresses that will be directed to the default gateway (ie. IP address of the switch in that VLAN)
2. Install SSH client, used OpenSSH-server for our case.
3. Create a new user that will be used to ssh into the machine, making sure the user created does not have admin access.
4. Create a key-pair on each of the client on the new user and install the public key on the user. We can install the public key by issuing the following command: ssh-copy-id -I [location of public key] [username]@[ip address]
5. We also need to disable root access, we can do this by editing sshd_config file. Go to /etc/ssh/sshd_config file and edit PermitRootLogin from yes to no. Save the edit and restart ssh service

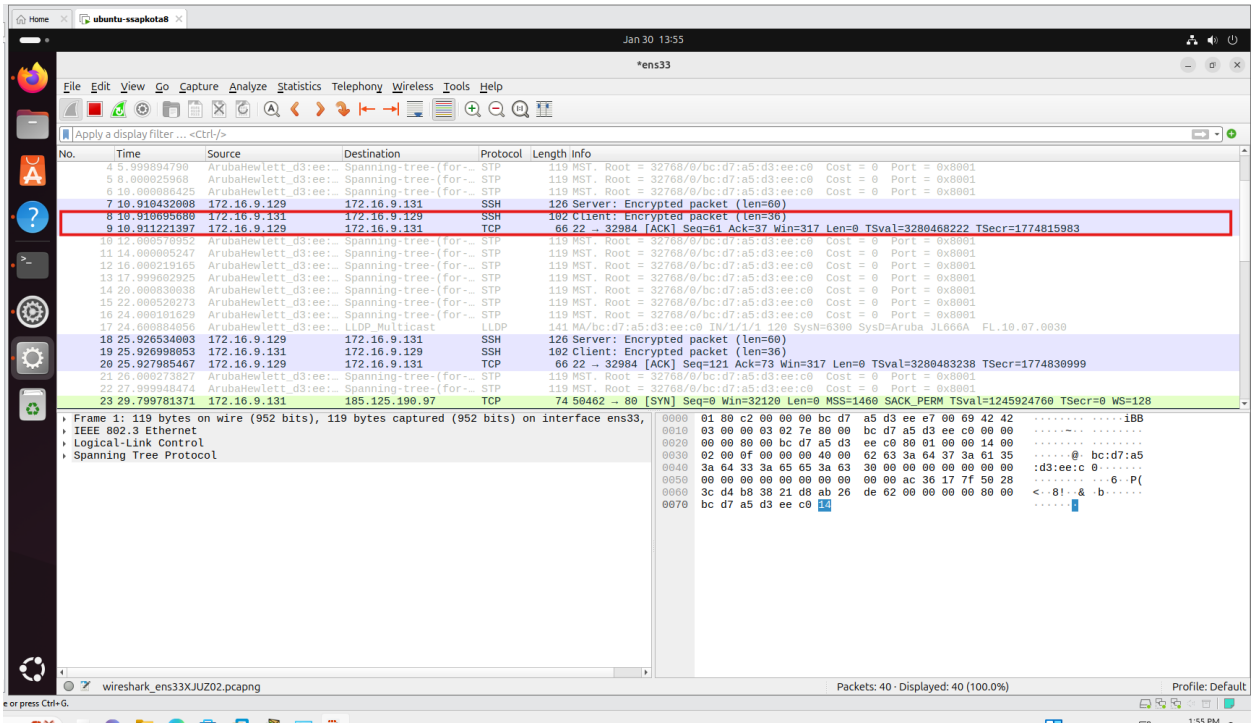
Step 6 Testing the network configuration

1. Always check the ping first, see if the packet reaches to the other PC. If ping does not work, check the following in order: IP routes, the IP address, switch configuration, hardware connection.
2. If ping is successful, SSH into each other’s VM using non admin user account, no password prompt will be needed as we have installed the public key installed. If successful, everything is configured correctly. If unsuccessful, check the above steps again.
3. Try SSH into each other’s VM using root account, we should be denied without a password prompt. If you are able to login, or password is prompted, check the sshd_config file again and make sure it is saved, and you have restarted the ssh service.

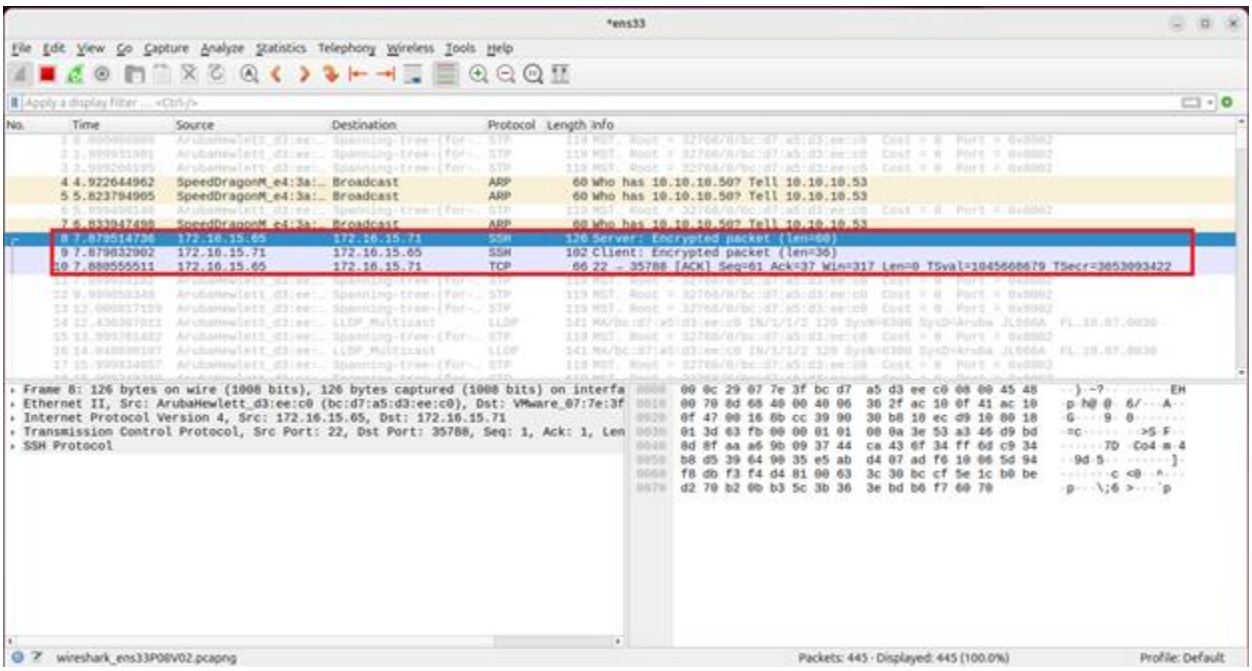
Appendix A: Wireshark

(Note. *STUDENT_A* IP address: 172.16.9.128 DG:172.16.9.129 , *STUDENT_B* IP address: 172.16.15.64 DG:172.16.15.65)

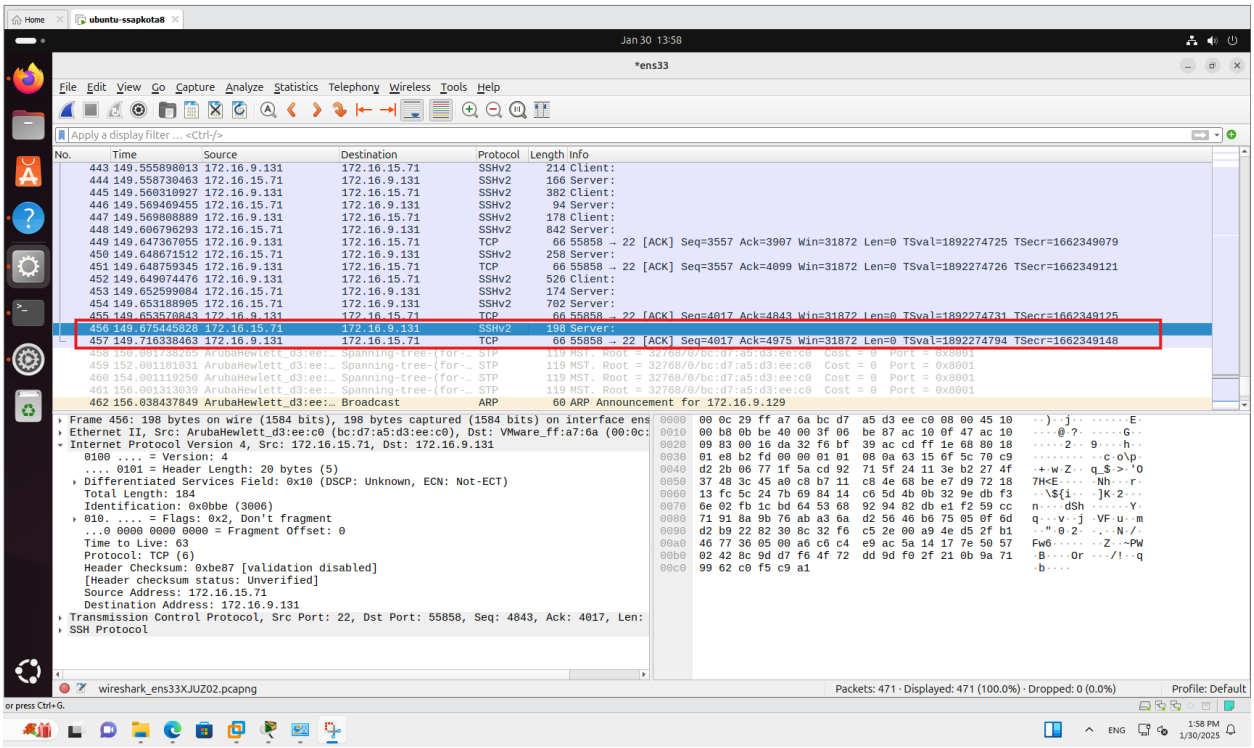
STUDENT_A **VM to switch**



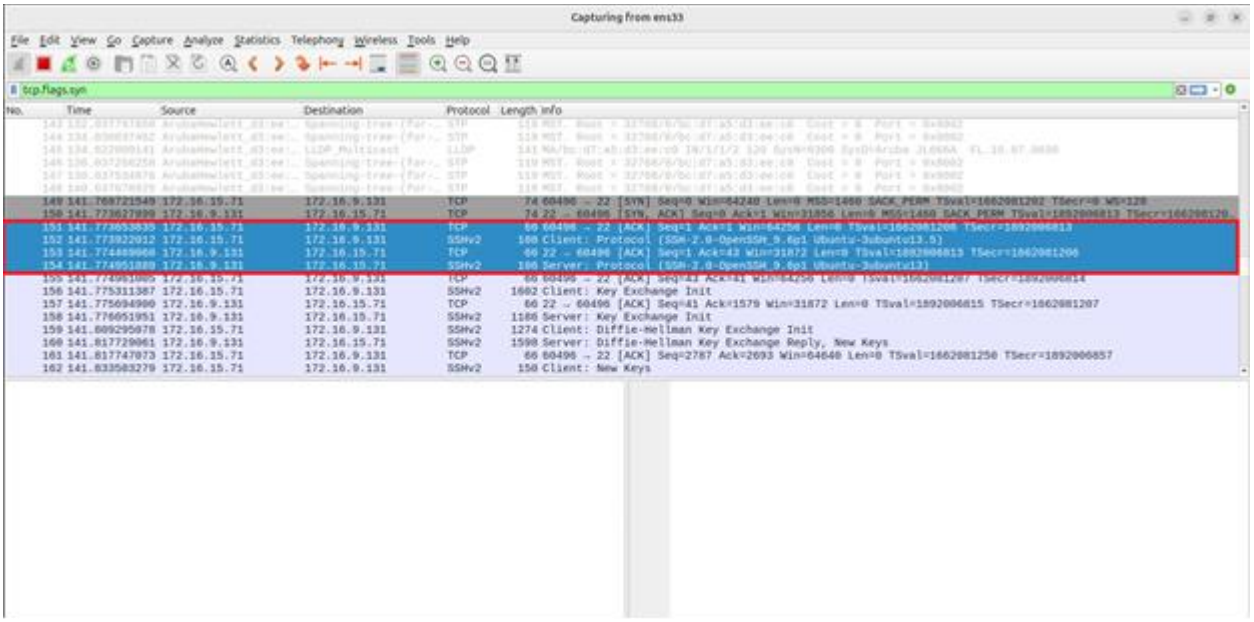
STUDENT_B **VM to switch**



STUDENT_A **VM to** *STUDENT_B* **VM**



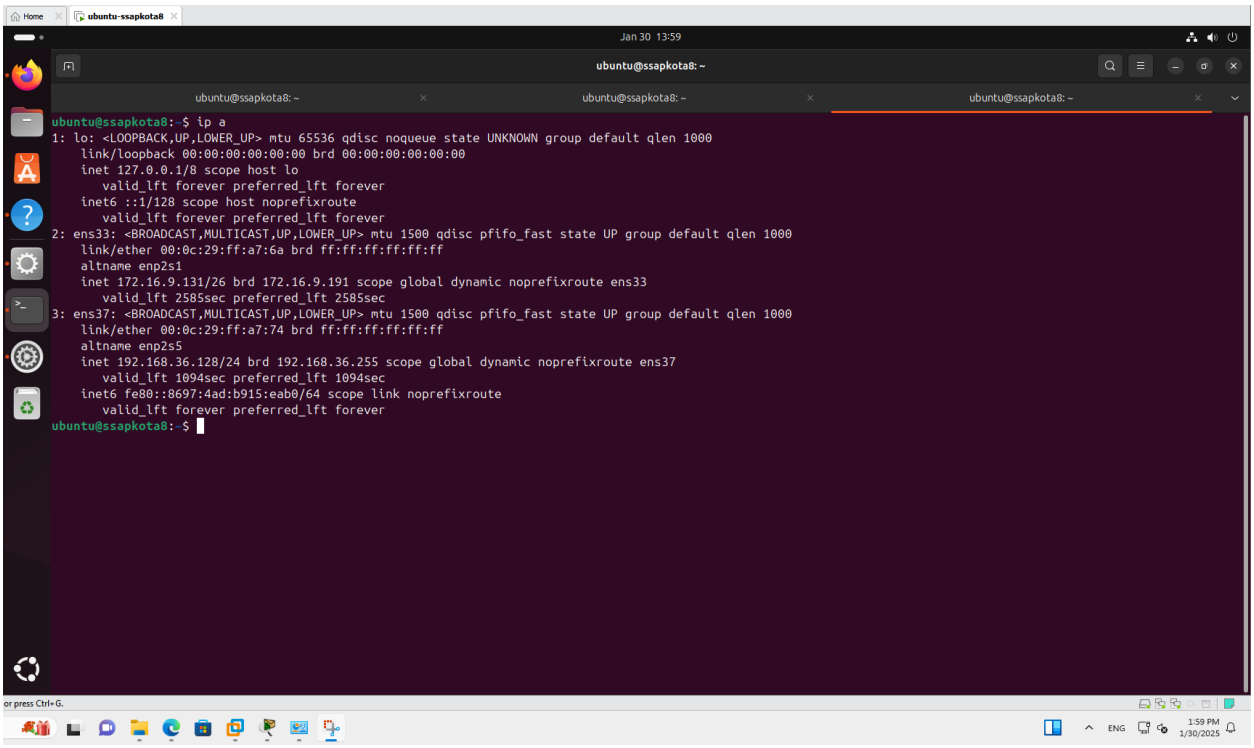
STUDENT_B **VM to** *STUDENT_A* **VM**



Appendix B: Commands on VM

Terminal Command “ip a”

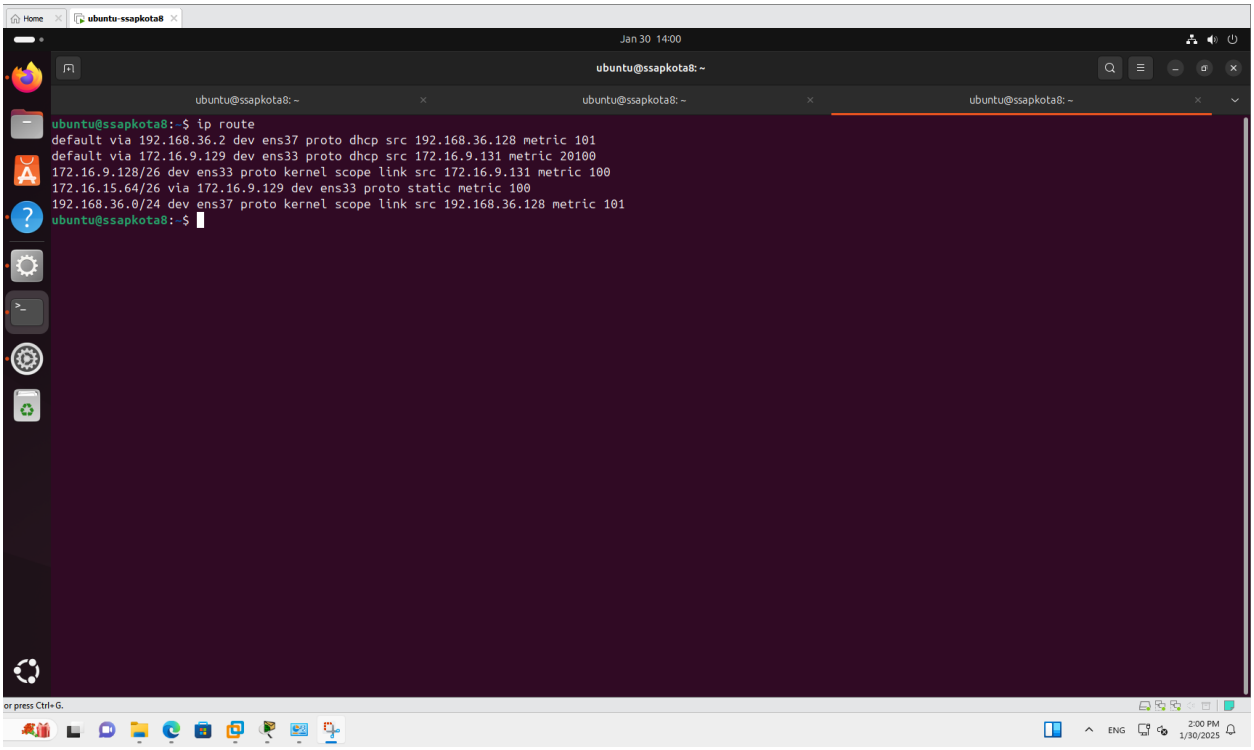
STUDENT_A **VM**



STUDENT_B **VM**

Terminal Command “IP route”

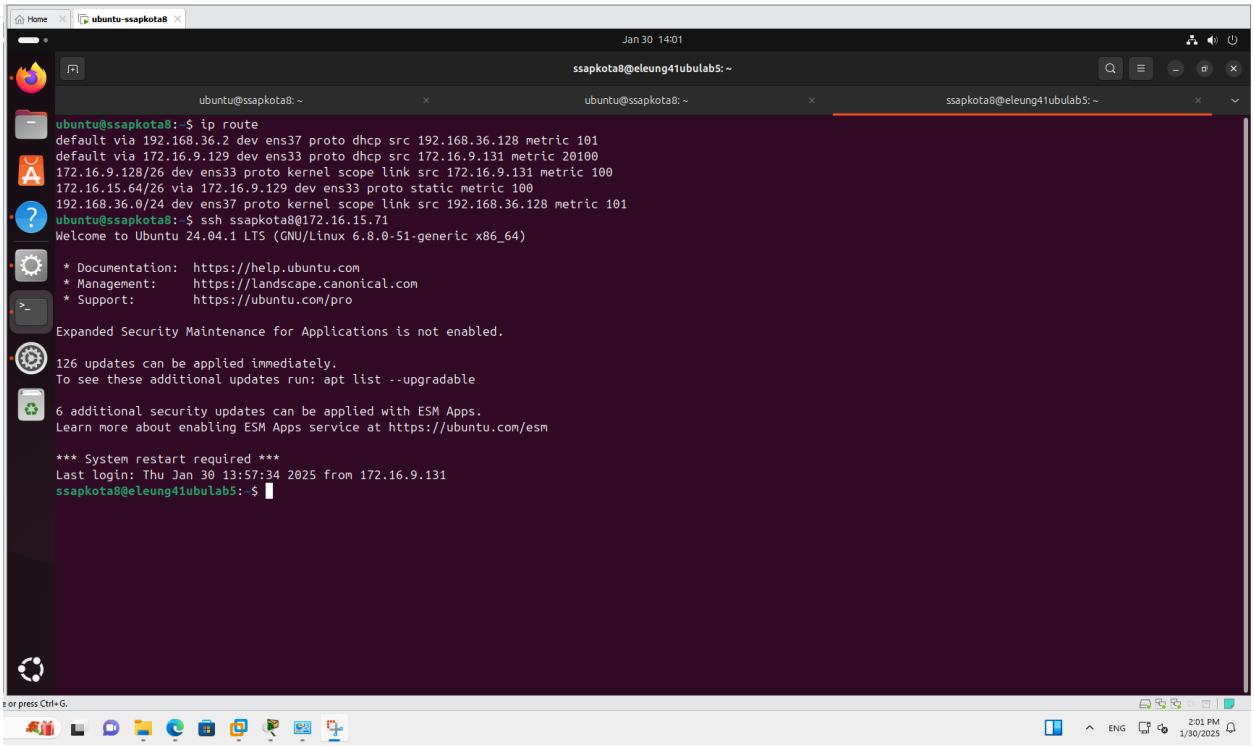
STUDENT_A **VM**



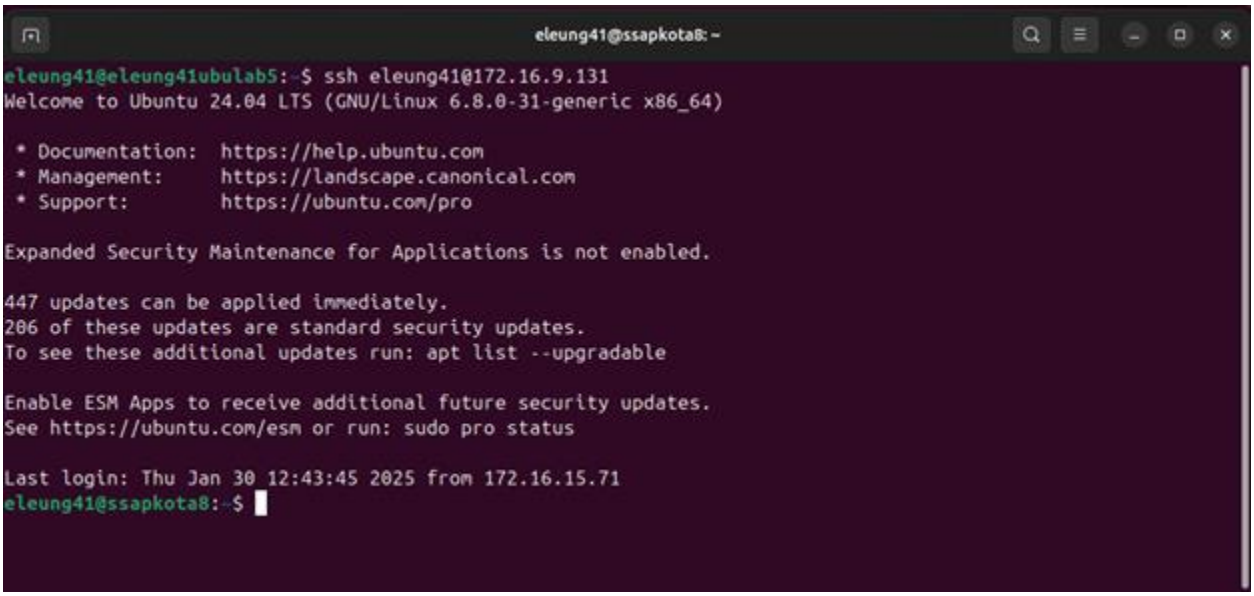
STUDENT_B **VM**

SSH to partners VM

STUDENT_A VM

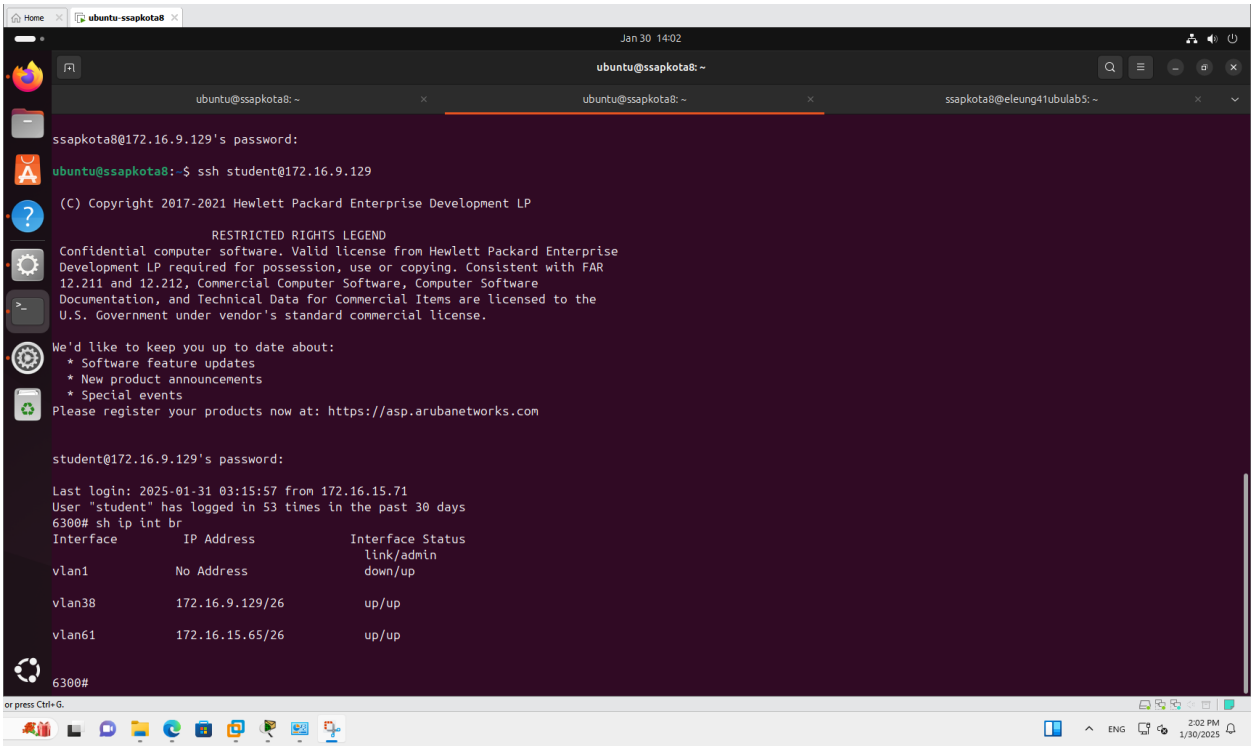


STUDENT_B VM

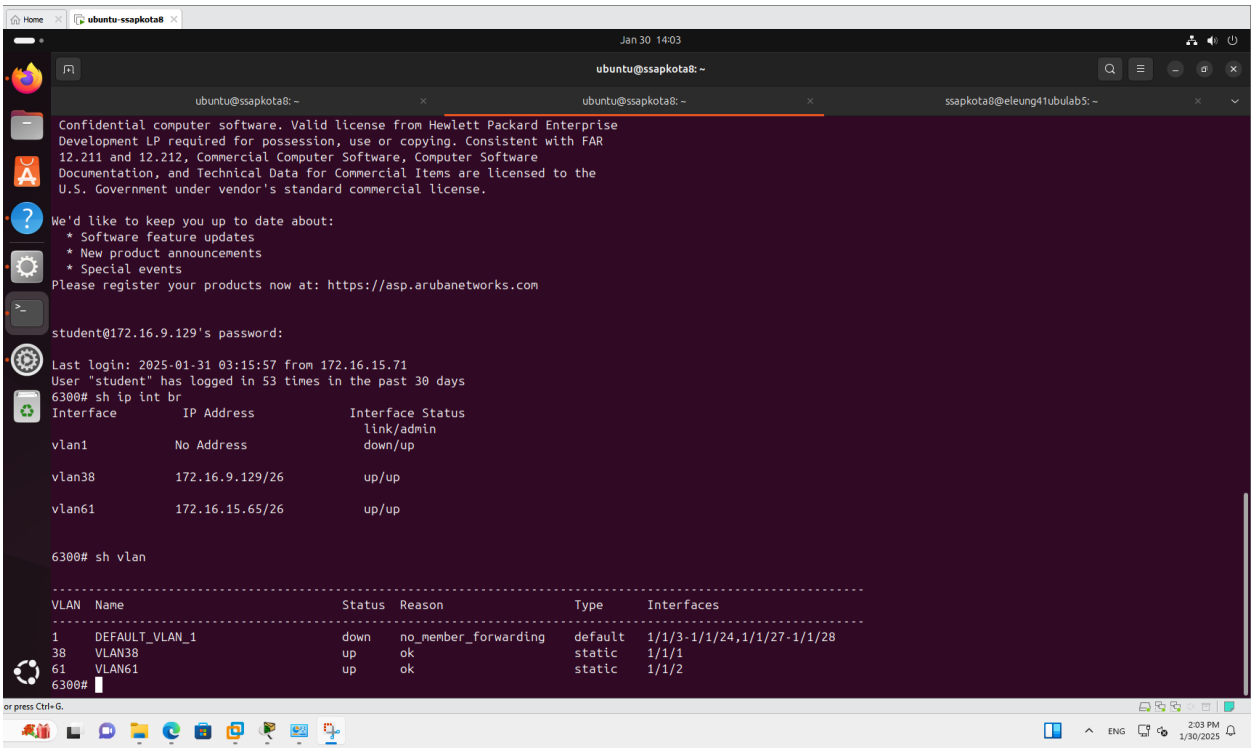


Appendix C: Commands on Switch

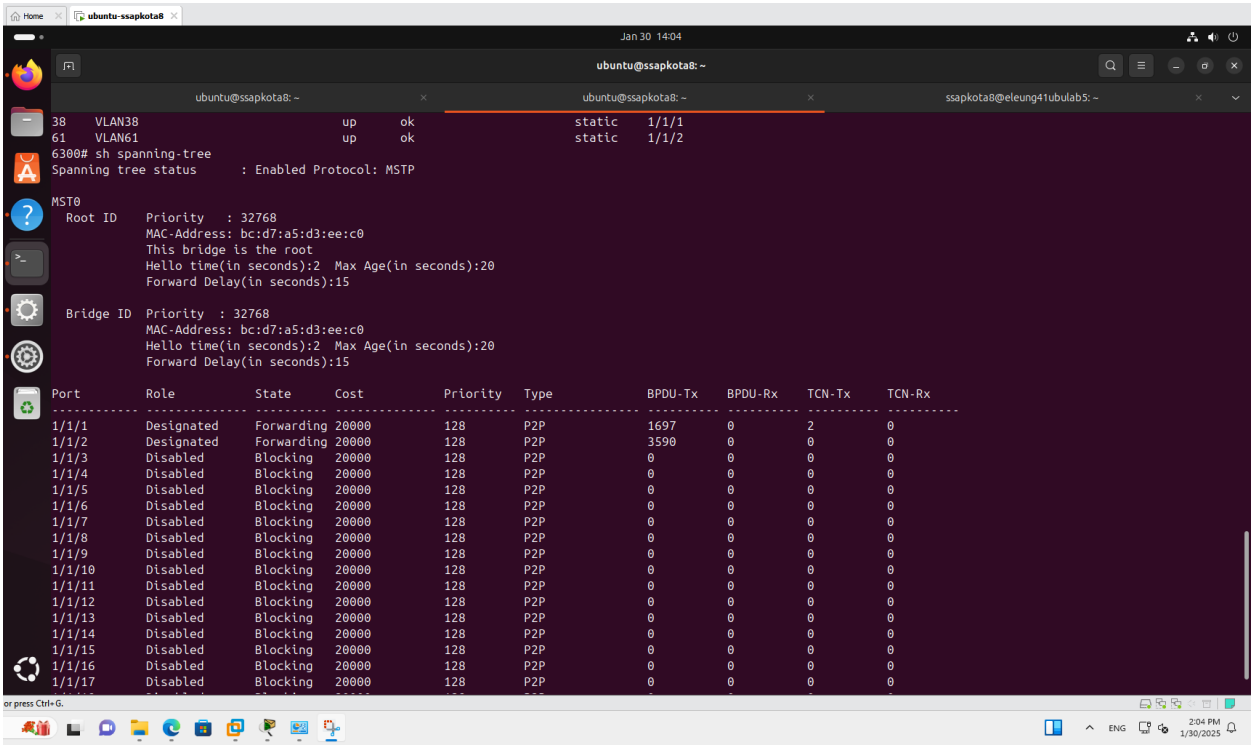
Sh ip int br

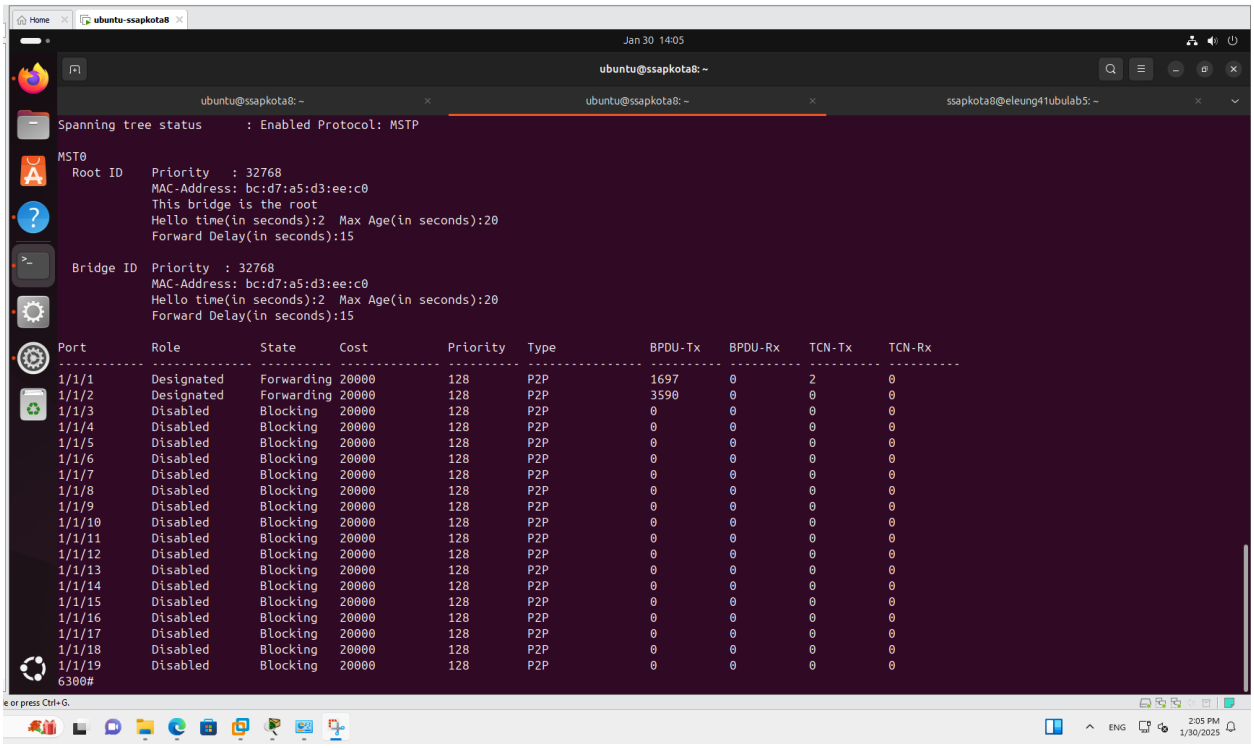


Sh vlan

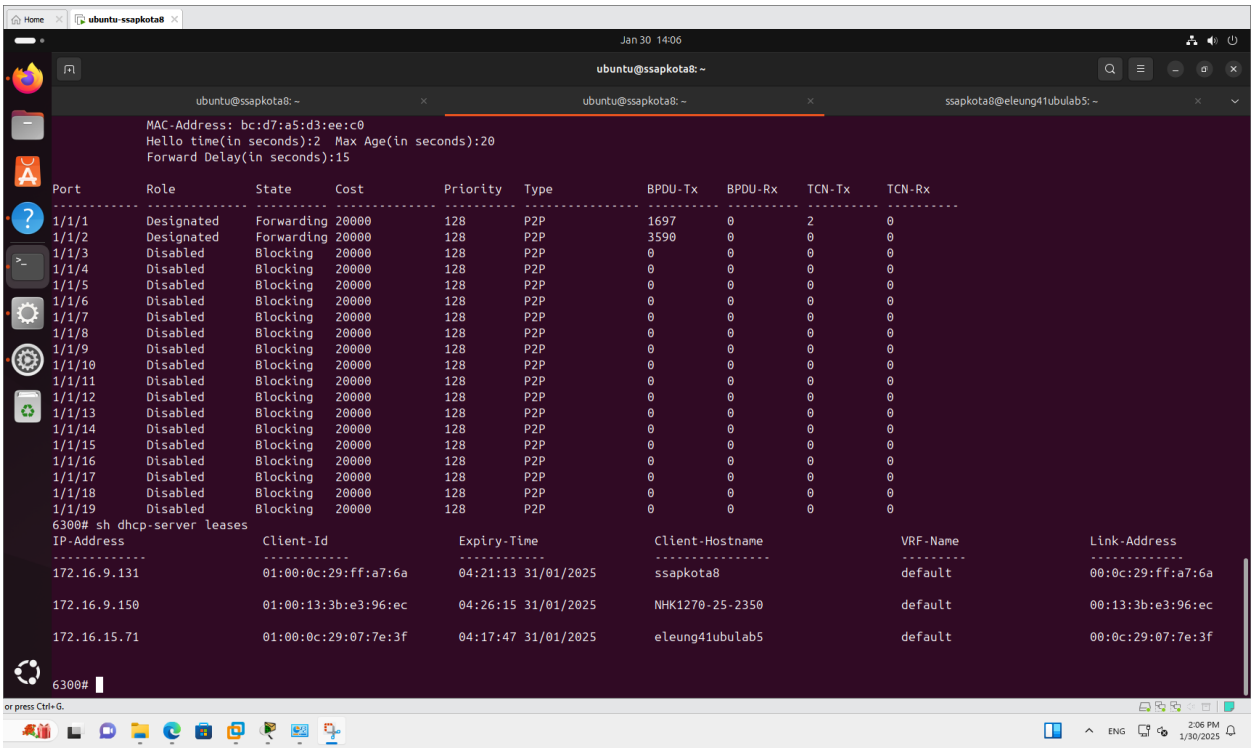

Home
ubuntu-ssapkota8
Jan 30 14:03
ubuntu@ssapkota8: ~
ubuntu@ssapkota8: ~
ubuntu@ssapkota8: ~
ssapkota8@eleung41ubulab5: ~
Confidential computer software. Valid license from Hewlett Packard Enterprise
Development LP required for possession, use or copying. Consistent with FAR
12.211 and 12.212, Commercial Computer Software, Computer Software
Documentation, and Technical Data for Commercial Items are licensed to the
U.S. Government under vendor's standard commercial license.
We'd like to keep you up to date about:
* Software feature updates
* New product announcements
* Special events
Please register your products now at: https://asp.arubanetworks.com
student@172.16.9.129's password:
Last login: 2025-01-31 03:15:57 from 172.16.15.71
User "student" has logged in 53 times in the past 30 days
6300# sh ip int br
Interface IP Address Interface Status
link/admin
vlan1 No Address down/up
vlan38 172.16.9.129/26 up/up
vlan61 172.16.15.65/26 up/up
6300# sh vlan
VLAN Name Status Reason Type Interfaces
1 DEFAULT_VLAN_1 down no_member_forwarding default 1/1/3-1/1/24,1/1/27-1/1/28
38 VLAN38 up ok static 1/1/1
61 VLAN61 up ok static 1/1/2
6300#
or press Ctrl+G.
ENG
2:03 PM
1/30/2025

Sh spanning-tree





Sh dhcp-server leases



```
Home | ubuntu-ssapkota8

Jan 30 14:06

ubuntu@ssapkota8: ~

ubuntu@ssapkota8: ~ | ubuntu@ssapkota8: ~ | ssapkota8@eleung41ubulab5: ~

            MAC-Address: bc:d7:a5:d3:ee:c0
            Hello time(in seconds):2  Max Age(in seconds):20
            Forward Delay(in seconds):15

Port         Role           State      Cost           Priority   Type            BPDU-Tx    BPDU-Rx    TCN-Tx     TCN-Rx
------------ -------------- ---------- -------------- ---------- --------------- ---------- ---------- ---------- ----------
1/1/1        Designated     Forwarding 20000          128        P2P             1697       0          2          0
1/1/2        Designated     Forwarding 20000          128        P2P             3590       0          0          0
1/1/3        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/4        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/5        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/6        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/7        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/8        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/9        Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/10       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/11       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/12       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/13       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/14       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/15       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/16       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/17       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/18       Disabled       Blocking   20000          128        P2P             0          0          0          0
1/1/19       Disabled       Blocking   20000          128        P2P             0          0          0          0
6300# sh dhcp-server leases
IP-Address                Client-Id                 Expiry-Time              Client-Hostname               VRF-Name                  Link-Address
------------              -----------               -----------              ---------------              ---------                 ------------
172.16.9.131              01:00:0c:29:ff:a7:6a      04:21:13 31/01/2025      ssapkota8                    default                   00:0c:29:ff:a7:6a

172.16.9.150              01:00:13:3b:e3:96:ec      04:26:15 31/01/2025      NHK1270-25-2350              default                   00:13:3b:e3:96:ec

172.16.15.71              01:00:0c:29:07:7e:3f      04:17:47 31/01/2025      eleung41ubulab5              default                   00:0c:29:07:7e:3f

6300#

or press Ctrl+G.

ENG 2:06 PM 1/30/2025
```

Appendix D: Switch Script Commands

```
conf t
vlan 1,38, 61
spanning-tree
interface 1/1/1
   no shutdown
   no routing
   vlan access 38
interface 1/1/2
   no shutdown
   no routing
   vlan access 61
interface vlan 1
   ip dhcp
interface vlan 38
   ip address 172.16.9.129/26
interface vlan 61
   ip address 172.16.15.65/26
dhcp-server vrf default
   pool 38
      range 172.16.9.130 172.16.9.190 prefix-len 26
      default-router 172.16.9.129
      exit
   pool 61
      range 172.16.15.66 172.16.15.126 prefix-len 26
      default-router 172.16.15.65
      exit
   enable
```