IT Technology
Advanced Networking
Assignment 9

University College

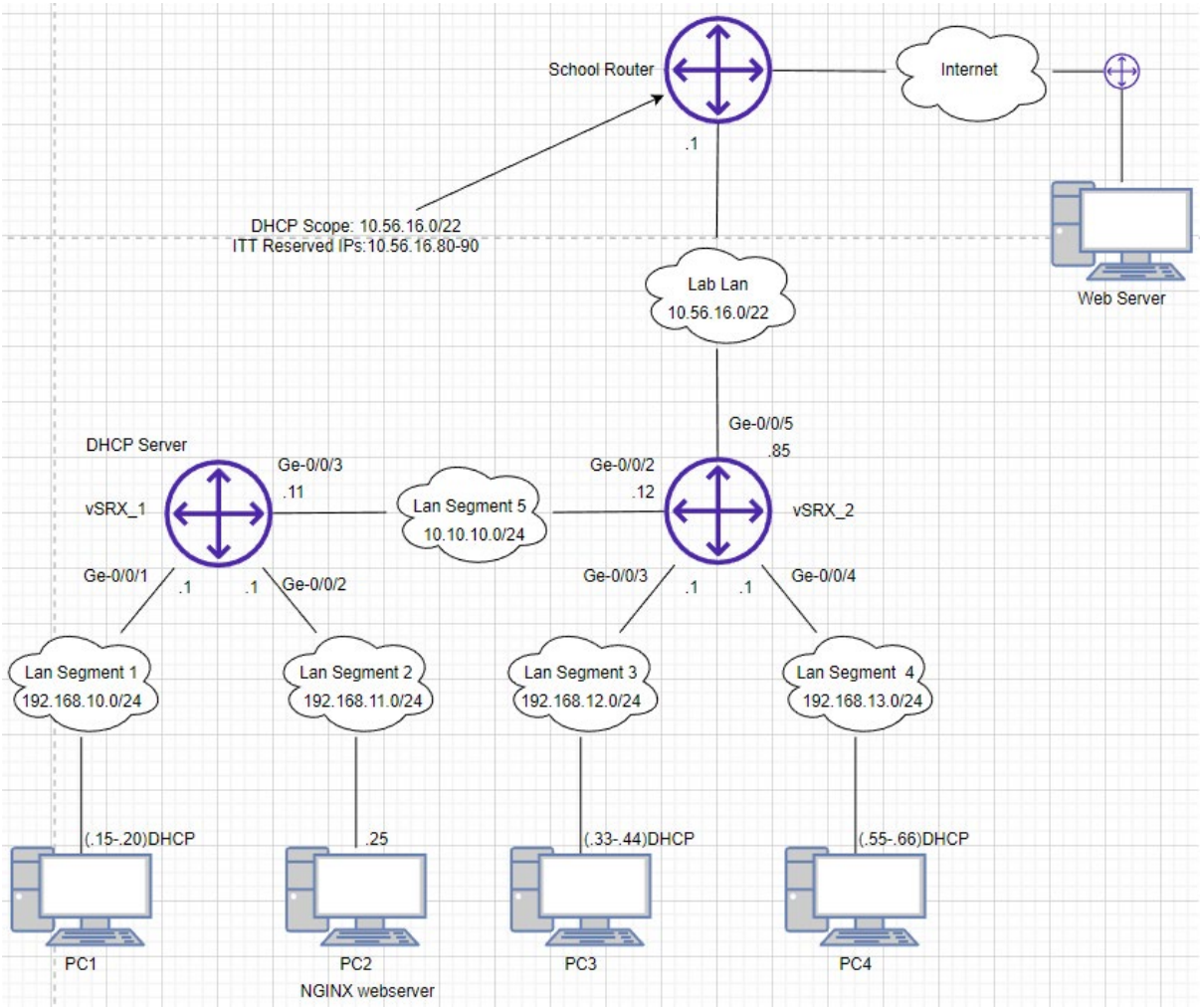
Authors
Reuben Badham
rmba28870@edu.ucl.dk
Bogdan
bdbu37436@edu.ucl.dk
Matej
maab37498@edu.ucl.dk
Klaudijus
klsk37482@edu.ucl.dk

06 September 2022

Inventory

Laptop
VMWare workstation
4x Virtual machines running xubuntu
2x vSRX
Ethernet cables

Network Diagram

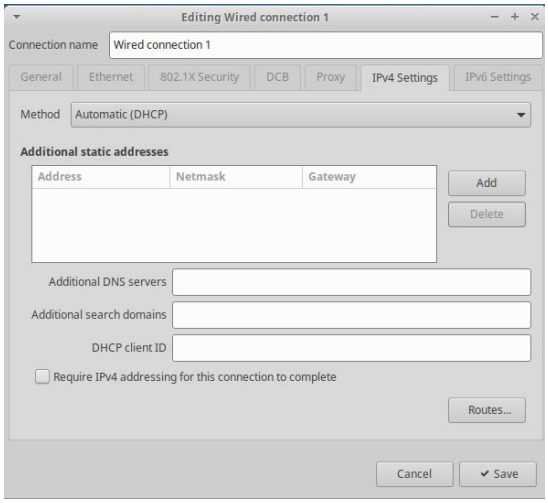


The image above shows the assignment 9 network diagram. PC 2 will be running the NGINX web server.
vSRX_1 will be running the DHCP server.
If PC 4 wants to be assigned an IP address, it will have to go through vSRX_2 to vSRX_1 and get an IP address from the DHCP server, running on vSRX_1.
The computers will gain internet access from Lab Lan through vSRX_2.

Gitlab links to working router configurations

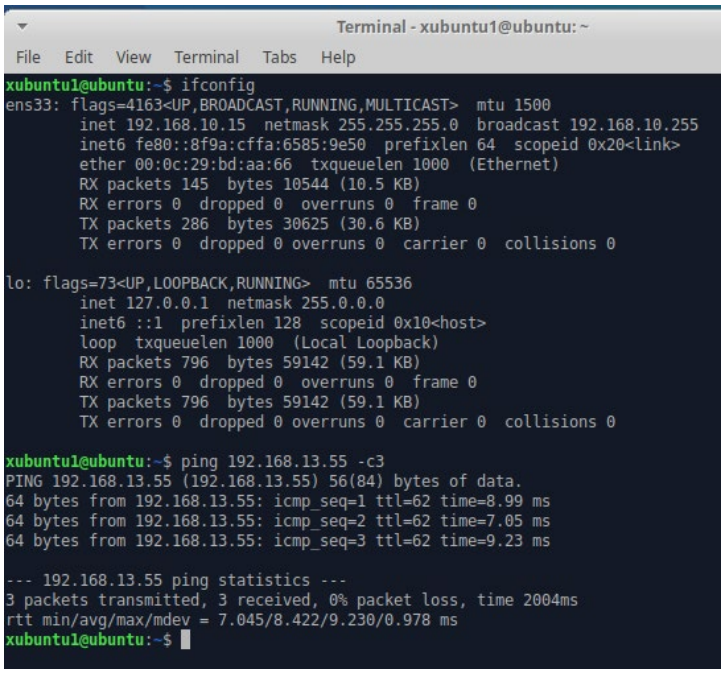
Router 1 (vSRX_1)
https://gitlab.com/bogdan7978/ucl-bogdan-buterchi/-/blob/main/Networking/Assignment9_vSRX1
Router 2 (vSRX_2)
https://gitlab.com/bogdan7978/ucl-bogdan-buterchi/-/blob/main/Networking/Assignment9_vSRX2

Configuring the PCs for DHCP



This is a screenshot of PC1 set up with automatic DHCP. It is on Lan segment 1 of the router. The router will use the DHCP server and take this DHCP configuration of PC1 and assign it an IP address.

PC1's IPV4 settings received from the router DHCP service

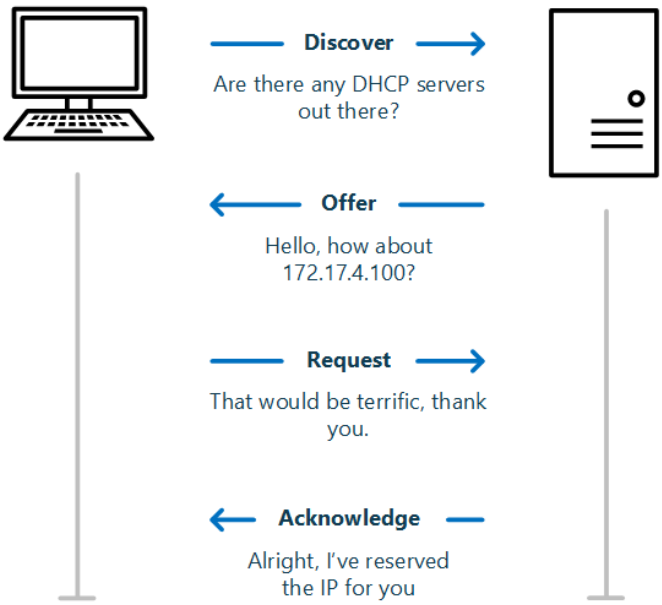


Here is an image of PC1 using the "ifconfig" command to show its settings. The image shows that the PC has obtained an IP address of 192.168.10.15 from the DHCP server on the vSRX_1.

What is DORA in DHCP

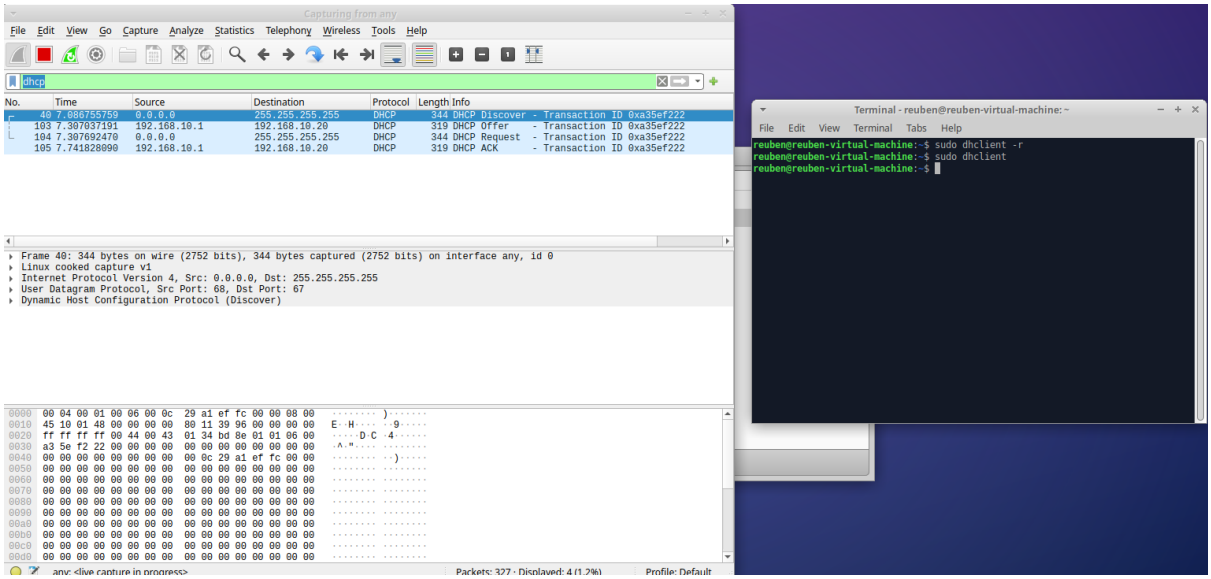
D - Discover
O - Offer
R - Request
A - Acknowledge

The “Discover” message is used to find the DHCP server in the network. When the DHCP server receives the “Discover” message it will send out an “Offer” request, with proposed IP and subnet mask. The host receives the “Offer” packet and replies back with a “Request” message, accepting the IP from the server. Once the server receives the “Request” message it will assign the host with the IP and subnet mask.



The DORA process through Wireshark

Use wireshark to show the dora process and describe the process



The screenshot above shows wireshark and the terminal of PC1. In the terminal the dhclient -r command has been issued. This command will release the current leased IP address from the DHCP client.

Once the leased IP address has been released, dhclient is reset and another IP address is issued.

Wireshark was used to capture the reset DHCP IP address. The packet capture shows the Discover, Offer, Request and Acknowledge stages.

The source of the discovery is 0.0.0.0 as it has no IP address, it is sent as a broadcast to 255.255.255.255. 192.168.10.1 (vSRX_1) replies with an offer. 0.0.0.0 (PC1) requests the offer. 192.168.10.1 (vSRX_1) acknowledges the request, and PC1 now has an ip address of 192.168.10.20.

Layer 4 ports and protocols used in the DHCP client and server

Layer 4 of the OSI model is the “Transport Layer”, this includes UDP and TCP.
UDP is used for DHCP communications, specifically ports 67 and 68 to separate client and server functions. The server listens on port 67 and the client on port 68.

Troubleshooting with Ping and Wireshark

Ping was used to check that all of the PCs were connected in the network. All of the PCs could ping the routers and the other PCs.
“ifconfig” was used to check that the PCs had been assigned an IP address through the DHCP server on vSRX_1. After finding the IP address a ping was issued to that device to check if the network was set up correctly.

Wireshark was used to check that the DORA process was working properly and that the machines were being assigned their IP addresses in the correct way.
Wireshark was also used to check the connection between vSRX_2 and the school router. During the setup and creation of assignment 9 an error occurred where there was no communication between the vSRX_2 and the school router. Wireshark was used to intercept all of the network traffic between the two routers. In doing so it became apparent that there was an issue with the bridge adapter and that no traffic was able to pass through. The issue was then able to be targeted and fixed.

Appendix

What is DORA in DHCP
https://www.quora.com/How-does-DNS-DHCP-use-layer-4-protocols

Layer 4 ports and protocols used in DHCP
https://www.skillsire.com/read-blog/432_how-dora-works-dora-process-in-details.html