IT Technology
Assignment 28

Author
Silvija Bazaraite Siba36733@edu.ucl.dk
Simon Storm ssch38571@edu.ucl.dk
Romulus Prundis rvpr37603@edu.ucl.dk
Bogdan Buterchi bdbu37436@edu.ucl.dk

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1 Introduction

During this assignment we needed to configure and connect two physical routers to our laptops. This is the man things we needed to configure and learn it:

- Inter router routing.
- Static routes.
- Direct network.
- Routing trouble shooting using ping and traceroute.

2 Audience

This document we dedicate to our classmates and networking teacher

3 Inventory

- Laptop
- Two Juniper SRX series routers
- Ethernet cables

4 Definitions

Inter router routing – Inter router routing is when we use multiple VLANs within the same router. The VLANs usually have their own subnets.
Static routes – When we manually configure the router VLANs to route to specific (static) subnets. Routing can also be done dynamically.
Direct network – Direct network or point-to-point network is a network where every route is pre-configured. As in Figure 1, PC1 and PC4 is connected via a pre-configured routing table.

5 Network diagram

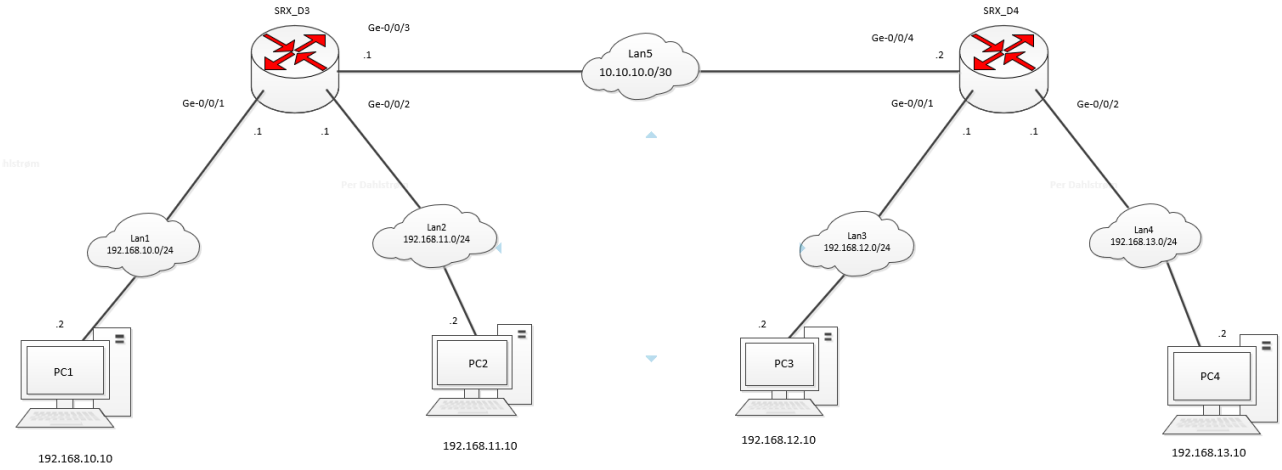


Figure 1 - Network topology diagram

6 The physical router

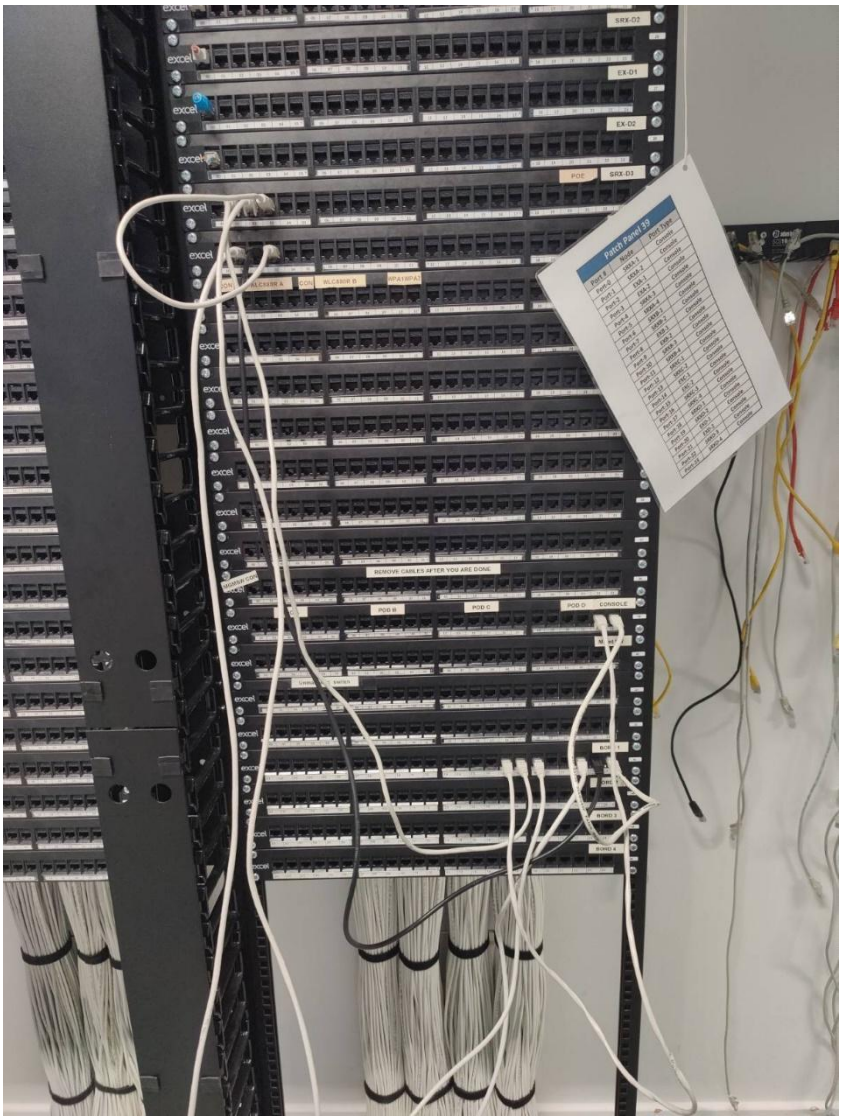


Figure 2 - A somewhat messy physical setup

Here the routers are connected to the table RJ45 sockets at the table via the patch panel. Also, the console for the routers is connected.

7 SRX_D3 and SRX_D4 configuration and routing table.

Both routers are configured using an edited version of the Assignment 11 configuration[1].
See Assignment 11 for the configuration process.

```
routing-options {
    static {
        /* Route to Lan3 */
        route 192.168.12.0/24 next-hop 10.10.10.2;
        /* Route to Lan4 */
        route 192.168.13.0/24 next-hop 10.10.10.2;
    }
```

Here we are defining the destination and the next-hop forwarding address. I.e., if we were to ping 192.168.13.10 we forwarded to 10.10.10.2 which is another router.

SRX_D3 router routing table.

```
root@SRX-D3> show arp
MAC Address       Address         Name                      Interface
Flags
00:26:88:01:5f:83 10.10.10.2      10.10.10.2                ge-0/0/3.0
none
f8:b4:6a:76:e1:e0 192.168.10.10   192.168.10.10             ge-0/0/1.0
none
0c:37:96:3f:60:88 192.168.11.10   192.168.11.10             ge-0/0/2.0
none
Total entries: 3
```

Figure 3 - SRX-D3 routing table

With this routing table, we can see what VLAN is assigned which port (interface) on the switch.
VLAN 192.168.10.10 (PC1) is assigned to interface Ge-0/0/1.0
VLAN 192.168.11.10 (PC2) is assigned to interface Ge-0/0/2.0
VLAN 10.10.10.2 (SRX-D4 router) is assigned to interface Ge-0/0/3.0

SRX_D4 router routing table.

```
sroot@SRX-D4> show arp
MAC Address       Address         Name                      Interface
Flags
28:8a:1c:47:af:c3 10.10.10.1      10.10.10.1                ge-0/0/3.0
none
f8:b4:6a:76:e1:e0 192.168.12.10   192.168.12.10             ge-0/0/1.0
none
0c:37:96:3f:60:88 192.168.13.10   192.168.13.10             ge-0/0/2.0
none
Total entries: 3
```

Figure 4 - SRX-D4 routing table

VLAN 192.168.12.10 (PC3) is assigned to interface Ge-0/0/1.0
VLAN 192.168.13.10 (PC4) is assigned to interface Ge-0/0/2.0
VLAN 10.10.10.1 (SRX-D3 router) is assigned to interface Ge-0/0/3.0

[1] https://perper.gitlab.io/networkingpages/#assignments/#assignment-28-routing-two-routers-five-subnets-physical-routers

8 PC pings to test that the routing is working

```
C:\Users\bogdan>ping 192.168.11.10

Pinging 192.168.11.10 with 32 bytes of data:
Reply from 192.168.11.10: bytes=32 time=2ms TTL=127
Reply from 192.168.11.10: bytes=32 time=4ms TTL=127
Reply from 192.168.11.10: bytes=32 time=2ms TTL=127
Reply from 192.168.11.10: bytes=32 time=3ms TTL=127

Ping statistics for 192.168.11.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 4ms, Average = 2ms
```

Figure 5 - Ping from PC1 to PC2

It is not obvious in this screenshot, but the connectivity from 192.168.10.10 to 192.168.11.10 is confirmed with the ping request and response.

9 Wireshark on PC1 and PC4 interfaces.

Here we ping from PC1 to PC2 and PC2 to PC1 and captured packets with wireshark to confirm connectivity between VLANs on the SRX-D3 router.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) request id=0x0001, seq=125/32000, t
2	0.001940	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=125/32000, t
3	1.011292	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) request id=0x0001, seq=126/32256, t
4	1.015390	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=126/32256, t
5	2.024318	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) request id=0x0001, seq=127/32512, t
6	2.026676	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=127/32512, t
7	3.042232	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) request id=0x0001, seq=128/32768, t
8	3.045530	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=128/32768, t

Figure 6 - Wireshark ICMP packets PC1-PC2

3	2.604769	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) request id=0x0001, seq=92/23552, tt
4	2.604828	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) reply id=0x0001, seq=92/23552, tt
5	3.602096	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) request id=0x0001, seq=93/23808, tt
6	3.602150	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) reply id=0x0001, seq=93/23808, tt
7	4.617314	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) request id=0x0001, seq=94/24064, tt
8	4.617368	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) reply id=0x0001, seq=94/24064, tt
9	5.631757	192.168.11.10	192.168.10.10	ICMP	74	Echo (ping) request id=0x0001, seq=95/24320, tt
10	5.631815	192.168.10.10	192.168.11.10	ICMP	74	Echo (ping) reply id=0x0001, seq=95/24320, tt

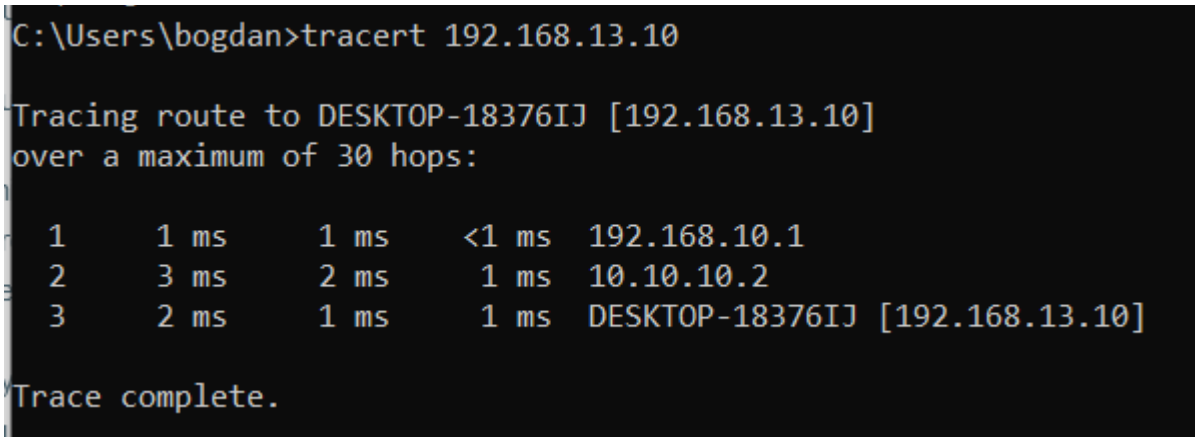
Figure 7 - Wireshark ICMP packets PC2-PC1

The same goes for the other router, and it looked absolutely beautiful. The real test is to confirm reachability between PC1-2 and PC3-4. Ping request and reply confirms reachability.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.10.10	192.168.13.10	ICMP	74	Echo (ping) request id=0x0001, seq=155/39680, t
2	0.028478	192.168.13.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=155/39680, t
3	1.006762	192.168.10.10	192.168.13.10	ICMP	74	Echo (ping) request id=0x0001, seq=156/39936, t
4	1.010585	192.168.13.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=156/39936, t
5	2.024373	192.168.10.10	192.168.13.10	ICMP	74	Echo (ping) request id=0x0001, seq=157/40192, t
6	2.027721	192.168.13.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=157/40192, t
7	3.043346	192.168.10.10	192.168.13.10	ICMP	74	Echo (ping) request id=0x0001, seq=158/40448, t
8	3.045557	192.168.13.10	192.168.10.10	ICMP	74	Echo (ping) reply id=0x0001, seq=158/40448, t

Figure 8 - Wireshark capture PC1-PC4

10 Traceroute from PC1 to PC4.



By using traceroute, we can see the route between PC1 and PC4 through the network.
First hop – to VLAN gateway.
Second hop – Forwarded to 10.10.10.2 which means we now have reached the other router and the first routing table is correct.
Third hop (destination) – Here we have reached our destination, and the route is as expected.

11 Conclusion

In conclusion, first we connected with cables the router to the laptops, we configured both routers D3 and D4, by using putty. After configuration we tried to make them ping with each other. First the PC1 and PC2 with D3 router and later PC3 and PC4 with D4 router to minimize points of failure and to better be able to troubleshoot. Then we confirmed reachability between PCs between both routers.