CO323 Lab 04

E/14/158
Gihan Chanaka Jayatilaka

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1 Design

1.1 File

See E14158-CO323-Lab04.pkt
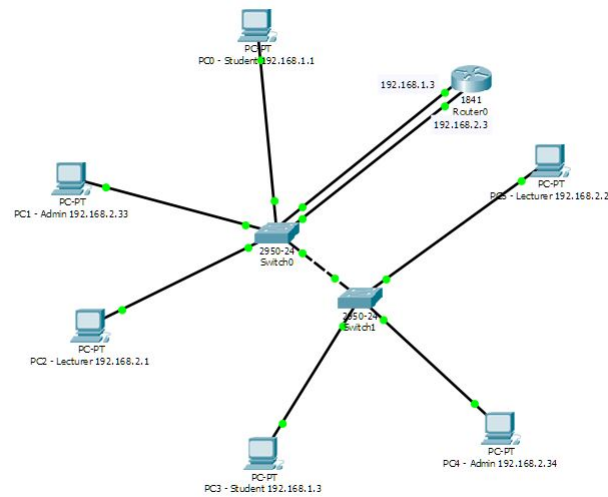
1.2 Diagram

Figure 1: Network.jpg

Parameter	Students	Lecturers	Admin staff
No of people	220	15	5
IP bl0ck size	256	32	8
IP range	192.168.1.0-192.168.1.255	192.168.2.0-192.168.2.31	192.168.2.32-192.168.2.39
Subnet mask	255.255.255.0	255.255.255.224	255.255.255.248
	192.168.1.0/24	192.168.2.0/27	192.168.2.32/29
Network IP	192.168.1.0	192.168.2.0	192.168.2.32
Broadcast IP	192.168.1.255	192.168.2.31	192.168.2.39
First IP for PC	192.168.1.1	192.168.2.1	192.168.2.33
Last IP for PC	192.168.1.254	192.168.2.30	192.168.2.38
IPs for PCs	254	30	6
PC IPs	192.168.1.1,2	192.168.2.1,2	192.168.1.33,34
Router IP	192.168.1.3	192.168.2.3	

Table 1: Network

1.3 IP ranges

2 Commands

2.1 Switch 0

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 4
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 3
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport nonegotiate
Switch(config-if)#switchport trunk allowed vlan 2-4
Switch#copy running-config startup-config
```

2.2 Switch 1

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/2
```

```
Switch(config−if)#switchport mode access
Switch(config−if)#switchport access vlan 3
Switch(config)#interface fastEthernet 0/3
Switch(config−if)#switchport mode access
Switch(config−if)#switchport access vlan 4
Switch(config)#interface fastEthernet 0/3
Switch(config−if)#switchport mode access
Switch(config−if)#switchport access vlan 2
Switch(config)#interface fastEthernet 0/1
Switch(config−if)#switchport mode trunk
Switch(config−if)#switchport nonegotiate
Switch(config−if)#switchport trunk allowed vlan 2−4
Switch#copy running−config startup−config
```

2.3 Router 0

```
Router(config)#interface FastEthernet0/0
Router(config−if)#ip address 192.168.1.3 255.255.255.0
Router(config)#interface FastEthernet0/1
Router(config−if)#ip address 192.168.2.3 255.255.255.0
Router#copy running−config startup−config
```

3 Ping and Tracert

3.1 Within student VLAN

From 192.168.1.1

```
Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=15ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli−seconds:
    Minimum = 0ms, Maximum = 15ms, Average = 3ms

C:\>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops:

  1    0 ms        17 ms        0 ms         192.168.1.2
```

Trace complete.

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=143ms TTL=255
Reply from 192.168.1.3: bytes=32 time=1ms TTL=255
Reply from 192.168.1.3: bytes=32 time<1ms TTL=255
Reply from 192.168.1.3: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli−seconds:
    Minimum = 0ms, Maximum = 143ms, Average = 36ms

C:\>tracert 192.168.1.3

Tracing route to 192.168.1.3 over a maximum of 30 hops:

  1   0 ms   0 ms   0 ms   192.168.1.3

Trace complete.

3.2   Within Lectuer VLAN

From 192.168.2.2

C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli−seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>tracert 192.168.2.1

Tracing route to 192.168.2.1 over a maximum of 30 hops:

```
  1     0 ms        0 ms        0 ms          192.168.2.1

Trace  complete.

C:\>ping  192.168.2.3

Pinging  192.168.2.3  with  32  bytes  of  data:

Reply  from  192.168.2.3:  bytes=32  time=20ms  TTL=255
Reply  from  192.168.2.3:  bytes=32  time<1ms  TTL=255
Reply  from  192.168.2.3:  bytes=32  time<1ms  TTL=255
Reply  from  192.168.2.3:  bytes=32  time<1ms  TTL=255

Ping  statistics  for  192.168.2.3:
    Packets:  Sent  =  4,  Received  =  4,  Lost  =  0  (0%  loss),
Approximate  round  trip  times  in  milli−seconds:
    Minimum  =  0ms,  Maximum  =  20ms,  Average  =  5ms

C:\>tracert  192.168.2.3

Tracing  route  to  192.168.2.3  over  a  maximum  of  30  hops:

  1     0 ms        0 ms        0 ms          192.168.2.3

Trace  complete.
```

3.3   Within Admin VLAN

From 192.168.2.33

```
C:\>ping  192.168.2.34

Pinging  192.168.2.34  with  32  bytes  of  data:

Reply  from  192.168.2.34:  bytes=32  time<1ms  TTL=128
Reply  from  192.168.2.34:  bytes=32  time<1ms  TTL=128
Reply  from  192.168.2.34:  bytes=32  time<1ms  TTL=128
Reply  from  192.168.2.34:  bytes=32  time<1ms  TTL=128

Ping  statistics  for  192.168.2.34:
    Packets:  Sent  =  4,  Received  =  4,  Lost  =  0  (0%  loss),
Approximate  round  trip  times  in  milli−seconds:
    Minimum  =  0ms,  Maximum  =  0ms,  Average  =  0ms
```

```
C:\>tracert 192.168.2.34

Tracing route to 192.168.2.34 over a maximum of 30 hops:

  1    1 ms        0 ms        0 ms        192.168.2.34

Trace complete.
```

3.4 Between Student and Admin VLANs

From 192.168.1.1

```
C:\>ping 192.168.3.33

Pinging 192.168.3.33 with 32 bytes of data:

Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.

Ping statistics for 192.168.3.33:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

3.5 Between Student and Lecturer VLANs

From 192.168.1.1

```
C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>tracert 192.168.2.1
```

```
Tracing route to 192.168.2.1 over a maximum of 30 hops:

  1    0 ms        0 ms        0 ms        192.168.1.3
  2    0 ms        0 ms        0 ms        192.168.2.1

Trace complete.
```

4   Conclusion

- The switches are transparent. The devices within a particular VLAN can directly send a packet to the other devices.

- Even when the devices are in the same switch, they cannot communicate unless they are on the same VLAN (in absence of other mechanisms).

- If two devices are on same switch, different VLANS they can communicate using a layer 3 packet forwarding device. eg: Router or L3 switch.

- Even when the devices are connected to the same switch, if they are on different VLANs connected by a router, the packets need additional hops. (The switch is not transparent across VLANS.