

CO1507 Introduction to Networking

Lab 12 - Routing

IMPORTANT: You should complete last week's worksheet first **before** attempting this one.

From last week's worksheet it is **especially** important that you can complete **tasks 1, 2, and 4!**

Ask your tutor for help where you are struggling.

Task 1 – Subnets

Throughout this worksheet I will expect you to look back over previous weeks materials to find detailed instructions on certain tasks many of which we have covered previously and so won't be explicitly described again here.

Calculate each of the subnets for the following network address:

192.168.10.0 /27

Record these addresses in your notes.

Device	Address
Subnet Mask	--- --- --- ---
1st Subnet Network Address	--- --- --- ---
1st Subnet Broadcast Address	--- --- --- ---
2nd Subnet Network Address	--- --- --- ---
2nd Subnet Broadcast Address	--- --- --- ---
3rd Subnet Network Address	--- --- --- ---
3rd Subnet Broadcast Address	--- --- --- ---
4th Subnet Network Address	--- --- --- ---
4th Subnet Broadcast Address	--- --- --- ---
5th Subnet Network Address	--- --- --- ---
5th Subnet Broadcast Address	--- --- --- ---
6th Subnet Network Address	--- --- --- ---
6th Subnet Broadcast Address	--- --- --- ---
7th Subnet Network Address	--- --- --- ---
7th Subnet Broadcast Address	--- --- --- ---
8th Subnet Network Address	--- --- --- ---
8th Subnet Broadcast Address	--- --- --- ---

Construct the initial topology as seen below. **Hint:** you can create one of the subnets initially, then copy and paste the second.

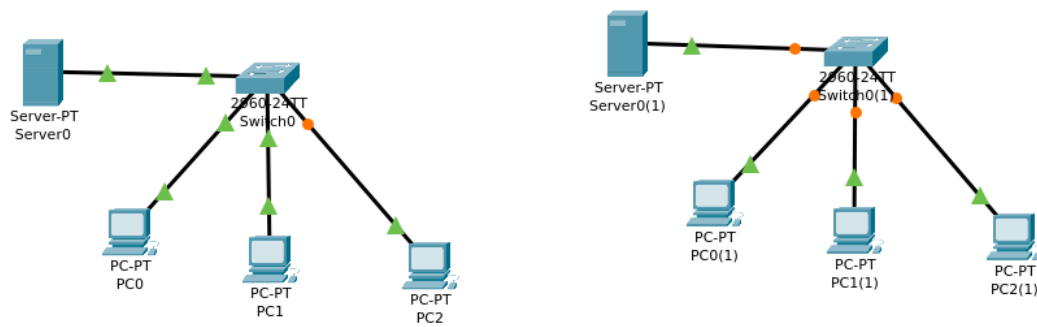


Figure 1: Subnets

Select any two of the subnets calculated above for the two in the topology - it does not matter which two.

Next, assign the servers statically assigned IP addresses and subnet masks. You should use the last valid host IP address as the server's address, meanwhile set the default gateway to be the first valid host IP address.

Configure the server as a DHCP server in both subnets. Do not include the first valid host IP address in either subnet as part of the DHCP pool.

Task 2 – Routers

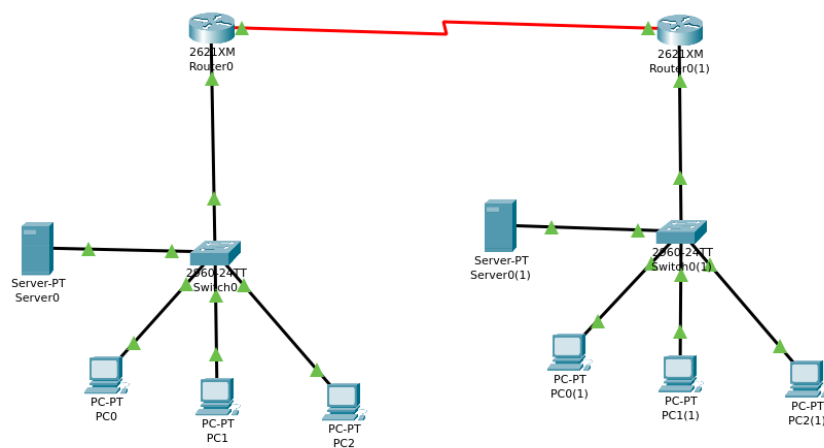


Figure 2: Wide-Area Network

Add the routers as in the diagram, you should use **2621XM** router WITH **WIC2T** expansion card installed.

You need to configure the subnet between the routers with an appropriate subnet.

What is the most appropriate subnet mask for 2 routers connected point-to-point? (How many valid host IP addresses do we need?)

Use a network in the 10.x.x.x range with the appropriate subnet mask.

Device	Address
Subnet Mask	--- --- --- ---
Subnet Network Address	--- --- --- ---
Subnet Broadcast Address	--- --- --- ---

Both s0/0 ports should be configured via cisco CLI, remember that one end should be the DCE and have a clock rate set. The other is the DTE.

Task 3- Static routing

Add recursive static routes to the left and right routers so that the non-directly connected subnet can be forwarded traffic.

Remember that a recursive static route specifies the **next hop IP** address.

Test your network for full connectivity, troubleshoot where necessary, consult your lab tutor if you get stuck.

Task 4 – DNS

Configure the server on the left to act as a DNS service. The DNS record should be from `www.your_domain_goes_here.com` to the OTHER servers IP address. This is because we will use the other server as the source of the HTTP service (i.e., web server)

Modify the HTML in index.html on the right-side server (under http, on services tab) to say something like "Welcome to co1507 intranet".

Finally modify the DHCP service on BOTH servers so that it will provide the address of the DNS server as part of the DHCP response- i.e., the left servers IP.

Task 5 – Wireless

Add a wireless access point on one of the switches and test by allowing laptops to connect to the subnet via DHCP. Remember that the laptops by default are not Wi-Fi ready, so you need to add a Wi-Fi card (module WPC300N) under the physical tab in the config.

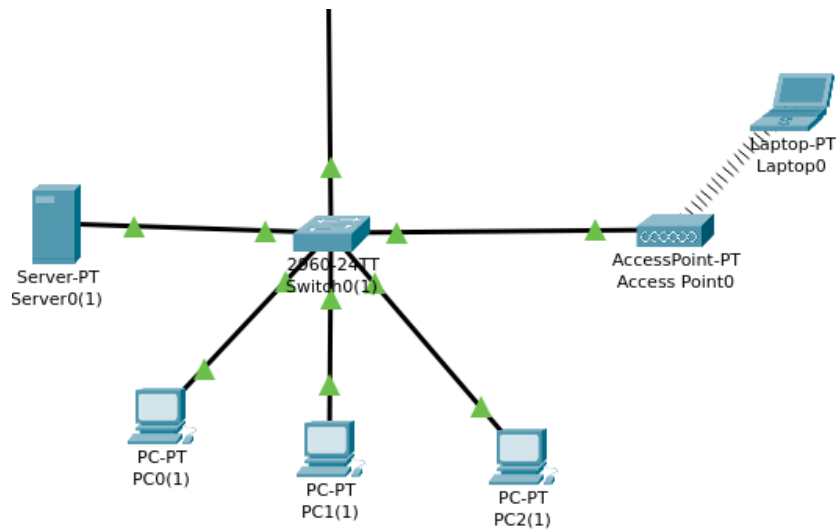


Figure 3: Wireless Access Point

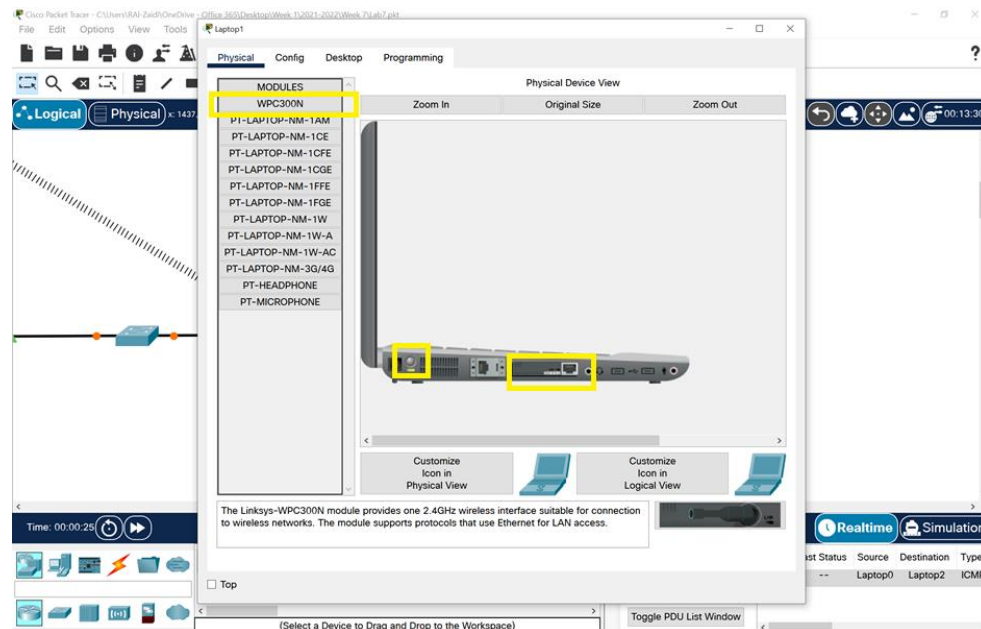


Figure 4: Wi-Fi NIC Configuration

Then you need to:

1. Set the name of the wireless network (SSID)
2. Choose the encryption mode as WPA2-PSK
3. Set the password.

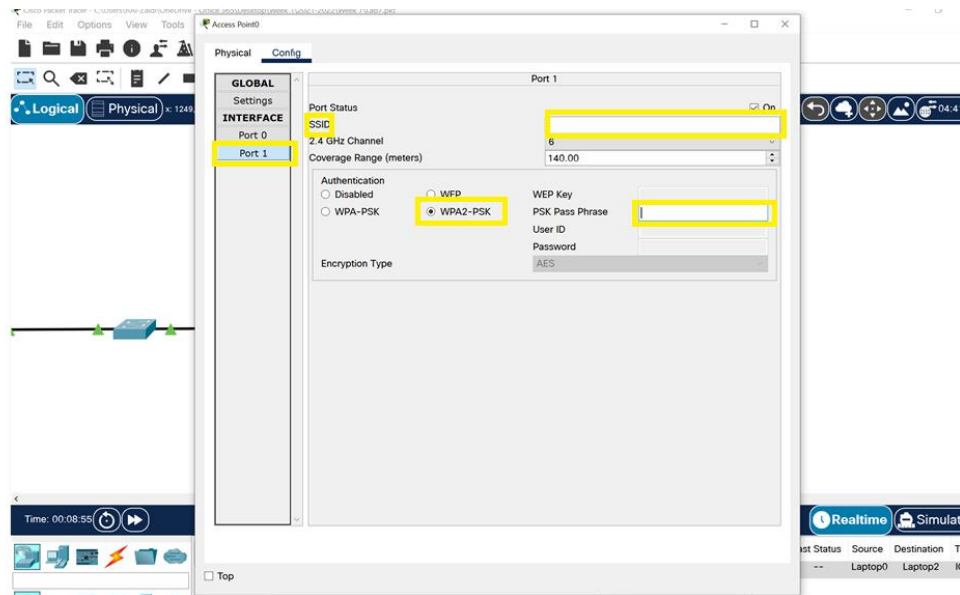


Figure 5: Wireless Access Point

Task 6- CLI config

You need to refer previous labs for the commands needed. Lab 9 will help. You need these commands for your upcoming assessment, so practice is very important.

Configure both routers to have:

1. Apply hostnames.
2. Set a password for console connection and privileged exec mode.
3. Setup a banner MOTD with an appropriate message e.g., "no unauthorised access" etc.
4. Prevent unwanted DNS lookup.

Task 7 – Questions

DNS Questions:

1. What is DNS and what is its purpose?
2. How does the DNS resolution process work?
3. What is a DNS record and what types of records are commonly used?
4. Can you explain the difference between authoritative and recursive DNS servers?

General revision Questions:

1. What is the OSI model and how does it help in understanding the communication process in a network?
2. Can you explain the difference between LAN, WAN and WLAN?
3. What is the purpose of an IP address and how is it used to route data in a network?
4. What is the role of a router in a network and how does it work?
5. How does Dynamic Host Configuration Protocol (DHCP) work and what is its purpose?

6. What is a subnet mask and how does it help in dividing a network into subnets?
7. Can you explain the relationship between subnet masks and IP addresses?
8. How does a custom subnet mask help in reducing network traffic and improving network security?
9. What is the significance of the number of host bits in a custom subnet mask?
10. Can you describe how to calculate the number of subnets and hosts per subnet for a given IP address and subnet mask?
11. What is the purpose of the default subnet mask and how does it differ from a custom subnet mask?
12. Can you explain the difference between a public and private IP address and their use cases?
13. How can you determine the network ID and broadcast address for a given IP address and subnet mask?