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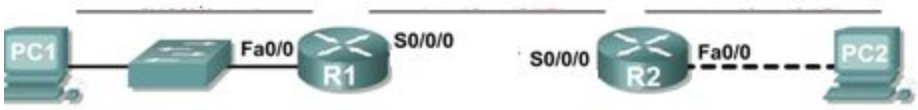
Lab 6: Subnet and Router Configuration

Topology Diagram

NID for subnets :

- 192.168.1.0/26
- 192.168.1.64/26
- 192.168.1.128/26



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.1	255.255.255.192	N/A
	S0/0/0	192.168.1.65	255.255.255.192	N/A
R2	Fa0/0	192.168.1.129	255.255.255.192	N/A
	S0/0/0	192.168.1.126	255.255.255.192	N/A
PC1	NIC	192.168.1.62	255.255.255.192	192.168.1.1
PC2	NIC	192.168.1.190	255.255.255.192	192.168.1.129

Learning Objectives

Upon completion of this lab, you will be able to:

- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Configure and activate Serial and FastEthernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Scenario

In this lab activity, you will design and apply an IP addressing scheme for the topology shown in the Topology Diagram. You will be given one address block that you must subnet to provide a logical addressing scheme for the network. The routers will then be ready for interface address configuration according to your IP addressing scheme. When the configuration is complete, verify that the network is working properly.

Task 1: Subnet the Address Space.

Step 1: Examine the network requirements.

You have been given the 192.168.1.0/24 address space to use in your network design. The network consists of the following segments:

- The network connected to router R1 will require enough IP addresses to support 15 hosts.
- The network connected to router R2 will require enough IP addresses to support 30 hosts.
- The link between router R1 and router R2 will require IP addresses at each end of the link.

Step 2: Consider the following questions when creating your network design.

How many subnets are needed for this network?

3 subnets will be required. As there are 3 small networks we'll need 3 subnets.

We'll take subnet of minimum capacity of **32 hosts.**

As 2 address are reserved address then available address are **32 – 2 = 30.**

For this we'll have **5 bit** for host IP i.e $\mathbf{2^5}$ hosts.

What is the subnet mask for this network in dotted decimal format?

We'll require subnet of minimum capacity of **32 hosts.**

As 2 address are reserved address then available address are **32 – 2 = 30.**

For this we'll have **5 bit** for host IP i.e $\mathbf{2^5}$ hosts.

So we'll need minimum 30 host that's minimum 5 host bits

i.e **n <= 3**

Other point is that we'll need subnet which will support **3** subnetworks

i.e **n >= 2**

from above conditions

2 <= n <= 3

Here n = 2 will be optimal choice as it's always good to have more hosts.

CIDR : **26**

Subnet Mask: **11111111.11111111.11111111.11000000**

Subnet Mask: **255.255.255.192**

What is the subnet mask for the network in slash format?

255.255.255.192 - /26

How many usable hosts are there per subnet?

Usable hosts $= 2^6 - 2 = 64 - 2 =$ **62**

Step 3: Assign sub-network addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1.
2. Assign subnet 2 to the link between R1 and R2.
3. Assign subnet 3 to the network attached to R2.

Task 2: Determine Interface Addresses.

Step 1: Assign appropriate addresses to the device interfaces.

1. Assign the first valid host address in subnet 1 to the LAN interface on R1.

   192.168.1.1
2. Assign the last valid host address in subnet 1 to PC1.

   192.168.1.62

3. Assign the first valid host address in subnet 2 to the WAN interface on R1.

   192.168.1.65
4. Assign the last valid host address in subnet 2 to the WAN interface on R2.

   192.168.1.126
5. Assign the first valid host address in subnet 3 to the LAN interface of R2.

   192.168.1.129
6. Assign the last valid host address in subnet 3 to PC2.

   192.168.1.190

Step 2: Document the addresses to be used in the table provide under the Topology Diagram

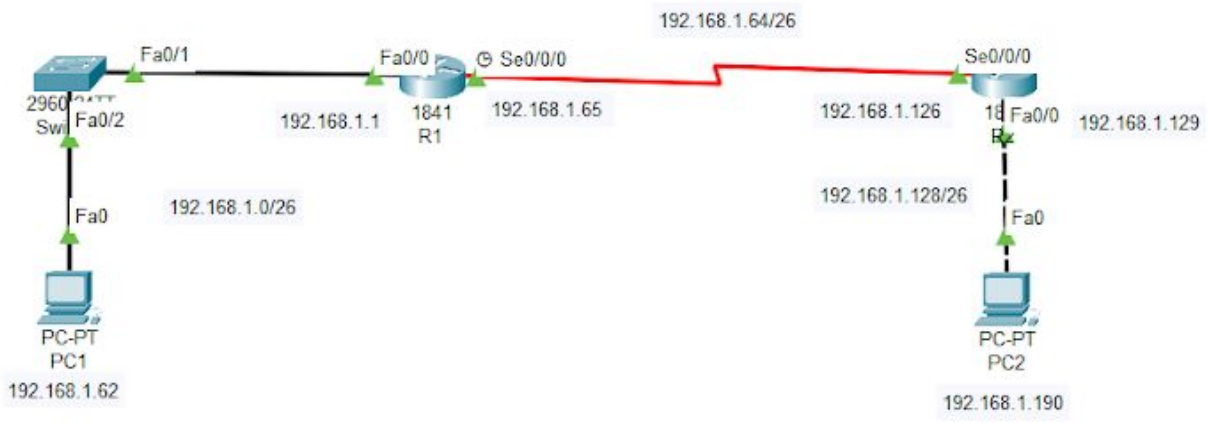
Task 3: Configure the Serial and FastEthernet Addresses.

Step 1: Configure the router interfaces.

Configure the interfaces on the R1 and R2 routers with the IP addresses from your network design. Please note, to complete the activity in Packet Tracer you will be using the Config Tab. When you have finished, be sure to save the running configuration to the NVRAM of the router.

Step 2: Configure the PC interfaces.

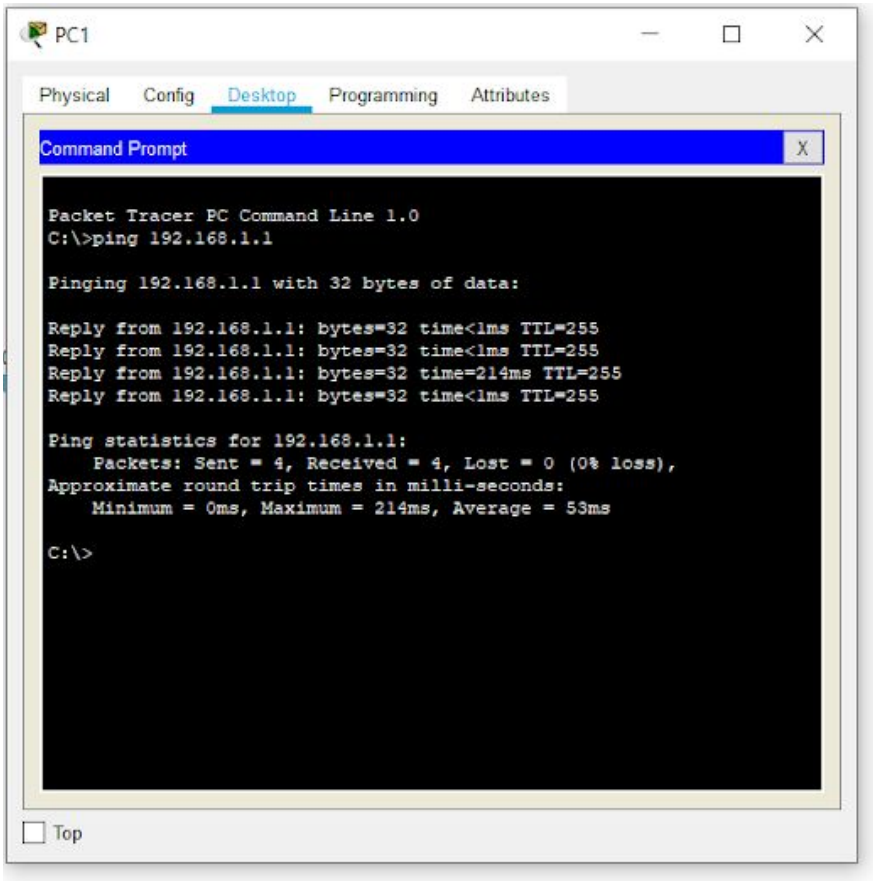
Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways from your network design.



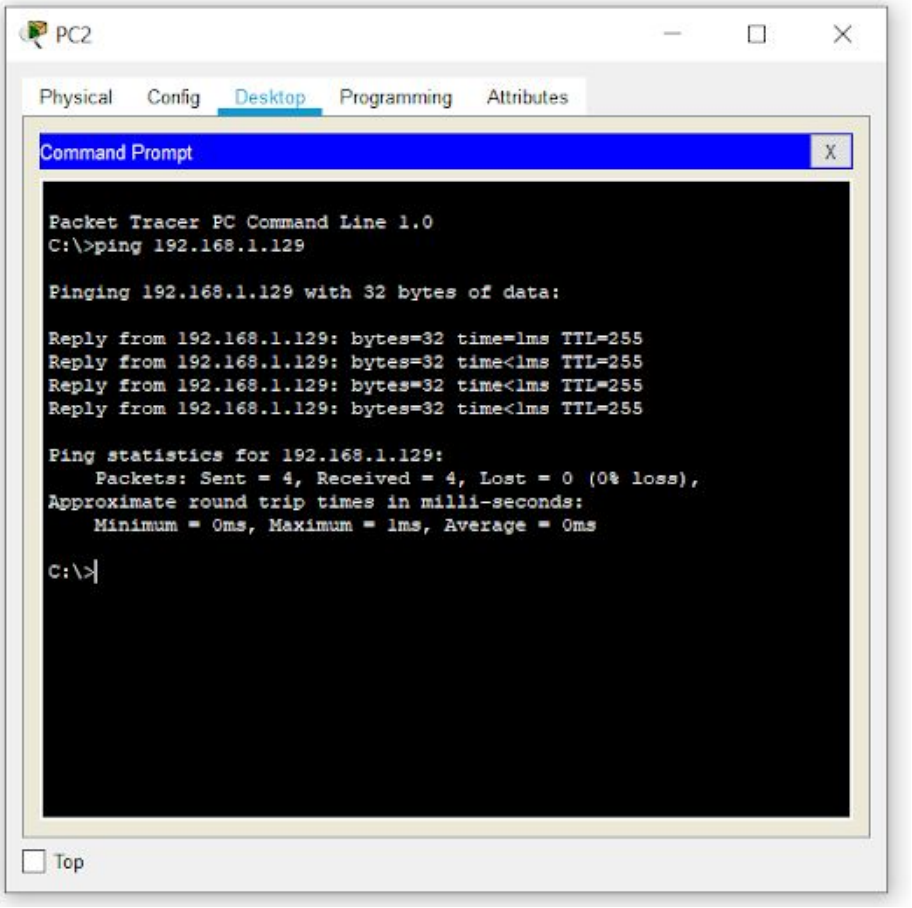
Task 4: Verify the Configurations.

Answer the following questions to verify that the network is operating as expected.

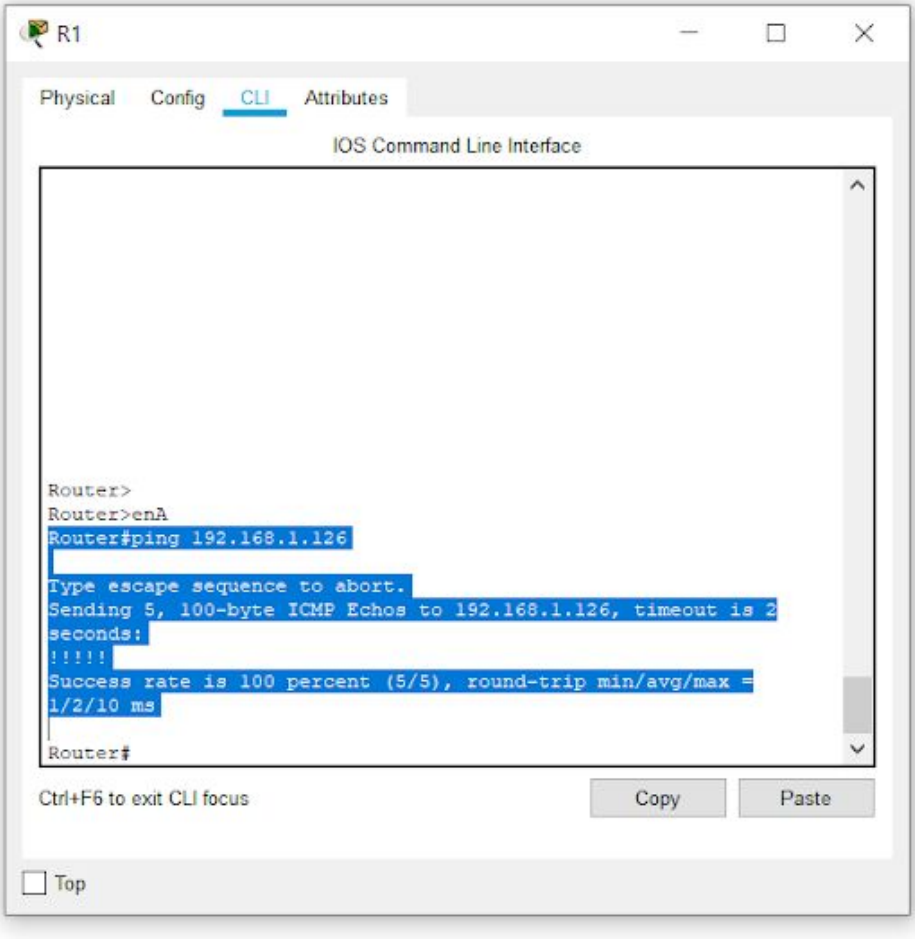
From the host attached to R1, is it possible to ping the default gateway? **YES**



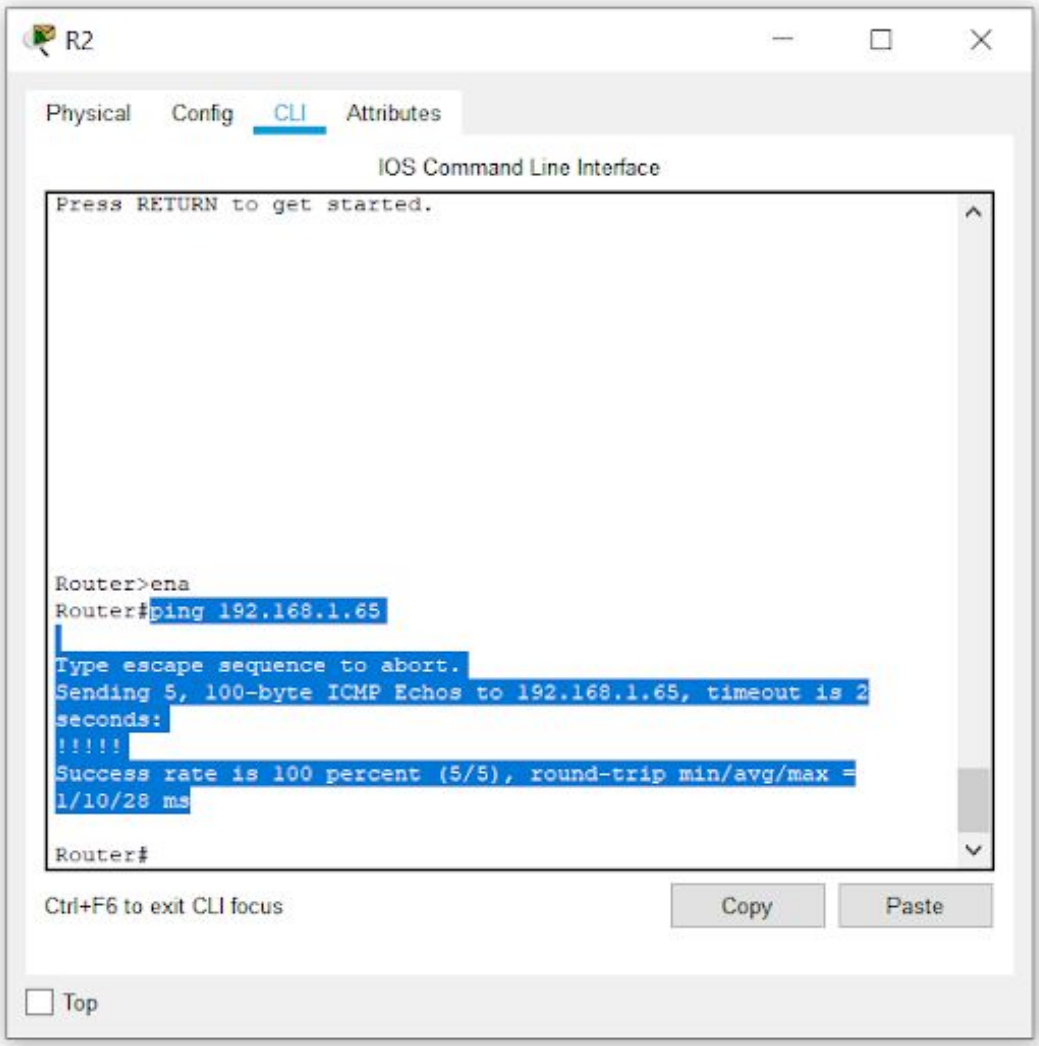
From the host attached to R2, is it possible to ping the default gateway? **YES**



From the router R1, is it possible to ping the Serial 0/0/0 interface of R2? **YES**



From the router R2, is it possible to ping the Serial 0/0/0 interface of R1? **YES**



The answer to the above questions should be **yes**. If any of the above pings failed, check your physical connections and configurations.

Task 5: Reflection

Are there any devices on the network that cannot ping each other?

Yes.

Device cannot ping other device outside of it's sub network.

P1 can ping **R1** and **R1** can ping **PC1**

R1 can ping **R2** and **R2** can ping **R1**

R2 can ping **PC2** and **PC2** can ping **R2**

Only this connections are possible.

What is missing from the network that is preventing communication between these devices?

Each device can ping the device which is in it's sub network, because it doesn't have route to the device outside it's network. By default, static routes have an administrative distance of one. So Routing protocol is required to connect the devices outside of the network.

CONCLUSION :

We learnt how to choose and set up subnets, how masking works in serverless routing, and also how to debug such networks briefly.

References:

https://networkengineering.stackexchange.com/questions/40597/computer-unable-to-ping-another-over-two-routers

https://www.cisco.com/c/en/us/support/docs/dial-access/floating-static-route/118263-technote-nexthop-00.html