

CREATING AN ORGANIZATIONS COMPUTER NETWORK.

Requirements for setting up a computer network

1) Hardware Components

- | | |
|-------------|-----------|
| a) Computer | c) Router |
| b) Switch | d) Cables |

2) Software Components

- | | |
|---------------------|-----------------|
| a) Operating System | c) Subnet masks |
| b) ISP | d) IP Address |

Setting up a network with in Internet access

To set up a network with internet access, you need an ISP router. This is the router that enables an organization to access the Internet. A router is a network device that connects different networks. They are different networks not because of the interconnection devices used but because of the IP configurations defined on those devices. As observed earlier, an IP Address comprises two parts; the network identification part and the host device. Therefore the network identification parts must be completely different. From the router, we can have a switch to multiply the internet resource amongst the computers on the rest of the

computers within the organization. The work of a switch is simply to multiply and at times to boost network signals as they pass through the device.

To avoid conflicts between the network configurations, we shall segment the network by introduction a router to shield configurations within our internal lab network and the rest of the local area network. We are introducing another router so that we form an independently different network in the lab from the rest of organizations network. This lab network is where we shall be doing tests before cascading the configurations to the rest of the organization network. This explains the reason why we need to segment a network; so that it is easier to isolate devices and configurations that cause conflicts and could easily bring down an organization network.

Router Operations

Let me explain how routers work within different networks i.e. your organizational Local Area Network (LAN) and other networks on the internet. I'll use the two routers i.e. ISP and Lab Network routers in the diagram below.

Routers achieve the functions of linking two different networks by use of software they comprise that can be configured. Let's take the ISP router. The

ISP router has software that can be configured in two ways; externally interacting and internally interacting. For the external interaction, the routers port is assigned an IP address with a different network identity from the port that interacts internally. For instance, if the external routers port is assigned an IP address 10.1.1.1 then the internal port cannot be assigned an IP address such as 10.1.1.2 because this will mean that that internal port is just like any other network device that ought to work with routers port within the same network only that it is a different host. To eliminate the confusions in the network identities, one can easily assign those external and internal ports using different classes. For example, let us assign the external port configuration of the ISP router to class A subnet 10.1.1.1 and the internal port configuration to Class B subnet 172.26.1.1 then proceed with those two configurations to the next lower level; the Lab Network router.

The Lab Network router also has software that provides configurations for external and internal interactions by the router. Now for the Lab Network router to be able to facilitate the lab computers access the internet resource, it must be on the same network as the ISP router. The only configurations that can fit those two routers to be on the same network is, if they can share the same network

identity. To achieve that, we make the external port configuration of the Lab Network router be on the same network prefix as the internal port configuration of the ISP router. We therefore assign the external port configuration of the Lab Network router IP address 172.26.1.2.

To enable the Lab Network router to facilitate the lab computers access the internet resource, we assign its internal port configuration a different network identity 192.168.1.1 that is different from the external port configuration 172.26.1.1. Here, we have assigned the internal port a Class C subnet.

As illustrated in the diagram above, computers labeled A can access the internet resource through the multiplier switch B. However, for them to achieve that, they must be configured in such a way that they belong to the same network as the ISP router. Here, we used Class B IP address 172.26.1.1, hence those

computers should use that Class B IP Address as their gateway in their configurations. A gateway is an IP Address of a device, such as a router, that enables devices from a certain network access resources that belong to a totally different network.

Therefore, there sample IP Addresses could be 172.26.1.17, 172.26.1.43, 172.26.1.151, etc., with their default gateway configurations as 172.26.1.1

Note that we can have more switches connected to switch C to multiply the number of network devices with internet access. All those devices must belong to the Class B subnet and that ISP router IP Address as their default gateway.

For the lab devices, labeled E, to have access the internet resource, they must adhere to the logical structure explained using the ISP router configurations. All the devices within the lab network must use the IP Address of the Lab Network router as the default gateway. Then all the devices must have IP Addresses whose subnet belongs to the same subnet as that of the Lab Network router. In this case, all the devices must use the Class C Lab Network router IP Address 192.168.1.1 while the devices must belong to the same network as the Lab Network router such as 192.168.1.56, 192.168.1.111, 192.168.1.87, etc. Note

that equally, more switches can be connected through switch D to multiply the number of devices that can be connected.

Computing device F could be a server machine providing certain services to the lab network devices. This could include database services, web services, email services, back up services, etc. This device can as well access internet resources if the configuration puts it on the same network as the Lab Network router with a default gateway as that of the Lab Network router. However, the services provided by this device can only be accessed and utilized by the devices within the lab network and none other can.

Lab Work IV

In the computer lab, you have been provided with a wireless Linksys router, switch, cables, and desktop computers. The network modules in the computer lab have internet connectivity. You have your laptops capable of wireless connectivity. In groups of two, network the computers until they are capable of connecting to the internet.

- a) Document the resultant IP configurations on the router and those of your computing devices that are facilitating the internet connectivity.

b) Explain the classes of your IP configurations in (a) above.