1.0 Introduction

Using the internet seems pretty easy for the regular user, but this is not the fact as the most people think. The internet communication takes a lot of operations, protocols, and set of complex software and hardware to make the network communication to be done, and to make the internet much simpler and easier to deal with.

To better understand of how the Internet works today, we are going to take a look at the architecture of the network and how to build it.

In this report we will give a general idea about how we are communicating using the computer network, and what are the things those happen inside which the regular users don't usually know.

In order to simplify the information in this report we will assume that we have a big **company "A"** in KSA, in Riyadh city, which is the fundamental company. The **"A" company** has 3 sub companies, one of them in the same city which is the **company "B"**, and the third company is located in the same country, in Jeddah city which is the **company "C"**, and the last branch has located in Canada, in Ottawa, which is the **company "D"**.

All these companies are linked with each other with different set of rules which will be explained later on at this report.

The following figure clarify the company locations .

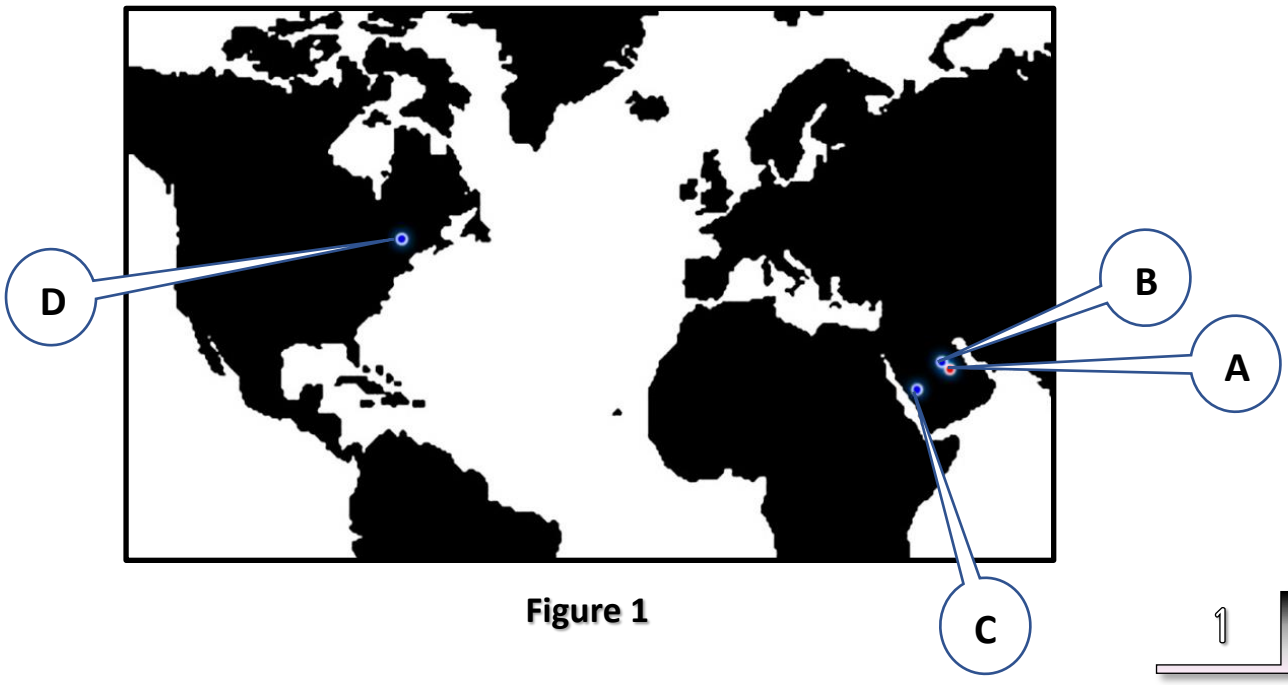


Figure 1

2.0 Physical Connections & Transmission Media

we will specify the physical connections that we could use inside our network.

The operation of choosing cables Absolutely depends on some specific requirements, which we have to make sure that we achieved, such as the distance that we need our data to be traveled to, or how fast we need our data to be sent, of course depending on how much money we able to spend.

Let's say that we want our connection to be very strong , and we want our data to be transferred with very high speed, and also we don't have a problem with high costs. In this case the best choice for our corporation is to use the **Fiber-Optic Cables** for wired networks.

Fiber-Optic Cables is the type of cables that uses light energy, and that light can be really strong like a laser, or it could use LEDs (light emitting diodes) which is a much weaker source of light, and here we can specify the exact type of fiber-optic cable that we want to use depending on the distance factor.

So, for example to link devices inside the company itself we would use the **MMF**(multi-mode fiber) cable, which is typically the type of cables that we would use when we don't need our fiber-optic cable to go very far.

But for example to link the **company "A"** with **company "B"** we definitely will use **SMF**(single mode fiber) cable which is can actually carry data about 50 times further than multi-mode fiber.

Using the guided transmission media is always better, because it guided - as it called - but the cost will be a problem, because the operation of connecting two places which are far away from each other is not easy as doing that using wireless transmission media.

3.0 Network Types

3.1 LAN (Local Area network) :

As we said we have four companies, and each branch of the company has its own **LAN** network, which is the type of network that we would use for limited area, it could be for an office size, or it could be for a whole university size. By the way LAN is the very first network that every device is connected to.

3.2 MAN (Metropolitan Area Network):

As we mentioned, inside the same building or the same company we will use LAN network to connect and serve all the devices those inside the department, but to connect two companies located in two different cities we must use **MAN** connection, which is the type of network that we would use to connect our **companies "A"** and **"C"**.

3.3 WAN (Wide Area Network):

Now, In order to connect our companies those located at the middle east with the Canada branch (**"D" company**), we have to use **WAN**, which is the network that used to connect different LANs, LANs are usually connected to each other through a router device.

Big example for WAN is the **internet**.

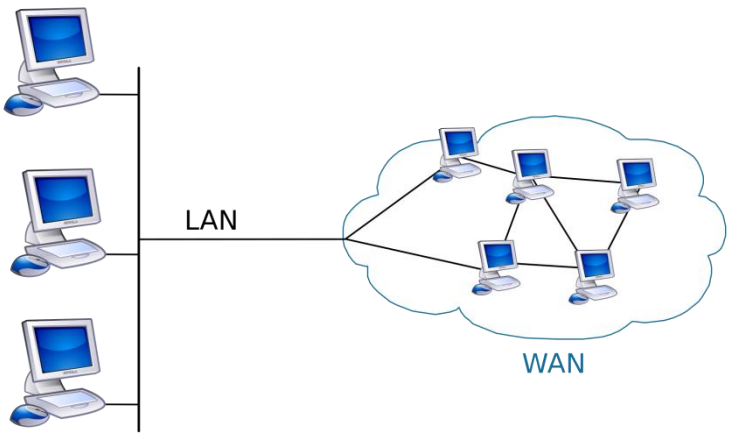


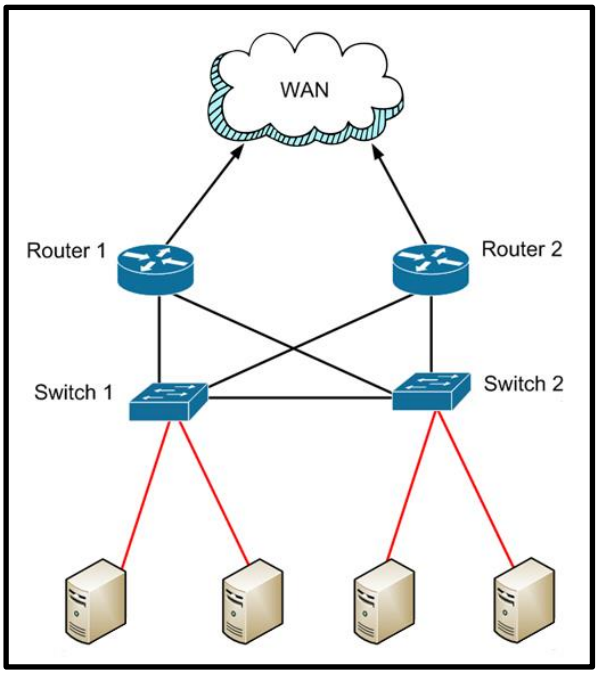
Figure 2

4.0 Topologies

Now, topologies pretty much depends on the type of the network that we use (which is the part that we've discussed on 3.0), so in order to choose the topologies those we would use in our companies, we should first care about the type of the network, then we have to care about the function of the topologies and how does it work.

Let's say that the company building is consist of three floors, in each floor there are two routers. Now in order to connect the company devices to the routers we will use another device which is the switch, the switch device will be connected to the company devices using star topologies, while the switches and router will be connected using mesh topology.

Figure 3



As shown in the figure 3, switches and routers - or with other word the networking devices - are usually connecting with each other using mesh topology, and that because in mesh topology every device is connected to the other devices, and the benefit of that is: every device in mesh can communicate with other devices directly to get the information that it needs.

Note: Router 1 is not connected to **Router 2** directly, and that type of mesh topology called **"Partial mesh"**

Actually at this figure there are two types of networks, WAN and LAN. When the routers communicate with the WAN network, there is where WAN occurs, but the network under the routers is LAN network, And one of topologies that we can use with LAN network is star topology, which is the topology that we've used to connect the switches with the company devices. In Star topology always there is a center witch is the switch that connected to the other devices individually, and the purpose of that is to direct the information to the device that needs it only.

At the following we did specify the technologies that we also can use with Local Area Network :

1. Bus technology
2. Ring technology
3. Star technology

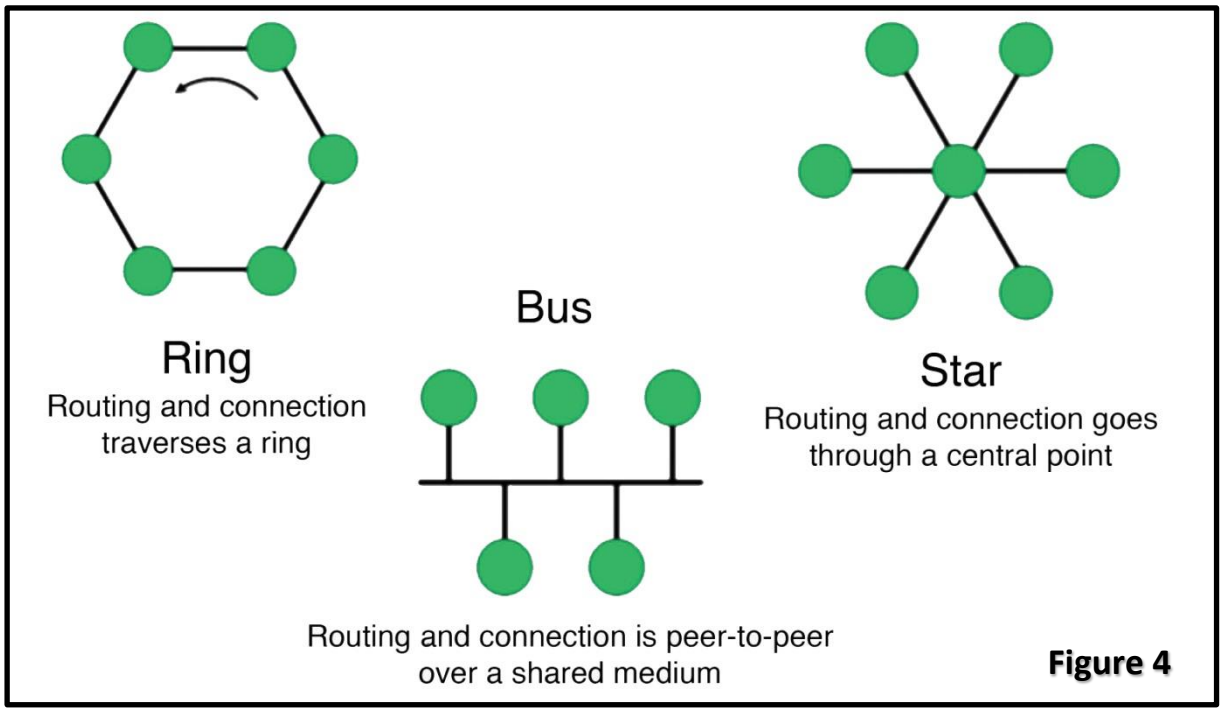


Figure 4

5.0 References :

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