World University of Bangladesh

Course Title : Computer Networks Lab
Code : CSE 1006

Term Paper

Submitted By

Name : Md.Saiham
Roll : 2674
Batch : 42[c]

Submitted To

KH. Mustafizur Rahman
Lecturer at World University of Bangladesh

Question 1.

This term paper conducts as a part of your study and will help to understand the real life scenario of computer networks. This report also facilitated the understanding of the academic theories associated with the course of CSE. At first you have to select a company/business (ISP) firm which has good reputation in the market. Main objective is to “to identify the Modeling Network Router, Switches and Security Cisco Firewall Using Packet Tracer Simulation Software”.

Guidelines for term paper preparation-

The paper should be at least 15-20 pages excluding cover page, annexure and references (if used). Avoid personal pronoun (I or me) in writing your report

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Introduction
Background of the Study
Methodology
Results and Discussion
Conclusion
Note-For the references you have to use APA or MLA citation styles and PLAGIARISM is strictly prohibited

Questions: Modeling Network Router, Switches and Security Using Cisco Firewall and Packet Tracer Simulation Software.

Answer must be followed as per sequence:
Introduction Part, background of the study, Methodology, Results and Discussion, Conclusion

Picture Only for Demo Purposes. (Network Design. You can setup as per your own ideas.)

Answer.

Answer to the question no. 1

Introduction:

We all use the internet in the present days almost everyone. And for this we need devices. And these devices communication needs a medium. For this the computer networks has became the most important thing in the present days. The offices and companies run well organized networks for maintaining the administration, communications, automation, e-business etc. The computer networks can be in many froms like LAN, WAN, MAN, WLAN, PAN, SAN etc. But in most of the offices has it's own LAN networks where they maintain the connections. The LAN network is unuseful in many ways like storage media mainframe computers or mini computers and high speed printers. For handling these tasks we need the proper system managers and softwares to use them. The simulaton tools can give us the way which hardware will work how if we connect it in the network. Here we will use the Cisco packet tracer to sumulate these things. This paper will show how the tool can be used to develop a simulation model of the LAN for an organization in the form of messages, databases and so forth. Whatever the network is located in a building or the network within an area the need of networking in computing is just a revolution in the history. Here we will model the network routing and security using Cisco network simulation software , which ordinarily will not work without some set of configurations. We employed the Cisco simulator software in modelling the router and to provide a robust security. The simulator software in which the network design was made is Packet Tracer. Packet Tracer was used because it has all the tools that can be used to design a Cisco network and accept configurations by a network administrator if they are correct and acceptable by the Cisco equipment.The model is validated with a very satisfying result.

Background of the study:

The "Cisco" networking company is a top rated company that makes high level security networking accessories. The cisco networking in the networking that contains high level of security because of the advanced configurations that is installed pre default and they are able to run with the different models. The OSI model was created by the international organization of standardizaiton. In this here is meant to support the vendors who create the universal devices that connects to the networks and software in the form of protocols so that they can communicate and work with each other. Though most of the devices work very well but somewhere there are exceptions. It would be a very good opportunity if it is possible to do with each and every devices. In these days the internet has become a mainstream activity. Everybody use the internet these days. So, networking here is a core element. Here, networking means at least linking two or more devices and the connection between them is called networking. The difinition of networking is an invisible thing but we use it by the activity of the softwares and hardwares. The data networks are made as a result of business applications that were written for microcomputer. In that time the microcomputer were not connected as computer terminals so the sharing of the data wasn't possible that time. This situation was in the beginning of the invention of the floppy disk. The floppy diskk wasn't effective also the floppy disk was a very costly thing that time it was hard to run the minor business organizations. Every time the sneaker create the multiple copies of data it need to be shared again with the users we need the file. When double prople modifies it then shares it the thing is one set of the file used to lost. So, the need of solution arises for the following problems :-

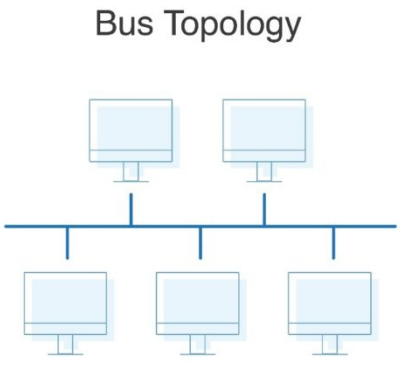
I. Efficiently communication
II. Files duplication
III. Setting a network and managing

In one of the solution there was the creation of local-area network standards. Because LAN standards provided an open set of guidelines for creating network hardware and software, the equipment from different companies could then become compatible. This allowed for stability in LAN implementation. In a LAN system each department of the company is a kind of storehouse of electrical system. The efficiency and quick task was always needed of the information movement, not only in an office but also one business to another. Then the solution was arised by the revolution of the computer network topology. The name of those tolologies are WAN (wide area network) and MAN (metropolitan area network). Then the question occured that "what if we run our businesses and maintain communication to the distant location ?". In the 1960s, 70s, 80s, 90s the Department of Defence (DoD), developed large wide area networks (WANs) for military and scientific reason.

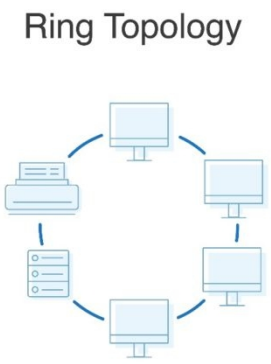
Methodology :

In the world of internet and the interconnectivity among the devices, the network topology takes part, it describes the logical and physical part and interconnection of the network devices, computers on a network. We know there are a lot of network topologies. We can mix of topologies and also create a new king of topology that is the hybrid topology. They are bus topology, ring topology, star topology, mesh topology and so forth.

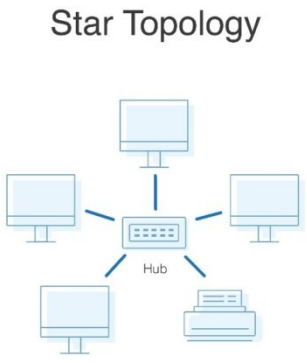
The bus topology there is a straight cable and each device is connected with the cable in a series.



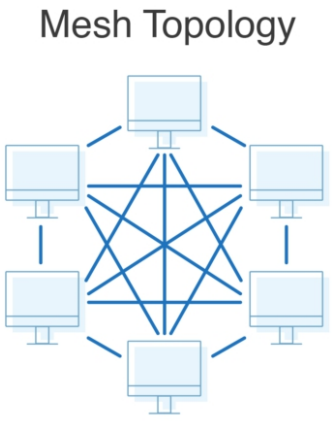
Ring topology is a kind of topology which makes a network like a circle or ring. The disadvantage of this topology is it cab only communicate with the nearby computer.



In the star topology the networking connection makes a star like network and that is star topology.



The mesh topology is king of network topology which means every computer has connection with every device of computer in the network.



Data travelling mean

It we talk about the data travelling way the thing rises how the devices are connected which medium. The devices are connected with each other through cables. Their types are :-

I. Coaxial cable

II. Twisted pair cable

III. Optic fiber cable

I. Coaxial cable : The coaxial cable contains two conductors. A conductor is inner insulated conductor and this inner insulated conductor is surrounded by the other conductor. The second layer of conductor is made with woven wire and metallic foil. The conductor which is in the core is protected by the metallic foil paper is always resistant to the electromagnetic interference.

II. Twisted pair cable : The twisted pair cable is a common cable type and generally used in the LAN media. Separately insulated copper strands are put into the twisted pair cables. The twisted pair cable is two types one is shilded twisted pair cable and other is unshilded twisted pair cable. The classification of cabling exist for UTP cable and they are :

Straight through cable, cross over and roll over cable.

III. Optic fiber cable : The fiber optic cabling is used as an alternative of copper. The optic fiber cable is capable of sending data in the speed of light. The use of light in stead of electricity makes the fiber optics immune to EMI.

The virtual local area network

The VLANs are a new type of monument that uses high speed switches and good intelligence. This type connects the physically connected computers to LAN segments. The VLANs connect the computers to LAN segments by softwares in the computer.

The types of VLANs are :-

I. Single switch VLANs
II. Multiswitch VLANs

I. Single switch VLANs : By using a special software the computer are assigned and physically connected together using a large physical switch. Computers can be assigned to switch in four ways. They are :-

1. The port based VLANs assignes the devices by the port numbers.
2. Mac based VLANs assignes the devices to the switch by the mac address.
3. IP based VLANs connect computers to the network by the IPs.
4. There are application based VLANs which assigns the devices in the application.

II. Multiswitch VLANs : The multiswitch VLANs send packets between many switches. It separetes the segment into many locations possible. The multiswitch VLANs can prioritize traffic using the IEEE 802.1 p standared in the gardware layer.

The internet protocol version 4 addressing and subnetting

An IP address is a unique thing and a Cnumeric identifier assigned to the devices on an IP network. This is made to specify the location and the device in a network. The IP addressing was designed to allow hosts on one network to communicate with hosts.

The structure of the IPv4 includes 32-bit address. However, it is written the decimal values instead writting the values in the binary bits. Here the IP, 192.168.100.107 represents every number to the 8-bit portion. The IP address has two parts they are network address and host address. The ip address component which bit refer to the network and which bit refer to the host is called subnet mask. The subnet example is, 255.255.255.0

The classes of IP address are divided into five parts they are :-

Address class	Range
A	1-126
B	127-191
C	192-223
D	224-239
E	240-255

Subnetting is the concept to device a large network into the small parts. Here we have an IP address and with the IP address we would have to do the tasks. By calculating the IP in may ways we would have to make branch of it with other IPs. The IPs are stored and pre defined to detect the subnet. After subnetting, network subnet field of hosts are made. A subnet mask is a 32-bit value that allows the recipient of IP packet to distinguish the network ID portion of the IP address from the host ID portion of the IP address.

Results and discussion :

We have a given network model what we can follow :

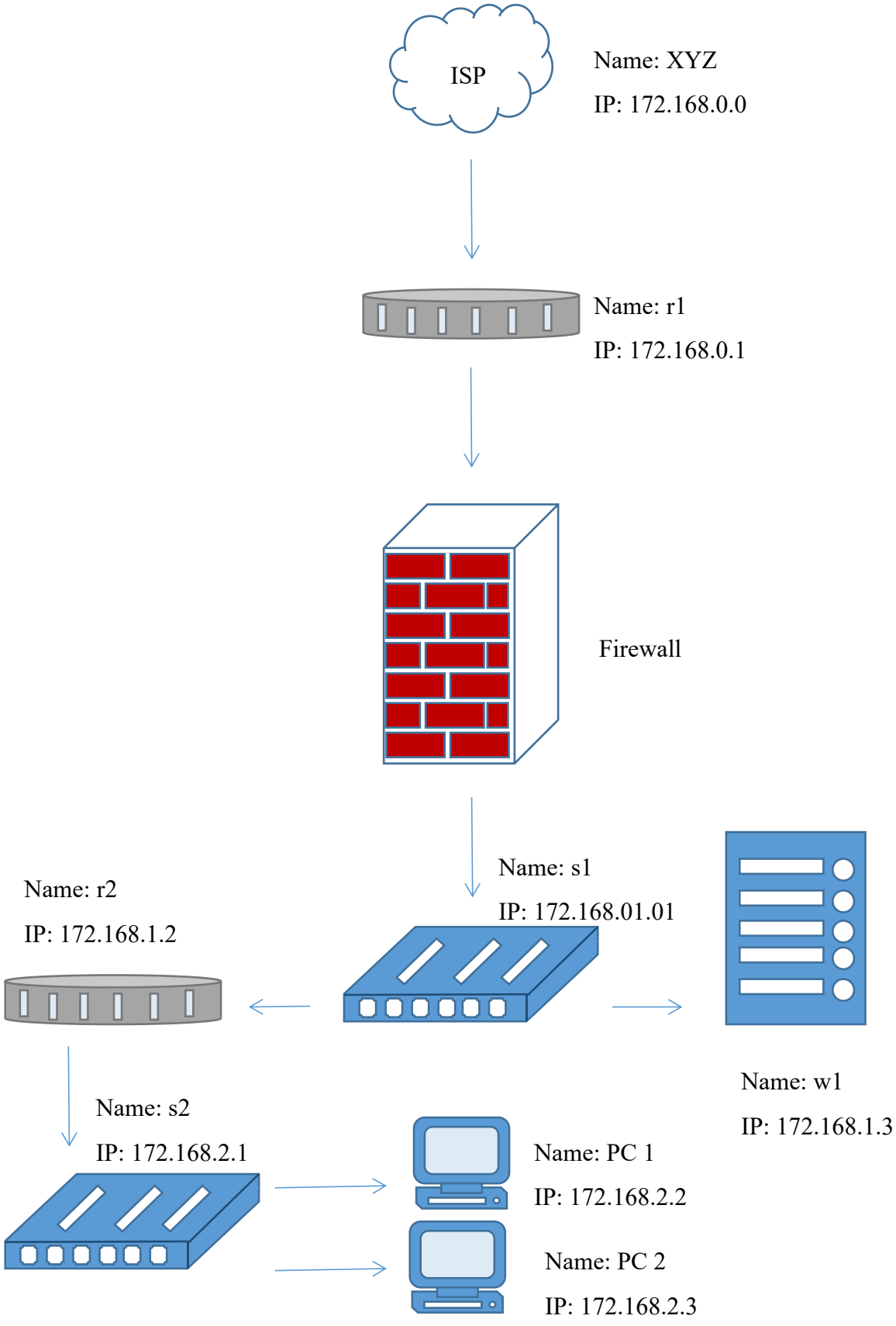


Figure : network model

Switch configuration

The switch configuration makes effect in the network. It makes some ports access ports and configures gateway. Creating VLANs and assigning switch ports to the VLANs.

Trunking commands :-

```
switch (config)# int fastethernet 0/1
switch (config)# switch mode trunk
switch (config-if)# spanning tree portfast trunk
switch (config-if)# interface manage fa0/2-24
switch (config-if-range)# switch port mode access
switch (config-if-range)# end
```

creating VLANs :-

```
switch (config)# vlan 01
switch (config)# vlan 10
switch (config)# name s1
switch (config)# vlan 02
switch (config)# vlan 11
switch (config)# name s2
```

Router configuration

The Cisco produces high quality router and this is a very useful and intelligent device. The router configuration commands are describe below.

Setting up default gateway :

```
r1 (config)# ip default-gateway 172.168.0.1
```

Creating subinterfaces for VLANs :

```
r1# configure terminal
r1(config)# interface gig 0/1
r1(config)# no ip address
r1(config)# duplex auto
r1(config)# speed auto
r1(config)# interface gig 0/1.1
r1(config)# describe VLAN 10_interface
r1(config)# encapsulation dot 1q 10
r1(config)# ip address 172.168.1.2 255.255.255.0
r1(config)# ip nat inside
r1(config)# ip helper - address 172.168.1.2
r1(config)# end
```

Security configuration

```
Router > enable
Router# configuration terminal
Router(config)# enable secret group 8
Router(config)# service password - encryption
Router(config)# end
Router# write memory
```

Conclusion: There are a lot of vendors in this world among them Cisco is a brand which produces many catagories of devices. They are nicely made. With the age of current technology they keep upgrading their devices. Among them there are routers, switches, hubs etc. So, if we need to design our or as a technician if we need to configure an organization's network we have to get proper knowledge in the networking and we have to learn the networking devices of Cisco and some other vendors so that in the future we don't stuck in any kind of difficulty.