Simulation and Design of University Area Network Scenario (UANS) using Cisco Packet Tracer

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Abstract

Computer network has become the most significant issue in our day to day life. Networking companies depend on the proper functioning and analysis of their networks for education, administration, communication, e-library, automation, etc. Mainly interfacing with the network is induced by one of the other user/users to share some data with them. So, this paper is about communication among users present at remote sites, sharing this same network UANS. UANS stands for the University Area Network Scenario. So in this work the network is designed using Cisco Packet Tracer. The paper describes how the tool can be used to develop a simulation model of the Pabna University of Science and Technology, Pabna, Bangladesh. The study provides into various concepts such as topology design, IP address configuration and how to send information in the form of packets in a single network and the use of virtual Local Area Network (VLANs) to separate the traffic generated by a different department.

Index terms— computer networks, IP addresses, ping test, Cisco Packet Tracer Simulation Tool, VLANs, Router.

1 Introduction

omputer network borne out of the need to use personal computers for sharing information within an organization in the form of messages, sharing files, resources and so forth. Whether the organization is located in a small area like as in one building or spread over a large area, the need for networking the computers cannot be over emphasized. A university area network is an essential part of university system. A university network has several uses such as teaching, learning, result publishing, resource sharing, file sharing, communication, etc. The University Area Network design is about designing a topology of a network that is a LAN (Local Area Network) for a university in which various computers of different departments and buildings are set up so that they can interact and communicate with each other by interchanging data. To design a network for a University which connects various departments and buildings to each other's, it puts forward communication among them. One of the purpose of networking is to reduce isolated users. The systems should be capable of communicating with others and should provide the desired information. A simulation tool offers a way to predict the impact on the network of a hardware upgrade, a change in topology. So in this dissertation, a UANS network is designed using Cisco Packet Tracer. Cisco Packet Tracer (CPT) is multitasking network simulation software that can be used to perform and analyze various network activities such as the implementation of different topologies, selection of optimum path based on various routers, analysis of different network configurations [4]. This University Area Network Scenario is about designing a topology of a network that is Local Area Network (LAN) for a university area in which different department has some computers in different buildings set up their network so that they can interact and communicate with each other by interchanging data.

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2   II.

Technology to be Used CCNA: Cisco discovered Cisco Certified Network Associate (CCNA) to identify and analyzethe basic capability of the installation and maintenance of different size networks. This technology used for connecting various devices like routers, switches with each other for transferring and interchanging data. To contract a disciplined and trustworthy network is scalable too. Portability is one of the characteristics of this network application of the UANS.

3   III.

4   Basic Architecture

5   Working of UANS

This University Area Networking Scenario is to provide a well-connected, secure, reliable, dependable communication among different departments. Several departments can simply split the required data without any problem and can exchange their data without going physically to them thus conserving time and energy.

6   Requirements

The following section discusses the requirements related to the interfaces used to communicate with lots of data. These data combine clients, software interfaces and other hardware that permit the system to carry out its task.

7   a) User Interface

The requirements represent in this module describes the UANS interface. The requirements are picked up to the main characteristics provided by the system. The necessities always maintain the activities interconnected with the subheading characteristics.

8   c) System Interface

In this UANS, giving data to end device, a Graphical User Interface is needed and appear a login form to the authorized user. We can reset the password by the help of network administration. Whereas unauthorized user prohibits to access the network. VI.

9   IP Addressing

An Internet Protocol address is a logical, numerical address that is assigned to every single computer, printer, switch, router or any device that is part of an IP based network ??5]. No network architecture exists without an IP address. Due to an IP address is logical address, so it used to identify the specific nodes in the network. So the IP address gives the location an address so that they can interact with each other via email or so on. An IP address is a 32-bit number. It has two versions one is IPv4 and other is IPv6. There are five classes of IPv4 address shown in Table -1 In the UANS is used IPv4. An IPv4 is of32 bits numbers. The address is written in dotted-decimal notation represent it X.X.X.X each octet divide by a dot. For UANS network the IP Address is used 192.168.0.0 with a subnet mask of 255.255.0.0. IP 192.168.0.0 is the class C address. IP address divide among various VLANs and ports for communication. The greater IP address is divide into small parts by using VLSM (Various Length Subnet Mask). VLSM is a method that categorized an IP address into a subnet and shares it according to the necessity of a network.

10   VII.

11   Scope of UANS

This project gives us an effective method to connect among all computers in the respective university area. Apart from interconnection, this topology has been created keeping in mind the matter of cost. One of the important points is security and authentication to oppose unauthorized access. This topology transmits data very fast from one place to another.

12   VIII.

13   Result of UANS

In Fig. 3 show the complete diagram of University Area Network and it consists of router, switches and end devices. Here the different department's personal computers are connected with switch. IP address and subnet mask are assigned to all the departments and area of this UANS. IP Address of personal computer (PC): Table 3 shows the IP Addresses all switches which are used in the UANS network.

14 Conclusion

In this paper, a UANS (University Area Network Scenario) that uses networking topology implemented with concepts like VLANs in a multiple area networks using Cisco Packet Tracer. VLANs have been used to logical UANS and with the aid of a router and switch configurations, data packet routed from one device to another. The procedures provide a design and approach for UANS using VLANs for an end to end IP network connectivity for next generation network architecture implementations. To design the network for UANS produces the substructure for all the service framework such as security of the network, wireless area network, operational efficiencies, virtual learning environments, and secure classrooms. Finally, the network foundation services such as switching, routing multicast, and high availability are giving for the UNAS.

X.

15 Future Work

The configuration and specifications are for the initial prototype and can further be developed and additional functionality can be added to increase support and coverage. [1] [2]
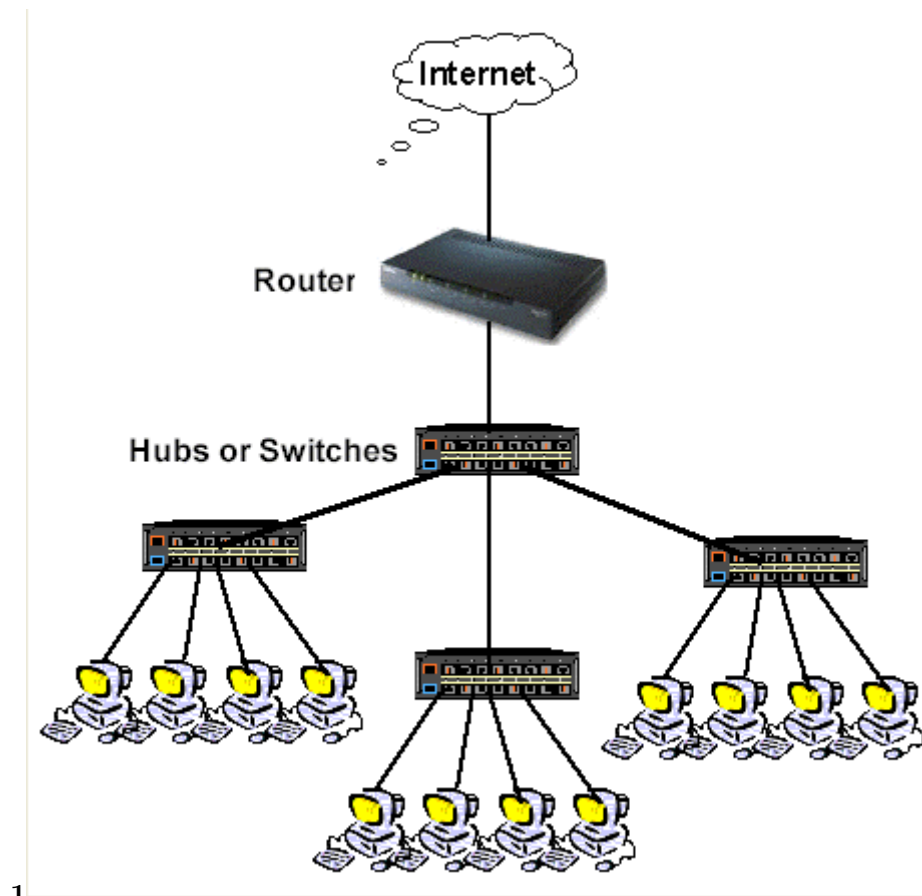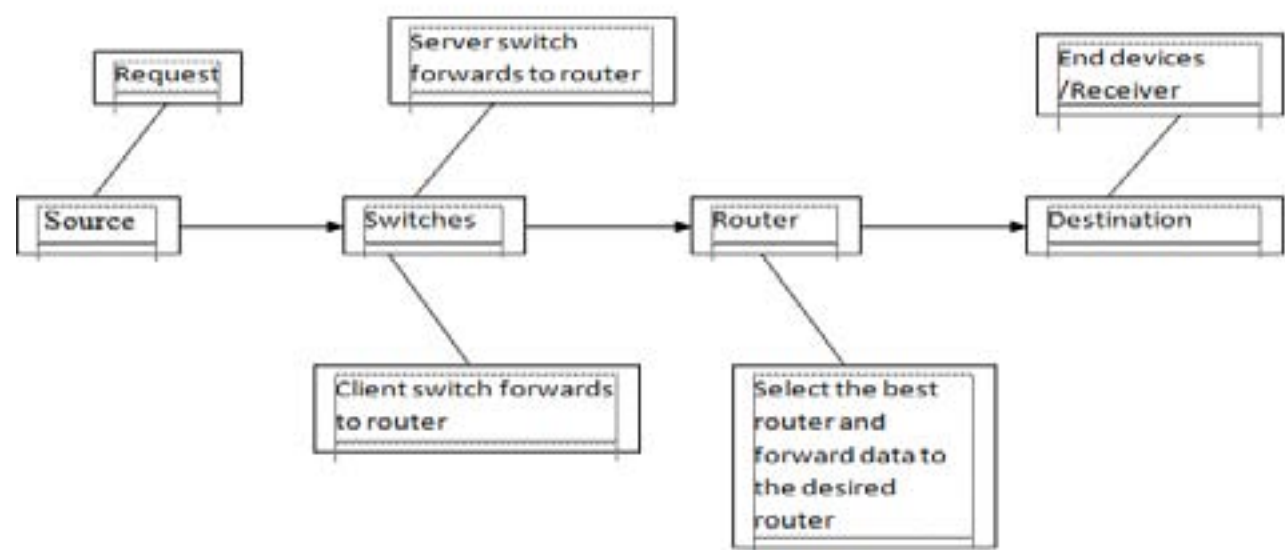

Figure 1: Fig. 1 :
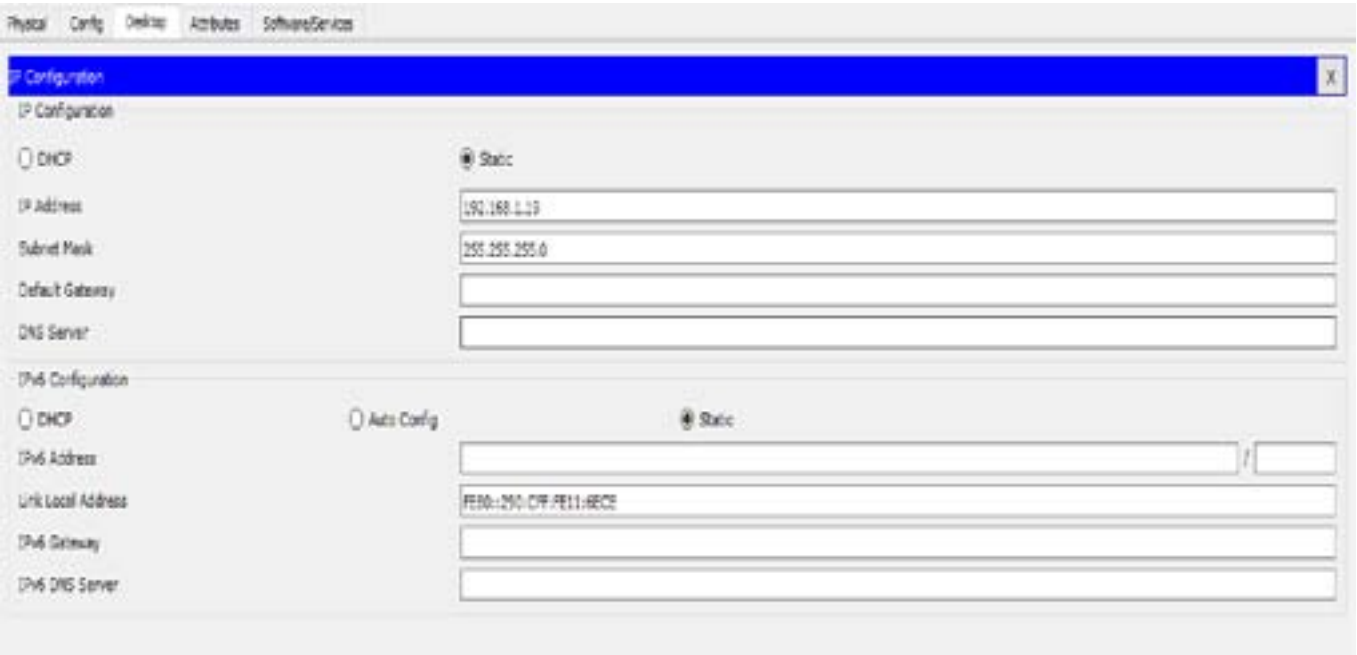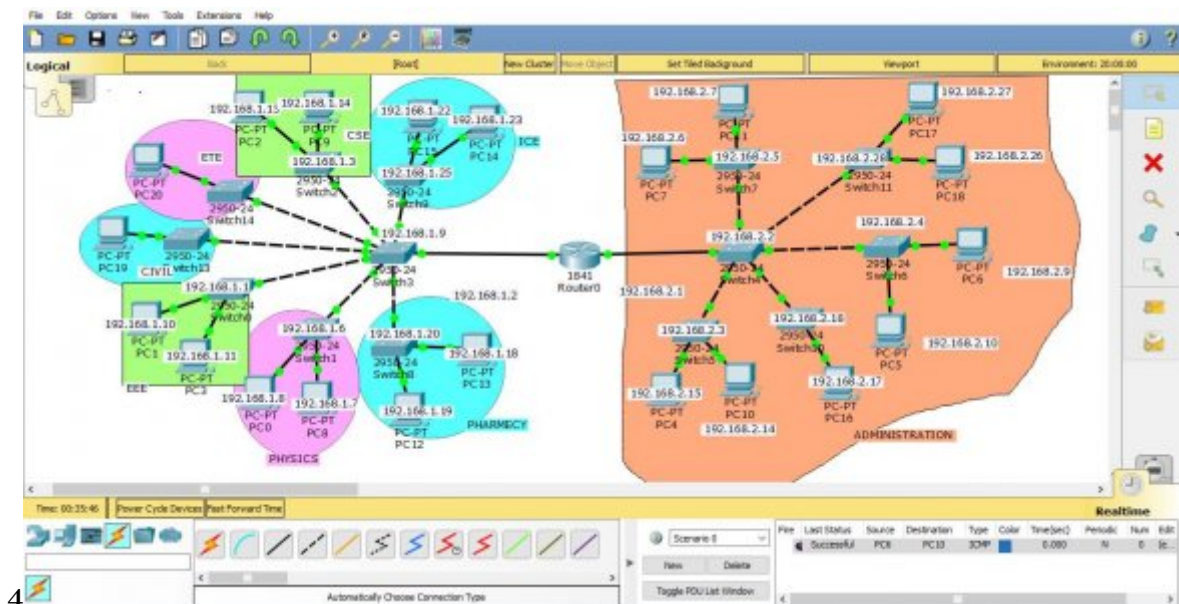

Figure 2: Fig. 2 :

Figure 3:

Figure 4: Fig. 4 :

```
switch>enable
switch#config t
Enter configuration commands. One per line. End with CNTL/Z.
switch(config)#hostname s1
switch(config)#interface vlan1
switch(config-if)#IP address 192.168.1.1 255.255.0.0
switch(config-if)#no shut
```
3

Figure 5: Fig. 3 :

```
Continue with configuration dialog? (yes/no)
no
Press RETURN to get started!
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa
Router(config)#interface fastEtharnet 0/0
Router(config-if)#ip address192.168.1.2 255.255.255.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINK-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#exit
Router(config)#interface fastEtharnet 1/0
Router(config-if)#ip address192.168.2.1 255.255.255.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINK-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```
4

Figure 6: Fig. 4 :

Figure 7: Fig. 5 :Fig. 5 :

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ADDRESS CLASS	VALUE IN 1 ST OCTET
A	1-126
B	128-191
C	192-223
D	224-239
E	240-255

Figure 8: Table 1 :

2

PC	IP ADDRESS
PC-0	192.168.1.8
PC-1	192.168.1.10
PC-2	192.168.1.15
PC-3	192.168.1.11
PC-4	192.168.2.15
PC-5	192.168.2.10
PC-6	192.168.2.9
PC-7	192.168.2.6
PC-8	192.168.1.7
PC-9	192.168.1.14
PC-10	192.1682.14
PC-11	192.168.2.7
PC-12	192.168.1.19
PC-13	192.168.1.18
PC-14	192.168.1.23
PC-15	192.168.1.22
PC-16	192.168.2.17
PC-17	192.168.2.27
PC-18	192.168.2.26
PC-19	192.168.1.52
PC-20	192.168.1.53

Command line interface (CLI) for Switch:

Figure 9: Table 2 :

3

SWITCH	IP ADDRESS
SWITCH-0	192.168.1.1
SWITCH-1	192.168.1.6
SWITCH-2	192.168.1.3
SWITCH-3	192.168.1.9
SWITCH-4	192.168.2.2
SWITCH-5	192.168.2.3
SWITCH-6	192.168.2.4
SWITCH-7	192.168.2.5
SWITCH-8	192.168.1.20
SWITCH-9	192.168.1.25
SWITCH-10	192.168.2.18
SWITCH-11	192.168.2.28
SWITCH-13	192.168.1.51
SWITCH-14	192.168.1.50

Figure 10: Table 3 :

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