UNIVERSITY NETWORKING

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Course Project Report titled "UNIVERSITY NETWORKING" is the bonafide work done by ANNANYA CHAUDHURY, KHUSHAL KHAITAN, YUVRAJ PANDEY, ANUSHKA CHAUHAN and MONIKA MARADANA who carried out under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

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ABSTRACT

Computer networks have a significant impact on the working of an organization. Universities depend on the proper functioning and analysis of their networks for education, administration, communication, e-library, automation, etc. An efficient network is essential to facilitate the systematic and cost-efficient transfer of information in an organization in the form of messages, files, and resources. The project provides insights into various concepts such as topology design, IP address configuration, and how to send information in the form of packets to the wireless networks of different areas of a University.

The aim of this project is to design the topology of the university network using the software Cisco Packet Tracer with the implementation of wireless networking systems. This university network consists of the following devices:

1. Routers(1941)
2. Switches(2960-24TT)
3. Email Server
4. DNS Server
5. Web Server(HTTP)
6. Wireless Device(Access Point)
7. PCs
8. Laptops
9. Smartphones

The model design includes the following parts of the University:

1. Hostel Blocks: Girls Block and Boys Block
2. Academic Blocks: AB1 and AB2
3. Tech park and Library

INTRODUCTION

A wired connection makes it difficult to keep track of all the devices and to manage the cable connection, which is not only chaotic but also challenging to handle.

Campus networking via wireless connection becomes an important part of campus life and provides the main way for teachers and students to access educational resources, which gives an important platform to exchange information. As laptops and intelligent terminals are widely used, demand for access to information anytime and anywhere has become more and more urgent, but traditional cable networks cannot meet this requirement. Then wireless network construction becomes necessary and essential. The wireless network is one of the important components of a digital campus and wisdom campus. It provides an efficient way to explore the internet with a mobile terminal for teachers and students regardless of cables and places. This is an important mark of the modern campus as a supplement of a cable network. With the development of network and communication technology, cable networks on a university campus bring much convenience for teaching and research work. But for mobility and flexibility, it has obvious shortcomings. A wireless network can overcome these drawbacks and has been applied to the university campus.

Project Statement

In this mini-project, we defined a simulation of campus networks based on wireless networking. The network is divided into two sets: one for the campus area and the other for the hostel area. The major aim of this project is to show the wireless connectivity that is used in universities to make the network efficient and mobile at the same time. Mobility is the major concentration of this project. In order to provide equal functionality to all the users (college staff and students), we have added DNS, Email, and HTTP servers for the maximum utilization of resources.

Hence the campus network provides different services such as connecting the user to the internet, data sharing among users (students, teachers, and different university members), accessing different web services for different functionalities, so it needs wireless networking for smooth processing.

Benefits of wireless networking over wired networking

To better understand the wide usage of wireless networking in today's world, is to start with the benefits it has over traditional wired networking is crucial for our project implementation. Some major aspects have been stated below that show the various advantages of a wireless network over wired ones.

1. Mobility

One of the major advantages of wireless is mobility. Users have the freedom to move within the area of the network with their computing devices staying connected to a network without being concerned about the cable connection.

2. Less Hassle

The wireless network helps in the reduction of large amounts of cables or wires which becomes chaotic and difficult to maintain, it makes the connection hassle-free.

3. Accessibility

Provide network access across your organization, even in areas that have been challenging to reach with the wired network, so your entire team can stay in touch.

4. Expandability

The wireless network helps in the expansion of the network to a wide range by adding multiple new users and locations without additional need to run cables and wires.

5. Guest Access

Offer secure network access to guest users, including customers and business partners, while keeping your network resources protected.

With lots of advantages, there come disadvantages as well, like security issues which can be resolved using strict protection passwords. Also, the Speed of wireless networks is considered to be slow and having low bandwidth when compared to the direct cable connection networks.

Simulation Environment

The simulations of our network topology can be easily achieved using cisco packet tracer. Using a simulation mode, you can see packets flowing from one node to another and can also click on a

packet to see detailed information about the OSI layers of the networking. Packet Tracer offers a huge platform to combine realistic simulation and visualize them simultaneously. Cisco Packet Tracer makes learning and teaching significantly easier by supporting multi-user collaboration and by providing a realistic simulation environment for experimenting with projects.

WORK DONE

In order to make our project understandable, we have divided the content into steps. They are as follows:

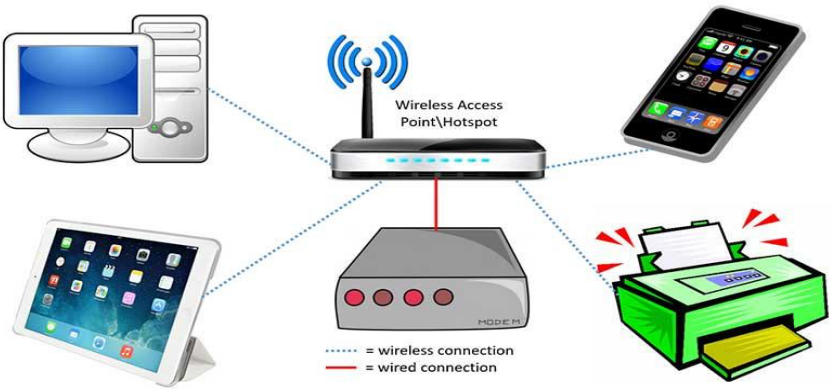
1. Software and hardware requirements

Before heading towards the implementation we need to make sure of the following requirements.

- A proper workstation (any mid-high range laptop will suffice).
- Packet Tracer by Cisco
- 8 GB RAM.
- Any 10,000+ Average CPU Mark scored processor.
- 16 GB of dedicated hard disk space.
- USB 3.0+ port.

2. Brief knowledge about our approach

The proposed wireless network is implemented for a university campus. We have made a virtual visualization of the network using the Cisco Packet tracer which provides a huge platform for users to test their projects using simulation tools. A Wireless network in an educational campus makes it easier for teachers and students to access educational resources, by enabling an important platform to exchange information.



3. Network Requirements

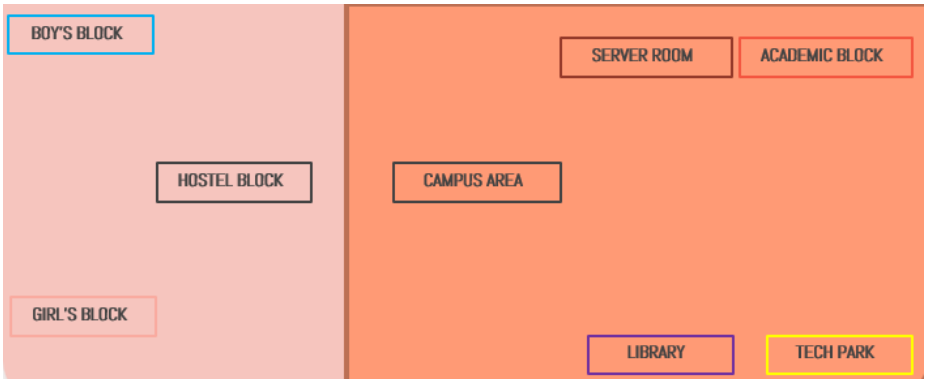
The network is divided into 2 areas :

1. Campus Area-

The Campus area is further divided into various accessing points like Tech park, Library, Academic Blocks, Server Center.

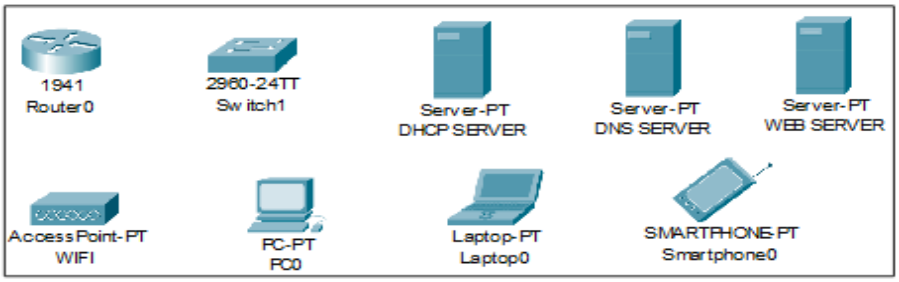
2. Hostel Area-

The Hostel area is further divided into Boys blocks and Girls blocks respectively.



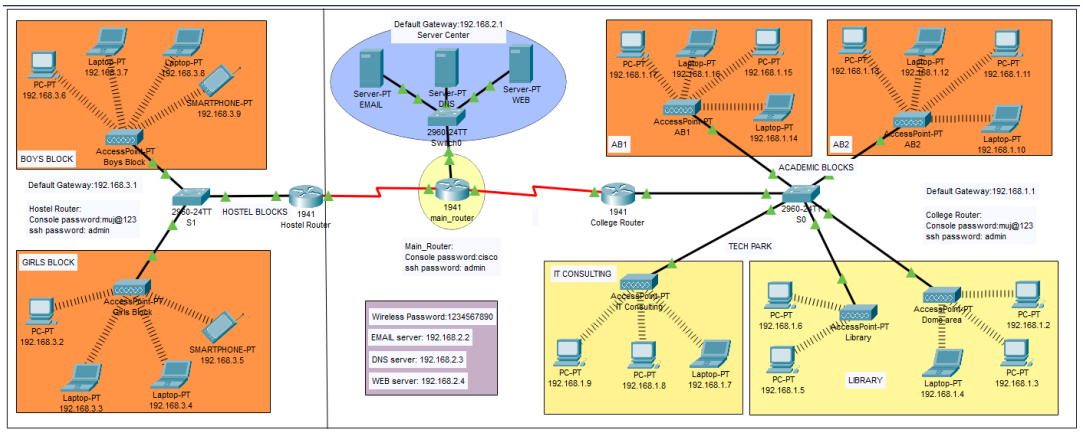
Devices Used In The Network

1) Router (1941)	x 3
2) Switches (2960-24TT)	x 3
3) EMAIL server	x 1
4) DNS server	x 1
5) WEB server (HTTP)	x 1
6) Wireless Device (Access Point)	x 7
7) PCs	x 12
8) Laptops	x 10
9) Smartphones	x 2

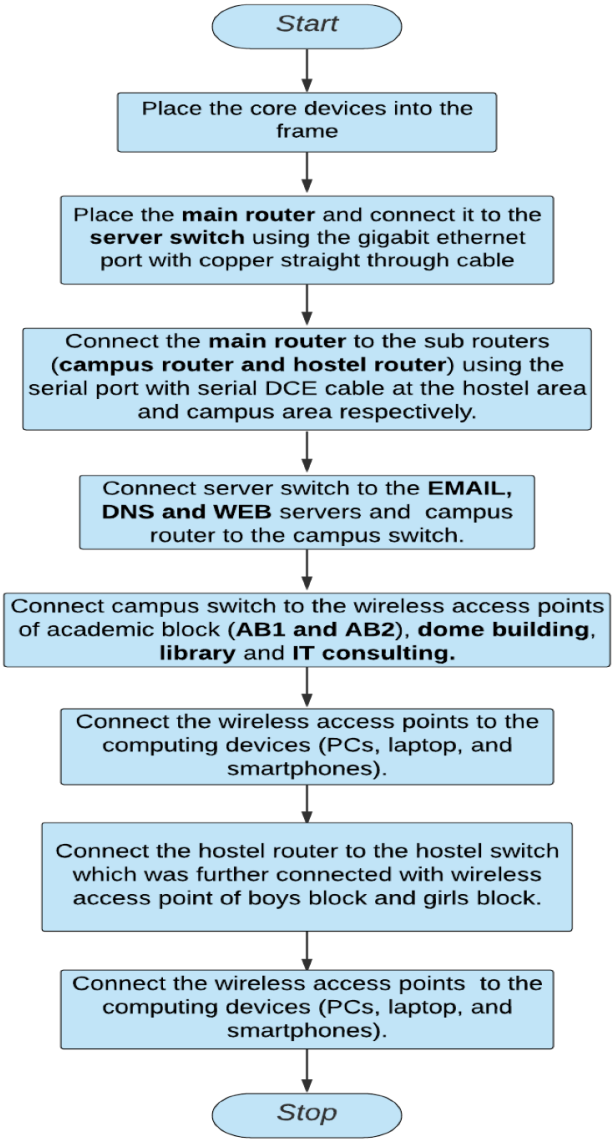


4. Implementation and Flow Diagram

● To design the wireless network of the university we initially started by placing the core devices into the frame as mentioned in the layout.
● Firstly, we placed the main router at the center of the university outline, which was further connected to the server switch using the gigabit ethernet port with copper straight-through cable and sub routers (campus router and hostel router) using the serial port with serial DCE cable at the hostel area and campus area respectively.
● The server switch was further connected to the EMAIL, DNS, and WEB servers respectively.



● Campus router was connected to the campus switch which was further connected with wireless access points of the academic block (AB1 and AB2), Tech park, library.
● The wireless access points were then connected to computing devices (PCs, laptops, and smartphones).



● Similarly, the hostel router was connected to the hostel switch which was further connected with the wireless access point of boys block and girls block.
● The wireless access points were then connected to the computing devices (PCs, laptops, and smartphones), every area has a dedicated access point which can only be connected with the help of a password.
● All these connections are made through ethernet ports (gigabit ethernet and fast ethernet) using copper straight-through cables.
This is the flow diagram for a better understanding of the steps mentioned above.

CONCLUSION

We started our discussion with the word “digitalization” and in order to achieve it, we aimed to start with an educational institute, and finally, we designed a network for a University, which is wireless. As we mentioned, mobility and efficiency are the key aspects of wireless networks, which were our main goal, and hence, we decided to shift to a wireless network instead of a wired one, making our network clean and less chaotic.

In this project, we designed a University Network using Cisco Packet Tracer that uses a networking topology implemented using servers, routers, switches, and end devices in a multiple area networks. We have covered all the necessary features that are required for a network to function properly. We have included a DNS server and a web server for establishing a smooth communication system between different areas of our network and specifically for the communication between students and teachers.

We have included an email server to facilitate intra university communication through emails within the domain. We have used console passwords and ssh protocol to ensure a safe and secure transfer of data.

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