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Campus Network Architecture

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ABSTRACT:

The purpose of this paper is to design a campus area network with low cost and high security. As every organization needs a network to be implemented for the allowance of communication between different devices of different departments. With the increased number of departments in an organization the network designing for the organization will become difficult as it becomes complex to build. We need to choose perfect designing topology to meet the advantages of networking in terms of efficiency, security, manageability and cost.In this paper we have chosen three-layered hierarchical architecture of the network design. In order to make it cost effective which will also make the small organizations to adapt the networking design we have used multilayered switches instead of routers for both the distribution layer and core layer. For the organizations which have used telnet protocol to connect the devices and remotely access them.In order to design campus network of this paper we have used. Cisco Packet Tracer is a powerful network simulation program that allows students to experiment with networking techniques.

Keywords— Cisco Packet Tracer, Telnet protocol .

Introduction

Designing of this College Network Architecture involves the knowledge of VLANs , Assigning IP addresses, Assigning Hostnames to avoid confusion which switch belongs to which department, Connecting end devices such as PCs, Laptops. Configuration of the Vlans on the Switches at different layers of network Architecture, Telnet configuration and Firewall Configuration .

The suggested College Network Scenario entails creating a network topology for a college in which multiple computers from various departments are set up such that equipment connected in one department can be accessed remotely from a location that is some distance away.

NETWORK COMPONENTS:

College Network Architecture Includes:

- PCs, Laptop, IP Phone, Access Point, Wireless Router, Router, Firewall

College Network Architecture Includes Multiple types of Inter Device Connectivity like:

- End Devices to Access Switch
- Access Switch to Distribution Switch
- Distribution Switch to Core Switch

Firewall to Router

College Network Architecture Includes Multiple Types of Vlans

- For Data
- For IP Phone
- For Management(For Telnet)

College Network Architecture Includes Multiple Types of Devices:

- **Access Switch**
  To connect end devices only.
- **Distribution Switch**
  To implement policy based routing.
- **Core Switch**
  To interconnect distribution layer devices.

Literature Review

• In [1], the author discusses how to implement a campus network design that includes Cisco 2911 routers, 2960 switches, DHCP servers, DNS servers, Cisco Access Point PT, computers, laptops, wireless printers, and smartphones, as well as CAT 5 Serial cables, CAT 5 Cross cables, and CAT 5 Straight through cables.

• In [2,] the author utilized Cisco Packer Tracer to create the campus network design. I chose a class C IP address, which is 192.168.0.0/24, and this subnet is separated into eight subnets, four of which I used, and the rest are reserved for future scalability.

• In [3,] the author suggests that to construct a campus network, Cisco packet tracer was utilized. Packet Tracer is built on three learning principles: active learning, social learning, and contextual learning. As a result, it's designed to make creating interesting, collaborative, and localized instructional materials easier. Packet Tracer can be utilized in several different ways:

• The author of [4] presents research on how to put this into practice; we need the best devices that can support these protocols more effectively. As a result of our debate, we decided to use layer 3 switches that can function as both a switch and a router, allowing us to develop routing protocols.

• The author of [5] proposes that as our network expands and grows, it becomes necessary to protect it from unauthorized users and hacking. As a result, we must maintain network security by employing various security options such as port security, encryption, and the use of the most secure routing protocol

Proposed Model

When a network device communicates with a large number of other devices, the stress placed on the device's CPUs might be taxing. Broadcast packets, for example, are inefficient on a big flat network. As a result, the hierarchical design model's modular structure allows for precise capacity planning inside each layer of the hierarchy, eliminating wasted bandwidth. The responsibilities for network administration and the network management system should be distributed throughout the layers of a modular network design. A flat network is a network architecture method for campuses that attempts to cut costs, simplify maintenance, and streamline administration. Flat networks reduce the number of routers and switches on a computer network by connecting devices to a single switch rather than several switches. The network is not physically segregated using distinct switches, unlike a hierarchical network design.A flat network's topology is not split or divided into different broadcast zones using routers.

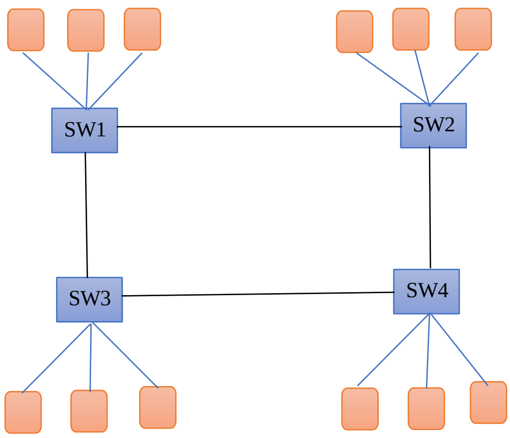

Fig: 1 Flat Network Architecture

Hierarchical network Model: • When network device communicates with many other devices, this workload required of the CPUs on the device can be burdensome. • For example, in a large flat(switched) network, traffic travels through one switch .As such the modular nature of the hierarchical design model is to enable accurate capacity planning within each layer of the hierarchy. • Network management responsibility and network management system should be distributed to the different layers of a modular network architecture to control management costs.

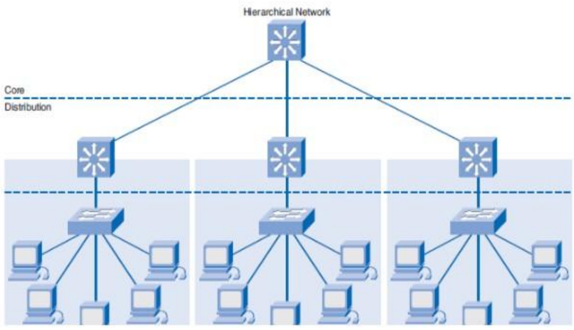

Figure 2 Hierarchical Network

Software Requirements

We utilised Cisco Packet Tracer to create a collegiate network. Cisco created a network simulation tool to create virtual network topologies.Its goal is to make it easier to create engaging, collaborative, and locally relevant teaching materials. Cisco Packet Tracer (CPT) is a multi-tasking network simulation software that may be used to establish appropriate servers, subnets, and analyse various network configuration and troubleshooting instructions. To start communication between end user devices and build a network, we must first choose suitable networking equipment from the packet tracer's component list, such as routers and switches, and then make physical connections by connecting cables to serial and fast Ethernet ports. Because networking devices are costly, it's advisable to start with a packet tracer to gain a better understanding of how the network works.

Firewalls and encryption should be used to strengthen the security of a network. Another security component that may be incorporated in a network is firewalls. A firewall is a crucial device that allows data to enter and exit a network. Many people, businesses, colleges, and governments are at risk of losing that asset if they do not have adequate network security.

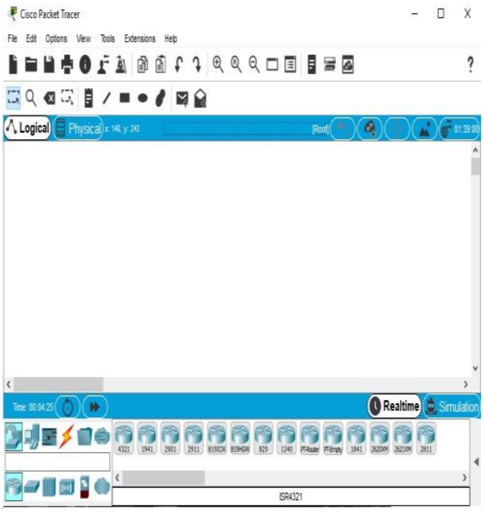

Figure 3.2(a) Cisco Packet Tracer

The software allows users tosimulate the configuration of cisco routers and switches using a simulated command line interface. Supports Majority of networking protocols. Engineers prefer to test any protocols on Cisco Packet Tracer before Implementing them. 4 problem types are well supported by cisco packet tracer

- Concept builders
- Skill builders
- Design challenges
- Troubleshooting challenges

Results

Accessing from CS:

Here we have accessed the ECE Department of EastBlock from Server Room using CS Switch of server room.Telnet is used here to remote access other Switches of the same Campus Network.

```
CS>en
Password:
CS#ping 192.168.123.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.123.2, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/1 ms

CS#ping 192.168.123.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.123.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/1/5 ms

CS#192.168.123.2
Trying 192.168.123.2 ...Open


User Access Verification

Password:
ASEBECE>
```

After password verification, here we are now able to access ASEBECE Switch.

Accessing Using PC of Server room:

In reality as we cannot access the devices using only switches , we now use a pc for accessing other devices from a server room.

Figure 5.1(a) Result from server PC

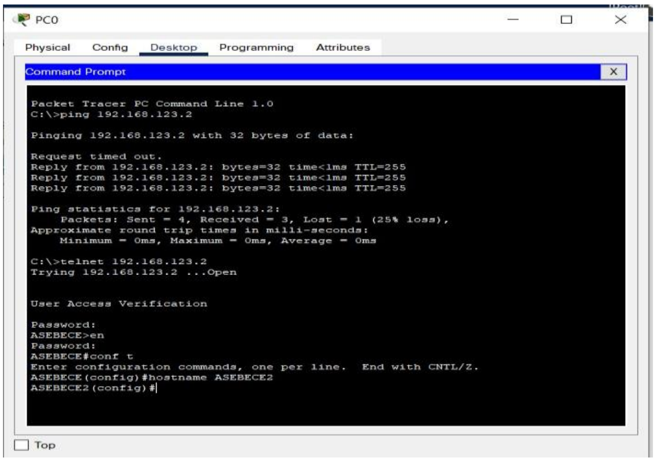

Figure5.1(b) Accessing another Department from server

Figure 5.1(c) Observing changed Information in a department

5.2 Output Screens

SIMULATION RESULTS:

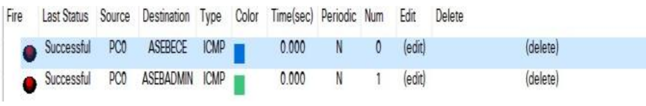

Figure 5.2 Simulated Result

Conclusion

The substructure for all otherexposures in the service framework, such as network security, wireless area network, mobility, and putting the justification to provide safety and security, operational efficiencies, virtual learning environments, and secure classrooms, is to design the network outlook for the community college network scenario.

References:

[1].S.Haller S. Karnouskos and C. Schroth "The Internet of Things in an Enterprise Context " in Future Internet-FIS 2008 Lecture Notes in Computer Science Vol. 5468 2009 pp 14-28.

[2]. A. C. Sarma and J. Girão "Identities in the Future Internet of Things" in Wireless Personal Communications 49.3 2009

[3] . Md. Waliullah, 'Wireless LAN Security Threats & Vulnerabilities', Department of Computer Science & Engineering, IJACSA-International Journal of Advanced Computer Science and Application, Vol. 5,2014.

[4]. Shivam Adke & Rutuja Bhawar, 'College Campus Network Design and Security', Department of Electronics Telecommunication Engineering, Sandip Institute of Technology & Research Centre, Nashik, IJAREEIEInternational Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN (online):2278-8875, Vol. 7, March 2018

[5]. Roberto Minerva AbiyBiru "Towards a Definition of the Internet of Things" IEEE IoT Initiative white paper.