CSCE 331202 Project – Computer Networks

Design an Institutional Computer Network Using Packet Tracer

Due Date: Tuesday May 11th, 2021

Grade: 15 Points

In this project, we target the design of a university computer network using a set of *Virtual Local Area networks (VLANs)*. The network is expected to offer a variety of services to different groups of users ranging from simply connecting to the Internet to data sharing and web services.

1. General Description

Your campus network is composed of six different networks: School of Engineering & Computer Science and five departments: IT, Student Labs, Accounts, Library and Office of the Registrar. Assume 15 to 20 usable IP addresses for each network.

2. Network Specifications

- Assume **only two routers** can be used in the university network. You may use a maximum of three routers, if needed, but you should clearly indicate the function of the third router. It depends on your network design.
- The types of routers and switches used depend on your network topology.
- The university is assigned the following block of IP addresses by the ISP: 191.11.0.0/12.
- Consider four or more PCs (or laptops) in each individual network.
- Each of the five departments is a standalone Network.
- Construct the **Addressing Table** (which includes all IP addresses) for the university network.
- A Border router (which is one of the routers you already use in the network) should connect the university network to the ISP.
- Any university user can access the following official websites (subject to the Access Rules given below): Google, YouTube and Facebook.
- Configure inter-VLAN routing. **You need to research VLANs and how to design them using Packet Tracer.**
- The IT department and Accounts should host two servers: Web server and E-mail server. **You should demonstrate their functionality by: i) browsing Google's website and ii) sending an email to any destination.**

- **Access Rules:**
  - Any end host in a department LAN should be able to ping all other end hosts in the other department LANs.

- A student should not be allowed to access the IT department LAN from the Student Labs, but IT can access the Student Labs. **You need to clarify the protocol used to achieve this and the network topology and configuration.**
- IT, Library and the Office of the Registrar departments are allowed to access all three websites: Google, YouTube and Facebook.
- The Engineering & CS School can access Google and YouTube Only.
- Student Labs can access only Google.
- Accounts should only be reached by email (sending and receiving) in order for the students to know the required fees.

3. Learning Outcomes

- Learn about **Packet Tracer**, a simulation tool designed by Cisco Systems and used to create network topologies and simulate computer networks for performance analysis.
- Learn how to design, configure and simulate a computer network.
- Learn about the network architecture, its hierarchy and the **Addressing Table.**
- Learn about the concept of **Access Lists** and how to implement it using Packet Tracers **(Each group needs to research this).**
- Learn about **VLANs**. **(Each group needs to research and learn about VLANs).**
- Learn how to troubleshoot a computer network.

4. Questions

1. Why is it necessary to erase the startup configuration before reloading the router?
2. Assume you find a couple of configuration issues after saving the current configuration in the router's startup configuration and you make necessary changes to fix those issues. If you were to reload the router now, what configuration would be restored to the router after the reload?
3. Given that the Student Labs can access only Google, can we deny a host in one of those labs access to Google because of an exam? Justify your answer.

5. Project Logistics

Each group consists of two students.

6. Project Deliverables

1. Network setup configuration and verification, the Addressing Table as given in the Requirements and the Questions above. (**8 points** = 5 points for the configuration + 3 points for Questions)
2. Technical Report summarizing the results, major findings and network topology. **(3 points)**
3. Demo with 10 minutes Q&A. **(4 points)** (Demo slots will be scheduled later).

Note: Each group should upload to Blackboard, both, the Packet Tracer configuration files and the Technical Report.