Spring 2024
Computing and Data Science Program
Computer Networks

Course Project

- **Project Scenario:** Each team is asked to design and simulate a network for our faculty when moving to the new campus getting into consideration using only two class C networks which are 193.158.1.0 and 2.0 covering 410 hosts and two server distributed in 7 different locations with 7 different topologies. Each team shall select the topologies, implement them, sub-net them, protect them with various NAT methods and try to routing methods to test their functionality and secure the networks with access lists.
- **Project Team:** From 3 to 5 members.
- **NB: Teams formed of 6 members shall introduce at least one extra features in their project.**
- **Project Requirements**

1. Select 5 different LAN network topologies and implement them on CISCO Packet Trace (PT) with the following requirements:
    a. Each LAN shall be connected to one router.
    b. Each LAN shall contain at least one switch as an example:
        i. Bus shall contain at least 5 switches.
        ii. Fully Connected / Partially Connected Mesh shall contain at least 7 switches.
        iii. Ring / Token Ring contain at least 7 switches.
        iv. Tree contain at least 5 switches.
        NB: LAN topology shall be illustrated on switches.
    c. At least 2 LANs shall contain two switches.
    d. At least 2 LANs shall contain two Virtual LANs.
    e. All LANs are sub-netted with class C IPs only in networks 193.168.1.0 & 193.168.2.0 referring to the number of hosts as the following:
        i. Computing and Data Science Department
            1. Number of Hosts: 212 Hosts
        ii. Cybersecurity Department:
            1. Number of Hosts: 36 Hosts
        iii. Intelligent Systems Department
            1. Number of Hosts: 47 Host
        iv. Business Analytics Department
            1. Number of Hosts: 125 Hosts
        v. Media Analytics Department
            1. Number of Hosts: 10
        vi. NB: These are the internal IP sub-netting for LANs.
    f. All router external interfaces are chosen to be in the class A network 10.0.0.0.
2. At least two servers shall be added on a sixth & seventh router with the IP 172.125.12.9 (class B) and the IP (174.125.12.9).
   NB: Connecting the 7 routers could be any topology chosen.
3. All IPs and subnet mask shall be documented in a table in the project report.
4. Three types of NAT shall be illustrated as the following:
    a. Static NAT on a server to any LAN.
    b. Dynamic NAT on the other server to any LAN.
    c. PAT on the three remaining LANs.
5. Two types of dynamic routing shall be illustrated in the project and each shall be submitted in an independent design or file which are:
    a. Open Shortest Path First (OSPF) (one are) which is applied for the whole network.

   b. Enhanced Gateway Routing Protocol (eIGRB) which is applied for the whole network.
6. One type of network security measurements which is creating an extended access list to filter the network traffic for all LANs and server (7 networks)
7. Additional bonus can be added such as:
   a. Using a third dynamic routing protocol such as RIP.
   b. Router authorization with at least one layer of passwords. (Passwords shall be hashed with any algorithm such as MD5 and encryption technique such as RSA/vigenere cipher)
   c. Creating a Firewall for each network.
   d. Using DHCP server.
   e. Using DNS server.
   f. Using FTP server.
   g. Adding SSH server.
   h. Adding telnet server.
   i. Using VLSM.
   j. Using port forwarding.
   k. Using web server with a designed HTML page.
   l. Using more port security on all switches.
   m. Adding extra topology.
   n. Any other extra work is also appreciated.

- **Project Deliverables:**
  - Each team shall deliver the following before the project discussion:
    - Detailed report with all steps at least 10 pages.
    - All packet tracer files. They shall be at least two files one for OSPF routing and the other for eIGRB routing.
    - A Demo Video illustrating the project testing with maximum length of 120 seconds.
- **Project Deadline:** Delivery shall be on classroom before 11st of May, 2024 11:59 P.M.
- **Project Discussion**: Each team shall attend an offline discussion with the TA on the 12nd of May, 2024 starting from 8:00 A.M to 4:00 P.M Team slots is to shared soon and coordinated with team leaders.
- **NB**: During the discussion be read to:
  - Show run all routers and switches.
  - Test all connection using ping command or message simulation.
  - Answer any question regarding your work.