CMPE355: Data Communications & Computer Networks Lab

Networking Project Scenario (Project B)

Gulf Spare Parts (GSP) is a Qatari automotive parts provider that imports and distributes automotive spare parts across the Gulf countries. The Headquarter is located in the Capital city of Qatar (Doha). They are in the process of centralizing their IT infrastructure (Users, Data, and Applications). Sharing their infrastructure will increase productivity. Table 1 below shows the number of employees at each building (GSP)/site per country and city.

Country	**City**	**Employees**
Qatar GSP HQ	Doha	734
UAE GSP	Dubai, Ajman	189, 70
Saudi Arabia GSP	Riyadh, Damam	600, 120
Oman GSP	Muscat	50
Bahrain GSP	Manama	30
Kuwait GSP	Kuwait City	7

Table 1: Number of Hosts per GSP Site

You have been hired as network engineers to **plan, design, implement** and **troubleshoot** the computer network using both IPv4 and IPv6 protocols.

GSP is planning to move some IT Services to public cloud; so, all GSP building/site can access these services.
This report should include your group's choices to plan, design and implement fully functional computer network and cloud-based services for the Gulf spare Parts (GSP) based on IPV4 and IPv6.

Project Brief

You are required to complete this Project with the following deliverables

Part 1:

1. Detailed report that will be presented to GSP about its network plan and design **(IP Addressing Schema)**. For more details and marking criteria refer to Report sections below.

Part 2:

2. The second part of the project will include the implementation and troubleshooting **(Packet Tracer)** of the project based on your plan and design presented to GSP earlier.

Report

The report should contain information on the following issues:

3. IP addressing and subnetting scheme (IPv4 and IPv6) for GSP. You have been provided with the following two IPv4 addresses to further subnet according to the Network requirements. 10.164.0.0/12 for the LAN connections and 102.8.50.0/26 for the WAN connections. Use IPV6 address 2007: C21A: 0DB8::/64 for Bahrain and Kuwait LANs.
4. Use a subnet mask for only the number of required devices in each network (Classless Addressing Scheme).
5. Using VLSM strategy, list the used and unused (future growth) subnets in a table.
6. All GSP buildings are configured to use IPv4 addressing. Kuwait and Bahrain branches use both IPv4 and IPv6 such that IPv4 will be used for external communication with other branches, for instance Qatar, UAE, so on. IPv6 will be used for internal communication between both branches to forward or exchange traffic.
7. Implement a routing protocol OSPF for IPv4 and OSPF for IPv6.
8. Detailed diagram showing your proposed Network design.
9. Implement five application layer services (DNS, Web Server, FTP, TFTP, and Email) using IPv4 on Cloud network.
10. The cloud network is connected directly to Qatar Headquarters with redundant high-speed links.
11. All GSP buildings are connected through a centralized edge/core router (Gulf-ISP), with no direct links between all GSP buildings cites and Qatar Headquarters
12. Implement one application layer service (DHCP) within the organization of all cites using IPv4 . Note IPv4 and IPv6 should be implemented in Kuwait and Bahrain DHCP.
13. Use the Router for DHCP implementation in Kuwait and Bahrain.
14. For the Other Site, use a Dedicated DHCP Server.
15. There should be one DHCP Server for both Dubai and Ajman Sites. The DHCP Server can be in either Dubai or Ajman.
16. There should be one DHCP Server for both Riyadh and Damam Sites. The DHCP Server can be in either Riyadh or Damam.
17. Setup SSH for all switches and routers for secure remote access.
18. You must have a backup static route to each location (LAN) in case dynamic routing is down.
19. Two PCs and Two switches are required per network.
20. Each router and switch must have a proper host name (Based on location).
21. Each connected interface on a switch or router must have a description (Based on location).
22. Any PC/Server on the network must be reachable.

Implementation

Implement the network in Packet Tracer (8.2.1.0118) and upload a fully functioning version to Blackboard.

Important Notes

1. Submit a Soft Copy of your work (Report + Packet Tracer File).
2. Discuss the network design solution. No discussions, NO grades. Appointments will be announced later. (40%)
3. The submission and demonstration date are in the lab week starting on 25/11/2023.
4. The project carries 10 marks.
5. Maximum four students per group can work on the project.
6. We will deduct 5% per day for late work (up to three days only). Being more than three days late will result in a grade of zero.
7. Plagiarism cases will not be tolerated; a misconduct form will be submitted immediately to the HOD.