Project 10 - Telco Company Network System

Cairo Telco is a fast-growing telecommunication company in Egypt, which offers IT solutions and services to its customers. The company is in the Egyptian Capital City, Cairo, and has occupied the fourth and fifth floors of Pharaoh's Mega Plaza. The company is distributed on the floor as follows:

4th Floor:

- HR & Finance: 40 devices
- Product Brand & Marketing: 45 devices
- Admin & Corporate departments: 35 devices

5th Floor

- IT & Support: 45 devices
- Software Engineering: 36 devices
- Cloud Engineering: 32 devices

As part of ICT infrastructure, the company has subscribed to Seacom ISP for internet services and has purchased the following devices:

- 1 5525-X Cisco ASA Firewall
- 1 Catalyst 3850 48-Port
- 3 Catalyst 2960 48-Port
- 2 Catalyst 2960 24-Port
- 1 Cisco Voice Gateway
- 1 Cisco WLC (Wireless LAN Controller)
- 6 LAPs

The company uses Windows Server 2022 to manage the Active Directory and Radius Server, the server is responsible for DNS services and for allocating IPv4 addresses to the DHCP hosts in the network. Besides, the company has an internally hosted device:

- ERP system
- Email Server
- File Server

Finally, has settled on using Cisco Voice Gateways to provide VoIP or Telephony services in the networks and Cisco WLC to provide central management for APs.

Cairo Telco leverages using Microsoft Azure cloud platform to facilitate service delivery; thus this is one of the core business functions of the firm. The devs and cloud engineers use several MS Azure resources like VM, blob storage, networking, and security among others to ensure seamless business continuity. The proposed network should allow the team access to these resources.

Due to security concerns, it has been decided that all LAN, WLAN and VoIP users will be on a separate network segment within the same local area network. The Firewall will be used to set security zones and filter traffic that moves in and out of the zones based on the configured inspections policies.

Design a robust network to meet all the requirements. You are required to design and implement a secured, reliable, scalable, and robust network system that is paramount of safeguarding the confidentiality, integrity and availability of data and communication.

Requirements

The company has emphasized high performance, redundancy, sacalability and availability, and hence you are required to to provide a complete Cairo Telco network infrastructure design and implementation. The company will be using the following IP addresses:

- 10.20.0.0 /16 for WLAN
- 192.168.10.0 /24 for LAN
- 172.16.10.0 /24 for Voice
- 10.10.10.0 /28 for DMZ

1. **Hierarchical Design** model to provide redundancy and availability.
2. **ISPs.** The network is expected to connect to a Seacom ISP Router.
3. **WLC** for each department to have an WAP providing both employees and guest WIFI managed by WLC. Remember adding the WLC's IP Address on Pool of DHCP server.
4. **Voip** for each department with IP phones
5. **VLAN** distribution: LAN: 50, WLAN: 60, VoIP: 101.
6. **EtherChannel.** Use standard **LACP** (*Link Aggregation Control Protocol)* as a method of link aggregation.
7. **STP PortFast and BPDU guard** configured to enable faster port transition from blocking to forwarding.
8. **Subnetting** giving the networks above, carry out subnetting to allocate the correct numbers of IP addresses to each department.
9. **Basic settings** configured on devices such as hostnames, console access and passwords encrypted, banner messages and disable IP domain lookup.
10. **Inter-VLAN Routing** required for all devices to communicate to each other with the respective multilayer switch configured for inter-VLAN routing.
11. **Core Switch** implemented with multilayer switches, to carry out both routing and switching functionalities and thus will be assigned IP addresses.
12. **DHCP Server** will allocate IP addresses for all devices in the network (**except** IP phones). AD servers will provide IP addresses dynamically.
13. **Cisco 2811 Routers** and **Catalyst 2811 L3 Switches** as the model of the Routers and Switches used, so they can support telephony services.
14. **Static Addressing** allocation for devices in the server room.
15. **Telephony Service** configured on the voice gateway and allocate dial numbers in formats 1..,2..,3.. and so on.
16. **Routing protocol**. Use OSPF as the routing protocol to advertise routes both on the routers and L3 switches.
17. **Standard ACL for SSH** configured on the line VTY to allow only Network Security Engineers to carry out all remote administrative tasks using SSH.
18. **CISCO ASA Firewall**. Configure security levels, zones, and policies to define how resources are accessed in the network.
19. **FINAL** tests communications. Ensure that everything configured is working as expected.

ADDRESSING

Networks Addres Allocation

Initial conditions

- 10.20.0.0 /16 for WLAN
- 192.168.10.0 /24 for LAN
- 172.16.10.0 /24 for Voice
- 10.10.10.0 /28 for DMZ

Note: It's no necessary to do subnetting since there were different networks assigned to each VLAN

CAIRO TELCO NETWORK				
Name VLAN	**Network /mask**	**Host range**	**Default GW**	**Broadcast**
WLAN	10.20.0.0 /16	0.1 – 255.254	10.20.0.1	10.20.255.255
LAN	192.168.10.0 /24	10.1 – 10.254	192.168.10.1	192.168.10.255
VoIP	172.16.10.0 /24	10.1 – 10.254	172.16.10.1	172.16.10.255
DMZ	10.10.10.0 /28	10.1 – 10.14	10.10.10.1	10.10.10.15

Point-to-Point Core Links

Point-to-Point links	
Link	**Network /Mask**
FW – CAIRO CORE SW	10.30.30.0 /30
FW – SEACOM ISP	197.200.100.0 /30
SEACOM ISP – AZURE CLOUD	20.20.20.0 /30
AZURE CLOUD	30.30.30.0 /8

DHCP Server's pools

Pools will be managed by AD-SERVER except VoIP. That'll be managed by CISCO-VOICE-GW

Department	**Defaul Gateway**	**Start IP Addresss**	**Subnet Mask**	**Number of Devices**
WLAN	10.20.0.1	10.20.0.10	255.255.0.0	500
LAN	192.168.10.1	192.168.10.10	255.255.255.0	220
VoIP	172.16.10.1	172.16.10.2	255.255.255.0	253