Project 8 – VoIP & Dial-Peering

Introduction

Turtle Consultancy Limited specialized in delivering IT infrastructure solutions to medium-sized organizations worldwide. With the expansion of the company**, a newly acquired branch needs a network**.

Each group has been assigned the task of **designing and implementing a network infrastructure** for Turtle Consultancy Limited by internetworking three departments which are as follows:

- **Finance**: 20 phones + 20 PCs + 1 Printer
- **HR**: 20 phones + 20 PCs + 1 Printer
- **Sales**: 20 phones + 20 PCs + 1 Printer
- **ICT**: 20 phones + 20 PCs + 1 Printer

Note: All desktops have associated a phone set (**each PC must be directly connected to a phone**, not a switch).

The network consists of four servers located at the Server-Side Site (SSS) and is fully configured for the operations, and all servers are shared between all users. The SSS room is performed as follows:

- HTTP Server
- Email Server
- DHCP Server
- DNS Server

Requirements

The IT Manager emphasized on **scalability and availability,** and hence you are required to provide a complete network infrastructure design and implementation. The company will be using the following IP addressing:

- **192.168.100.0 /24 for Data**
- **172.16.100.0 /24 for Voice**
- **10.10.10.0 /24 between routers**

1. Design the network to meet the given specifications.
2. **Routers.** Each department must have **VoIP enabled** router **with Server-Side LAN attached** to the **ICT department router.**
3. **Switches**. Each department must have an **access layer switch**.
4. **Connections.** Use **serial connections between Routers** and Straight-Through cable between Routers and Switches, Switches and hosts, etc.
5. **Subnetting.** Each department must have its own **subnetwork**.
6. **Basic settings.** Configure basic settings devices such as **hostnames, console access and password, enable passwords, banner mgs., encrypt all passwords, and disable IP domain lookup**.
7. **DHCP Server. For VoIP,** use the **respective router as DHCP server** while **for Data** use the **DHCP server device at SSS**.

8. **VLANs.** Each department will be in two VLANs. One for data and another for voice. Note: All IP phone must be allocated in VLAN 100.
9. **Inter-VLAN Routing.** Use **router on-a-stick** to enable **inter-VLAN routing** on the network. Note: create **sub interfaces** for both data and voice VLANs.
10. **IP addressing.** All devices in the network are expected to **obtain an IP address dynamically** from the respective **DHCP server** while the **devices in the server room** are to be allocated **IP address statically**.
11. **Routing Protocol. Use OSPF as the routing protocol** to advertise routes on the router.
12. **Remote Access.** Configure **SSH in all the routers** for remote login.
13. **Thelephony Service. Configure VoIP** on the routers and allocate dial numbers in this format for the departments. **Finance (1…), HR (2…), Sales (3…), ICT (4…)**, where "1…" means that could be 101 to 199, and so on.
14. **Routing for VoIP.** Configure **dial-peering on the routers to allow IP phones** from different routers to communicate. This is the backbone of the project.
15. **Finalize.** Test communication, ensure everything configured is working as expected.

ADDRESSING

Netorks Address Allocation

Initial Conditions

- 192.168.100.0 /24 as base network for DATA
- 172.16.100.0 /24 as base network for VOICE
- 10 IP phones per VLAN
- 10 PCs connected to de IP Phone
- Server-Side Site Department must have static IP addressing.
- Number of devices for Data on each VLAN: 20 PCs + 1 Printer.
- Number of Phones for Voice on each VLAN: 20.

Data Subnets				
Department	**Network**	**Mask**	**Host Range**	**Broadcast**
FINANCE	192.168.100.0	255.255.255.224 /27	100.1 – 100.30	192.168.100.31
HR	192.168.100.32	255.255.255.224 /27	100.33 – 100.62	192.168.100.63
SALES	192.168.100.64	255.255.255.224 /27	100.65 – 100.94	192.168.100.95
ICT	192.168.100.96	255.255.255.224 /27	100.97 – 100.126	192.168.100.127
SSS	192.168.100.128	255.255.255.248 /29	100.129 – 100.134	192.138.100.135
Voice Subnets				
FINANCE	172.16.100.0	255.255.255.224 /27	100.1 – 100.30	172.16.100.31
HR	172.16.100.32	255.255.255.224 /27	100.33 – 100.62	172.16.100.63
SALES	172.16.100.64	255.255.255.224 /27	100.65 – 100.94	172.16.100.95
ICT	172.16.100.96	255.255.255.224 /27	100.97 – 100.126	172.16.100.127
Core Subnets				
Link	**Network**	**Mask**	**Broadcast**	
FINANCE – HR	10.10.10.0	255.255.255.252 /30	10.10.10.3	
FINANCE – ICT	10.10.10.4	255.255.255.252 /30	10.10.10.7	
SALES – HR	10.10.10.8	255.255.255.252 /30	10.10.10.11	
SALES – ICT	10.10.10.12	255.255.255.252 /30	10.10.10.15	

DHCP Server's Pools Allocation

Department	**Defaul Gateway**	**Start IP Addresss**	**Subnet Mask**	**Number of Devices**
FINANCES	192.168.100.1	192.168.100.2	255.255.255.224 /27	28
HR	192.168.100.33	192.168.100.34	255.255.255.224 /27	28
SALES	192.168.100.65	192.168.100.66	255.255.255.224 /27	28
ICT	192.168.100.97	192.168.100.98	255.255.255.224 /27	28