

# COMPANY NETWORK

A trading floor Support center employs 600 staff. They have recently expanded and as a result, need to move to a new building. A building has been identified but has no network. This means that before they can move out, new network service needs to be designed and implemented in the new building. Existing Network comprises of the following elements:

The new building is expected to have three floors with two departments in each:

- (1). 1st Floor - Sales and Marketing - 120 users expected, Human Resource and Logistics Department - 120 users expected.
- (2). 2nd Floor - Finance and Accounts - 120 users, Administrator and PR - 120 users.
- (3). 3rd Floor - ICT - 120 users, Server Room - 12 devices.

## **Requirements**

- (1). Use Hierarchical model providing redundancy at every layer i.e. two routers and two multilayer switches are expected to be used to provide redundancy.
- (2). The network is also expected to connect to at least two ISPs to provide redundancy and each router to connect to the two ISPs.
- (3). Each department is required to have a wireless network for the users.
- (4). Each department should be in a different VLAN and in a different subnetwork.
- (5). Provided a base network of 172.16.1.0 carry out subnetting to allocate the correct number of IP addresses to each department.
- (6). The company network is connected to the static, public IP addresses - 195.136.17.0/30, 195.136.17.4/30, 195.136.17.8/30 and 195.136.17.12/30.
- (7). Configure basic device settings such as hostnames, console password, enable password, banner messages, disable IP domain lookup.
- (8). Devices in all the departments are required to communicate with each other with the respective multilayer switch configured for inter-VLAN routing.
- (9). The Multilayer Switches are expected to carry out both routing and switching functionalities thus will be assigned IP addresses.
- (10). All devices in the network are expected to obtain an IP address dynamically from the dedicated DHCP servers located at the server room.
- (11). Devices in the server room are to be allocated IP addresses statically.
- (12). Use OSPF as the routing protocol to advertise routes both on the routers and multilayer switches.

(13). Configure SSH in all the routers and Layer 3 switches for remote login.

(14). Test communication, ensure everything configured is working as expected.

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## **Design**

Followed the Hierarchical Network Design model consisting of - Access, Distributed and Core Layers.

(1). Subnetting:

172.16.1.0/16 network is given as a base network.

Since each department expects to connect to 120 hosts. Therefore, in order to have 120 hosts, we would require 7 bits in the host port, to provide us with 128 addresses. Therefore, it will have left 25 bits for the network portion, therefore a /25 prefix length subnet.

1st Floor:

Subnet Mask - 255.255.255.128

Sales - 172.16.1.0/25.

1st usable address - 172.16.1.1

last usable address - 172.16.1.126

HR - 172.16.1.128/25

1st usable address - 172.16.1.129/25

last usable address - 172.16.1.254/25

2nd Floor:

Finance - 172.16.2.0/25.

1st usable address - 172.16.2.1/25

last usable address - 172.16.2.126/25

Admin - 172.16.2.128/25

1st usable address - 172.16.2.129/25

last usable address - 172.16.2.254/25

3rd Floor:

ICT - 172.16.3.0/25

1st usable address - 172.16.3.1/25

last usable address - 172.16.3.126/25

Serverroom - (Requires only around 12 devices).

4 bits would provide us with 16 addresses. Therefore, 32-4 would leave us with 28 bits. Hence, a 28 bits subnetwork.

Subnet mask - 255.255.255.240

Network ID - 172.16.3.128/28

1st usable address - 172.16.3.129/28

last usable address - 172.16.3.142/28

MultiLayer Switch 0 & Routers 0 and 1:

(1). GigabitEthernet1/0/1 are no switchport interfaces.

IP address - 172.16.3.145/30, Subnet mask - 255.255.255.252

the 172.16.3.146/30 address is assigned to the Router0 interface.

(2). GigabitEthernet1/0/2 are no switchport interfaces.

IP address - 172.16.3.149/30, Subnet mask - 255.255.255.252

172.16.3.150/30 is assigned to the Router1's G0/0 interface.

Multilayer Switch 1 & Routers 0 and 1:

(1). GigabitEthernet1/0/6 is a no switchport interface.

172.16.3.152/30

IP address - 172.16.3.153/30, Subnet mask - 255.255.255.252

172.16.3.154/30 to Router0's interface

(2). GigabitEthernet1/0/7 is a no switchport interface as well.

172.16.3.156/30

IP address - 172.16.3.157/30, Subnet mask - 255.255.255.252

172.16.3.158 to Router1's G0/1 interface.

(B). The requirement asks us to configure the public IP addresses - 195.136.17.0/30, 195.136.17.4/30, 195.136.17.8/30 and 195.136.17.12/30, on the Company routers.

Therefore,

Router1: S0/2/0 - 195.136.17.9/30, S0/2/1 - 195.136.17.13/30

Router0: S0/2/0 - 195.136.17.1/30, S0/2/1 - 195.136.17.5/30

Router2: S0/3/0 - 195.136.17.2/30, S0/3/1 - 195.136.17.10/30

Router3: S0/3/0 - 195.136.17.6/30, S0/3/1 - 195.136.17.14/30

(C) . The Multilayer Switch is responsible for inter-VLAN routing. SVI's have been configured with the last usable IP address from every subnet, as the default-gateway. Configured each PC to use the SVI of the Multilayer Switch as the default-gateway.

(D). Configured DHCP Service on the DHCP Server residing in the Serverroom.

(E). Configured OSPF on L3 Switches and Routers in the Core layer to advertise networks.

(F). Configured SSH on all Layer 2 Switches, Layer 3 Switches and Routers.

(G). Verified connectivity and inter-VLAN routing.

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