Campus/University System Network Design:
A large university which has two campuses situated 20 miles apart.
The university's students and staff are distributed in 4 faculties; these include the faculties of Health and S ciences;
Business; Engineering/Computing and Art/Design. Each member of staff has a PC and students have acc ess to PCs in the labs.
A network topology with main components That support the following:
University locations:
Main Campus:
- Building A: Administrative staff in the departments of management, HR and finance. The admin staff PC s are distributed
in the building offices and it is expected that they will share some networking equipment. The Faculty of Business is
also situated in this building
- Building B: Faculty of Engineering and Computing and Faculty of Art and Design.
- Building C: Students' labs and IT department. The IT department hosts the University Web server and ot her servers - There is
also an email server hosted externally on the cloud.
Branch Campus:
Faculty of Health and Sciences (staff and students' labs are situated on separate floors)

-Each department/faculty is expected to be on its own separate IP network.
-The switches should be configured with appropriate VLANs and security settings.
-RIPv2 will be used to provide routing for the routers in the internal network and
static routing for the external server.
-The devices in building A will be expected to acquire dynamic IP addresses from a
router-based DHCP server.

Technologies Implemented:
-Hierarchical Network Design(Core, Distribution, Access layers).
-Connecting Networking devices with Correct cabling.
-Creating VLANs and assigning ports VLAN numbers.
-Subnetting and IP Addressing.
-Configuring Inter-VLAN Routing (Router on a stick).
-Configuring DHCP Server (Router as the DHCP Server).
-Configuring SSH for secure Remote access.
-Configuring RIPv2 as the routing protocol.
-Configuring switchport security or Port-Security on the switches.
-Host Device Configurations.
-Test and Verifying Network Communication.

Main Campus-Router Configuration:
```
enable
configure terminal
interface gig0/0
no shutdown
exit
interface gig0/1/0
no shutdown
exit
interface gig0/2/0
no shutdown
exit
do wr
```

```
interface gig0/1/0
ip address 10.10.10.1 255.255.255.252
exit
interface gig0/2/0
ip address 10.10.10.5 255.255.255.252
exit
do wr
interface gig0/0.10
encapsulation dot1Q 10
ip address 192.168.1.1 255.255.255.0
exit
interface gig0/0.20
encapsulation dot1Q 20
ip address 192.168.2.1 255.255.255.0
exit
interface gig0/0.30
encapsulation dot1Q 30
ip address 192.168.3.1 255.255.255.0
exit
interface gig0/0.40
encapsulation dot1Q 40
ip address 192.168.4.1 255.255.255.0
exit
interface gig0/0.50
encapsulation dot1Q 50
ip address 192.168.5.1 255.255.255.0
exit
interface gig0/0.60
encapsulation dot1Q 60
ip address 192.168.6.1 255.255.255.0
exit
interface gig0/0.70
encapsulation dot1Q 70
ip address 192.168.7.1 255.255.255.0
exit
interface gig0/0.80
encapsulation dot1Q 80
ip address 192.168.8.1 255.255.255.0
exit
do wr
service dhcp
ip dhcp pool Management-pool
network 192.168.1.0 255.255.255.0
default-router 192.168.1.1
dns-server 192.168.1.1
exit
ip dhcp pool HR-pool
network 192.168.2.0 255.255.255.0
default-router 192.168.2.1
dns-server 192.168.2.1
exit
ip dhcp pool Finance-pool
network 192.168.3.0 255.255.255.0
default-router 192.168.3.1
dns-server 192.168.3.1
```

```
exit
ip dhcp pool Fa-of-Busi-pool
network 192.168.4.0 255.255.255.0
default-router 192.168.4.1
dns-server 192.168.4.1
exit
ip dhcp pool Fa-of-Engi-and-Comp-pool
network 192.168.5.0 255.255.255.0
default-router 192.168.5.1
dns-server 192.168.5.1
exit
ip dhcp pool Fa-of-Art--Des-pool
network 192.168.6.0 255.255.255.0
default-router 192.168.6.1
dns-server 192.168.6.1
exit
ip dhcp pool Students-labs-pool
network 192.168.7.0 255.255.255.0
default-router 192.168.7.1
dns-server 192.168.7.1
exit
ip dhcp pool IT-pool
network 192.168.8.0 255.255.255.0
default-router 192.168.8.1
dns-server 192.168.8.1
exit
do wr
router rip
version 2
network 10.10.10.0
network 10.10.10.4
network 192.168.1.0
network 192.168.2.0
network 192.168.3.0
network 192.168.4.0
network 192.168.5.0
network 192.168.6.0
network 192.168.7.0
network 192.168.8.0
exit
do wr
hostname Main-Campus-Router
ip domain-name cisco
username cisco password cisco
crypto key generate rsa
1024
line vty 0 15
login local
transport input ssh
do wr
exit

-----------------------------------
Branch campus-Router Configuration :
enable
```

```
configure terminal
interface gig0/1/0
no shutdown
exit
interface gig0/0
no shutdown
exit
do wr
interface gig0/1/0
ip address 10.10.10.2 255.255.255.252
exit
do wr
interface gig0/0.90
encapsulation dot1Q 90
ip address 192.168.9.1 255.255.255.0
exit
interface gig0/0.100
encapsulation dot1Q 100
ip address 192.168.10.1 255.255.255.0
exit
do wr
service dhcp
ip dhcp pool Staff-department-pool
network 192.168.9.0 255.255.255.0
default-router 192.168.9.1
dns-server 192.168.9.1
exit
do wr
ip dhcp pool Students-labs-pool
network 192.168.10.0 255.255.255.0
default-router 192.168.10.1
dns-server 192.168.10.1
exit
do wr
router rip
version 2
network 192.168.9.0
network 192.168.10.0
network 10.10.10.0
exit
do wr
hostname Branch-campus-Router-Router
ip domain-name cisco
username cisco password cisco
crypto key generate rsa
1024
line vty 0 15
login local
transport input ssh
do wr
exit
```

CLOUD-Router Configuration:

```
enable
```

```
configure terminal
interface gig0/1/0
no shutdown
exit
interface gig0/0
no shutdown
exit
do wr
interface gig0/1/0
ip address 10.10.10.6 255.255.255.252
exit
do wr
interface g0/0
ip address 20.0.0.1 255.255.255.252
exit
do wr
route rip
version 2
network 10.10.10.4
network 20.0.0.0
exit
do wr
hostname CLOUD-Router
ip domain-name cisco
username cisco password cisco
crypto key generate rsa
1024
line vty 0 15
login local
transport input ssh
do wr
exit
```

Main Campus-L3-Switch Configuration:

```
enable
configure terminal
interface gig1/0/2
switchport mode access
switchport access vlan 10
exit
interface gig1/0/3
switchport mode access
switchport access vlan 20
exit
interface gig1/0/4
switchport mode access
switchport access vlan 30
exit
interface gig1/0/5
switchport mode access
switchport access vlan 40
exit
interface gig1/0/6
switchport mode access
```

switchport access vlan 50
exit
interface gig1/0/7
switchport mode access
switchport access vlan 60
exit
interface gig1/0/8
switchport mode access
switchport access vlan 70
exit
interface gig1/0/9
switchport mode access
switchport access vlan 80
exit
do wr
interface gig1/0/1
switchport mode trunk
do wr
exit

Faculty of Health and Sciences-L3-Switch Configuration:
enable
configure terminal
interface gig1/0/2
switchport mode access
switchport access vlan 90
exit
interface gig1/0/3
switchport mode access
switchport access vlan 100
exit
do wr
interface gig1/0/1
switchport mode trunk
do wr
exit

Management-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 10
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

HR-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 20
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Finance-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 30
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Faculty of Business-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 40
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Faculty of Engineering and Computing-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 50
do wr

interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Faculty of Art and Design-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 60
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Students' labs-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 70
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

IT -Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 80
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Staff department-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 90
do wr
interface fa0/2
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

Students' labs-2-Switch Configuration:
enable
configure terminal
interface range fa0/1-24
switchport mode access
switchport access vlan 100
do wr
interface fa0/3
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address sticky
switchport port-security violation shutdown
exit
do wr

E-mail Server IP Configuration:
IPv4 Address: 20.0.0.2
Subnet Mask: 255.255.255.252
Default Gateway : 20.0.0.1

SSH Remote login test on Test-Pc command:
ssh -l cisco 10.10.10.5
password : cisco
