**Introduction**

comit.co.uk is one of the world's largest furniture shops, with 42 locations worldwide. In this project, we'll look at network design and implementation for London Branch. HR/Finance, Engineering, Sales and Servers are the four departments of the London branch. In each branch, the end-user device is linked to the appropriate department.

**Network Scenario**

As the company’s mostly business is online based so it has lots of servers but four of them are situated at the London branch. Servers include DNS Server, Wb-server, email server and File server. Each department has its dedicated file server that can only be accessible by the department only while the Web/DNS and DMZ server can be accessed by any department and from outside the network also.

Purpose of the report is to provide all the technical information including IP addressing, routing technologies and all the other necessary information that is implemented in this network so that it would be easy to understand the topology.

**VLAN:**

For security purposes VLAN has been implemented in the topology and each department is placed in a separate VLAN.

1. **HR/Finance VLAN10**
2. **Engineering VLAN20**
3. **Sales VLAN30**
4. **Servers VLAN40**

All the departments are isolated from each other meaning HR/Finance cannot access Engineering and Sales and similarly Engineering and sales cannot access each other and HR/Finance but they all can access the Server department that has DMZ and Web/DNS server

Server department is accessible by all the departments internally and externally as well.

**Servers:**

**File Server:**

A dedicated File server has been placed in each department that is only accessible by that department only. The purpose of the file server is to create backups as fast as it can so that’s why each department has its own server. Also, for security its only accessible by the respective department only.

**DHCP Server:**

DHCP server is implemented in the network so that end users don’t have to add IP addresses to their systems. DHCP server assigns IP addresses to the end users automatically according to their VLANs.

**DNS Server:**

Its always difficult to remember the IP address so for ease DNS server maps the name of the website to its IP address. In our case DNS server maps [www.comit.co.uk](http://www.comit.co.uk) to 192.168.44.10

**DMZ Server:**

DMZ server is placed so that public cannot access the private network. All the information that can be accessed by the public is placed in the DMZ server,

**Design and Implementation**

To design this network, we are using 1 router, 1 layer 3 switch and 1 switch per department. It can be increased for making the topology fault tolerant and scalable as well. Router routes all the public traffic that connects with the outside of the world while layer 3 switch is performing the core operations within the private network. VLANs are configured here while it is also performing routing as well.

Layer 3 switch assigns VLANs and give them IP addresses according to the department with the help of VLANs and DHCP. DHCP server is configured with the VLANs to give appropriate IP addresses to the end users.

Access control List is also applied here. ACL permit and deny IP networks to access other networks. So layer 3 switch here is performing all the core tasks including security as well.

The previous network that was designed was totally a mess. All the departments were connected to the same switch with no proper IP addressing and VLAN implementation as well. No perspective of security so that was very unsecure also. While comparing the previous network with this new one it is properly structured, organized and have security as well.

Chart, diagram

Description automatically generated

After designing the topology, the next big thing is IP addressing. For scalability we are using /24 mask that can have 254 usable ip address, so in future if departments wants to extend then it will have sufficient IP addresses to cater new users

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Department | Devices | Network | VLAN | IP range | Users | Subnet Mask |
| HR/Finance | 7 Computer | 192.168.41.0/24 | 10 | 192.168.41.1 – 192.168.41.254 | 7 | 255.255.255.0 |
| Engineering | 8 PC  1 Printer  1 Scanner | 192.168.42.0/24 | 20 | 192.168.42.1 – 192.168.42.254 | 10 | 255.255.255.0 |
| Sales | 9 PC  1 Printer | 192.168.43.0/24 | 30 | 192.168.43.1 – 192.168.43.254 | 60 | 255.255.255.0 |
| Web, email Servers | 2 servers  1 will act as internal dns server | 192.168.44.0/24 | 40 | 192.168.44.1 – 192.168.44.254 | 2 | 255.255.255.0 |

|  |  |
| --- | --- |
| Server | IP Address |
| DNS/Webserver | 192.168.44.10 |
| DMZ | 192.168.44.2 |

While all the departments will get IP address with the help of DHCP Server

**Trunk and access ports:**

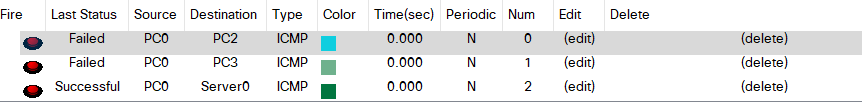
FA0/2-5 all ports are trunk ports While all the ports of access switches are access ports.

**Access – Control List:**

Access List is implemented according to the given conditions. All the 3 departments cannot access each other but can access the servers and similarly the servers can access all the computers.

**HR/Finance Department:**

PC0 is of VLAN10 HR/Finance department, and we can clearly see that Finance cannot access other 2 departments but can access the Server0



**Engineering Department:**

PC2 is of VLAN20 Engineering department, and we can clearly see that Engineering cannot access other 2 departments but can access the Server0

A picture containing graphical user interface

Description automatically generated

**Sales Department:**

PC3 is of VLAN30 Sales department, and we can clearly see that Sales cannot access other 2 departments but can access the Server0

A picture containing chart

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**DNS and Webserver**

Graphical user interface, application

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Graphical user interface, text, application, email

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**DHCP configuration a Layer 3 switch**

Table

Description automatically generated with medium confidence

**Sales Department DHCP at end Device**

Graphical user interface, text, application, email

Description automatically generated

**VLANS**

Graphical user interface, table

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**Access-List:**

Text

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**OSPF**

Text

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**Layer 3 switch Configurations**

ip dhcp pool vlan10

network 192.168.41.0 255.255.255.0

default-router 192.168.41.1

dns-server 192.168.44.10

ip dhcp pool vlan20

network 192.168.42.0 255.255.255.0

default-router 192.168.42.1

dns-server 192.168.44.10

ip dhcp pool vlan30

network 192.168.43.0 255.255.255.0

default-router 192.168.43.1

dns-server 192.168.44.10

ip dhcp pool vlan40

network 192.168.44.0 255.255.255.0

default-router 192.168.44.1

!

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ip routing

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spanning-tree mode pvst

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!

!

!

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!

interface FastEthernet0/1

no switchport

ip address 211.212.213.162 255.255.255.248

duplex auto

speed auto

!

interface FastEthernet0/2

switchport trunk encapsulation dot1q

switchport mode trunk

!

interface FastEthernet0/3

switchport trunk encapsulation dot1q

switchport mode trunk

!

interface FastEthernet0/4

switchport trunk encapsulation dot1q

switchport mode trunk

!

interface FastEthernet0/5

switchport trunk encapsulation dot1q

switchport mode trunk

!

interface FastEthernet0/6

!

interface FastEthernet0/7

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interface FastEthernet0/8

!

interface FastEthernet0/9

!

interface FastEthernet0/10

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interface FastEthernet0/11

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interface FastEthernet0/12

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interface FastEthernet0/13

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interface FastEthernet0/14

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interface FastEthernet0/15

!

interface FastEthernet0/16

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interface FastEthernet0/17

!

interface FastEthernet0/18

!

interface FastEthernet0/19

!

interface FastEthernet0/20

!

interface FastEthernet0/21

!

interface FastEthernet0/22

!

interface FastEthernet0/23

!

interface FastEthernet0/24

!

interface GigabitEthernet0/1

!

interface GigabitEthernet0/2

!

interface Vlan1

no ip address

shutdown

!

interface Vlan10

mac-address 0030.f2d3.2201

ip address 192.168.41.1 255.255.255.0

ip access-group 100 out

!

interface Vlan20

mac-address 0030.f2d3.2202

ip address 192.168.42.1 255.255.255.0

ip access-group 101 out

!

interface Vlan30

mac-address 0030.f2d3.2203

ip address 192.168.43.1 255.255.255.0

ip access-group 102 out

!

interface Vlan40

mac-address 0030.f2d3.2204

ip address 192.168.44.1 255.255.255.0

!

router ospf 10

log-adjacency-changes

network 192.168.0.0 0.0.255.255 area 0

network 211.212.0.0 0.0.255.255 area 0

!

ip classless

!

ip flow-export version 9

!

!

access-list 100 permit ip 192.168.44.0 0.0.0.255 192.168.41.0 0.0.0.255

access-list 100 deny ip any any

access-list 101 permit ip 192.168.44.0 0.0.0.255 192.168.42.0 0.0.0.255

access-list 101 deny ip any any

access-list 102 permit ip 192.168.44.0 0.0.0.255 192.168.43.0 0.0.0.255

access-list 102 deny ip any any

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line con 0

!

line aux 0

!

line vty 0 4

login

!

!

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!

end

**References:**

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5. <https://www.ictshore.com/free-ccna-course/three-tier-architecture/>