Small Office Network Design Final Report

1. Summary

This document outlines the network design for a small office, detailing the topology, device configurations, VLAN segmentation, IP addressing, and internet connectivity. The goal is to provide a scalable, secure, and efficient network solution for the office, supporting different departments with isolated traffic and access to shared resources.

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2. Network Requirements

2.1 Number of Users

The network is designed to support three primary departments:

- **Management**: 3 users (PCs, IP Phone, Printer)
- **IT**: 3 users (PCs, IP phones, Printer)
- **Sales**: 6 users (PCs, IP phones, Printer)

2.2 Devices

The following devices are deployed in the network:

- **Router**: 1 x Cisco 2811 for external internet access.
- **Switches**: 2 x Cisco 2960, Layer 2 switches.
- **PCs**: 12 workstations (PCs).
- **IP Phones**: 5 IP phones.
- **Printers**: 3 network printers, one for each department.
- **Server**: 1 server for internal services (file sharing).

2.3 Internet Connectivity

The Cisco 2811 Router provides internet access and serves as the gateway for all VLANs.

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3. Network Topology

The topology consists of three VLANs for traffic segmentation, connected through two 2960 switches. A 2811 router connects the network to the internet. The server is centrally accessible for all departments.

3.1 VLAN Configuration

- **VLAN 10 (Management)**: This VLAN is assigned to the Management department to ensure their traffic is isolated from other departments.
- **VLAN 20 (IT)**: The IT department has its own VLAN to handle sensitive tasks and access to the printer.
- **VLAN 30 (Sales)**: The Sales department has its own VLAN to manage their devices and network traffic.

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4. IP Addressing Scheme

Each VLAN is assigned its own subnet to simplify routing and traffic management. **4.1 Subnet Overview**

VLAN	Department	Subnet	IP Range
VLAN 10	Management	192.168.1.0/24	192.168.1.1 – 192.168.1.254
VLAN 20	IT	192.168.2.0/24	192.168.2.1 – 192.168.2.254
VLAN 30	Sales	192.168.3.0/24	192.168.3.1 – 192.168.3.254

4.2 IP Assignment

- **Static IPs** will be assigned to critical devices (printers, servers, routers).
- **Dynamic IPs**: End-user devices (PCs, phones) will obtain IP addresses via DHCP from the server.

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5. Device List

Device Type	Device	Quantity
Router	Cisco 2811	1
Switch	Cisco 2960	2

PCs	Desktop PCs	11
Device Type	**Device**	**Quantity**
IP Phones	Cisco 7960	5
Printers	Network Printers	3
Server	Server PT	1

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6. Security Considerations

- **VLAN Segmentation**: Each department is assigned its own VLAN to reduce broadcast domains and enhance security.
- **SSH Access**: Secure Shell (SSH) will be enabled on the switches and routers for remote management.
- **Strong Passwords and Encryption**: Device logins will use strong passwords and encryption (e.g., for VTY lines).

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7. configurations:

Switch 1:

hostname AS1

!

enable secret 5 1mERr$3HhIgMGBA/9qNmgzccuxv0

!

!

!

ip domain-name lol.com

!

username admin secret 5 1mERr$3HhIgMGBA/9qNmgzccuxv0

```
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 30
 switchport mode access
 switchport voice vlan 40
!
interface FastEthernet0/2
 switchport access vlan 10
 switchport mode access
 switchport voice vlan 40
!
interface FastEthernet0/3
 switchport access vlan 10
 switchport mode access
 switchport voice vlan 40
!
interface FastEthernet0/4
 switchport access vlan 10
 switchport mode access
 switchport voice vlan 40
```

```
!
interface FastEthernet0/5
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/6
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/7
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/8
 switchport trunk allowed vlan 10,20,30,40
 switchport mode trunk
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
```

interface FastEthernet0/13

!

interface FastEthernet0/14

!

interface FastEthernet0/15

!

interface FastEthernet0/16

!

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
!
!
!
!
line con 0
 password 123
 login local
!
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login
!
!
!
!
End
```

Switch 2:

```
hostname AS2
!
enable secret 5 $1$mERr$3HhIgMGBA/9qNmgzccuxv0
!
!
!
ip domain-name lol.com
!
username admin secret 5 $1$mERr$3HhIgMGBA/9qNmgzccuxv0
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/3
```

```
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/4
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/5
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/6
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/7
 switchport access vlan 20
 switchport mode access
 switchport voice vlan 40
!
interface FastEthernet0/8
 switchport trunk allowed vlan 10,20,30,40
 switchport mode trunk
!
interface FastEthernet0/9
```

!

interface FastEthernet0/10

!

interface FastEthernet0/11

!

interface FastEthernet0/12

!

interface FastEthernet0/13

!

interface FastEthernet0/14

!

interface FastEthernet0/15

!

interface FastEthernet0/16

!

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
!
!
!
!
line con 0
 password 123
 login local
!
line vty 0 4
 login local
 transport input ssh
line vty 5 15
```

login

!

!

!

!

End

Core Switch:

hostname CS

!

!

enable secret 5 1mERr$3HhIgMGBA/9qNmgzccuxv0

!

!

!

!

!

ip routing

!

!

!

!

username admin secret 5 1mERr$3HhIgMGBA/9qNmgzccuxv0

!

!

!

```
!
!
!
!
!
!
!
ip domain-name lol.com
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface FastEthernet0/1
 switchport trunk allowed vlan 10,20,30,40
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/2
 switchport trunk allowed vlan 10,20,30,40
 switchport trunk encapsulation dot1q
```

```
 switchport mode trunk
!
interface FastEthernet0/3
 description Link to Router
 switchport trunk allowed vlan 10,20,30,40
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
```

!

interface FastEthernet0/13

!

interface FastEthernet0/14

!

interface FastEthernet0/15

!

interface FastEthernet0/16

!

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 0060.3e88.c001
 ip address 192.168.1.1 255.255.255.0
!
interface Vlan20
 mac-address 0060.3e88.c002
 ip address 192.168.2.1 255.255.255.0
!
interface Vlan30
 mac-address 0060.3e88.c003
 ip address 192.168.3.1 255.255.255.0
!
ip classless
!
ip flow-export version 9
!
!
```

!

!

!

!

!

!

line con 0

 password 123

 login local

!

line aux 0

!

line vty 0 4

 login local

 transport input ssh

!

!

!

!

End

Router:

hostname Office_R

!

!

!

```
enable secret 5 $1$mERr$3HhIgMGBA/9qNmgzccuxv0
!
!
!
ip dhcp pool Management
 network 192.168.1.0 255.255.255.0
 default-router 192.168.1.1
 dns-server 8.8.8.8
 domain-name wr
ip dhcp pool Sales
 network 192.168.2.0 255.255.255.0
 default-router 192.168.2.1
 dns-server 8.8.8.8
ip dhcp pool IT
 network 192.168.3.0 255.255.255.0
 default-router 192.168.3.1
 dns-server 8.8.8.8
 domain-name wr
ip dhcp pool Voice
 network 192.168.40.0 255.255.255.0
 default-router 192.168.40.1
 option 150 ip 192.168.40.1
!
!
!
```

```
ip cef
no ipv6 cef
!
!
!
username admin secret 5 $1$mERr$3HhIgMGBA/9qNmgzccuxv0
!
!
license udi pid CISCO2811/K9 sn FTX10173J61-
!
!
!
!
!
!
!
!
!
ip domain-name lol.com
!
!
spanning-tree mode pvst
!
!
!
```

```
!
!
!
interface FastEthernet0/0
 description CS Layer 3 Switch
 no ip address
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 ip address 192.168.1.1 255.255.255.0
!
interface FastEthernet0/0.20
 encapsulation dot1Q 20
 ip address 192.168.2.1 255.255.255.0
!
interface FastEthernet0/0.30
 encapsulation dot1Q 30
 ip address 192.168.3.1 255.255.255.0
!
interface FastEthernet0/0.40
 encapsulation dot1Q 40
 ip address 192.168.40.1 255.255.255.0
```

```
!
interface FastEthernet0/1
 description Internet
 ip address 1.1.1.2 255.255.255.0
 ip nat outside
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
ip nat inside source list 1 interface FastEthernet0/1 overload
ip classless
ip route 0.0.0.0 0.0.0.0 1.1.1.1
!
ip flow-export version 9
!
!
!
!
!
!
!
telephony-service
```

```
 max-ephones 10
 max-dn 10
 ip source-address 192.168.40.1 port 2000
 auto assign 1 to 5
 auto assign 1 to 10
!
ephone-dn 1
 number 1
!
ephone-dn 2
 number 2
!
ephone-dn 3
 number 3
!
ephone-dn 4
 number 4
!
ephone-dn 5
 number 5
!
ephone 1
 device-security-mode none
 mac-address 0010.1104.988E
 type 7960
```

```
 button 1:1
!
ephone 2
 device-security-mode none
 mac-address 0040.0B90.B9EC
 type 7960
 button 1:2
!
ephone 3
 device-security-mode none
 mac-address 0090.0C32.23A9
 type 7960
 button 1:3
!
ephone 4
 device-security-mode none
 mac-address 0060.3E9D.71E7
 type 7960
 button 1:4
!
ephone 5
 device-security-mode none
 mac-address 000C.8588.BE14
 type 7960
 button 1:5
```

```
!
line con 0
 login local
!
line aux 0
!
line vty 0 4
 login local
 transport input ssh
!
!
!
end
```

---

8. Conclusion

This network design ensures departmental separation using VLANs, efficient traffic management with IP subnets, and secure internet access through the Cisco 2811 Router. The design is scalable, allowing for future expansion if needed.