



## Digital Egypt Pioneers Initiative

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### Graduation Project Report

### Design and Implement a Small Office Network

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**2024**



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### **Abstract**

The report outlines the steps involved in structure network design and deployment for a small office home office need.

It presented the steps (or phases) of a structured network design and demonstrated a practical implementation of the steps using a real-life case study. The design was first simulated using Cisco Packet Tracer™ software. Specifically, the paper demonstrated first hand, how a small network may be set up using the five phases beginning with the needs analysis and ending with deployment/testing.

The result of simulation and results of the post- deployment test revealed that the network met the client's needs.



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### **Introduction**

Designing the network requirements for a small office involves considering several factors, including the number of users, types of devices, internet connectivity needs, security, and scalability.

Extensive planning should go into a network installation/implementation. Just like any project, a need is identified and then a plan outlines the process from beginning to end.

This project focuses on designing a comprehensive and resilient network for a small office, consisting of one floor allocated for import and exports.

The office consists of some departments such as management, technical staff, secretary, sales and financial department.

The network is segmented using VLANs, ensuring efficient traffic management and improved security across the



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organization. In the office and all departments we used some devices to create the required network such as switches connect PCs, IP telephony, laptops, smart phones, printers, access points, server and router that offers a separate guest network for office employees, as well as a dedicated network for visitors.

switches support inter-VLAN routing, ACL (Access Control List).

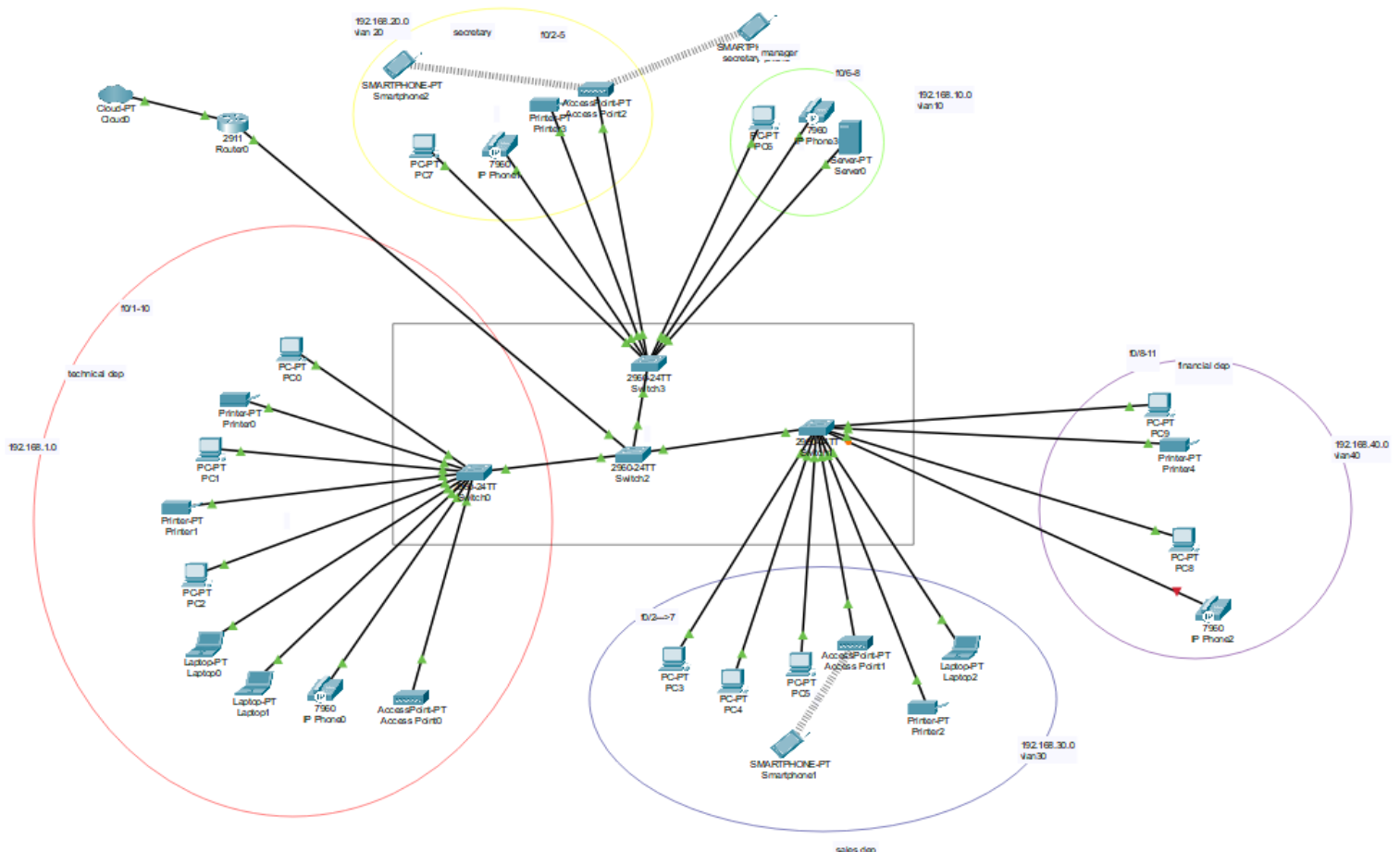
Overall, this design ensures a highly reliable, secure, and scalable network that can support the office operations while minimizing downtime and maintaining a high level of security for both internal and external users.



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### Network Topology:

The network topology consists of five departments, each department with some devices to conform the office and dedicated to different operations.





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### **Protocols Implemented:**

On Switches:

- VLANs
- Inter-VLAN
- SSH
- Port Security
- Inter-VLAN



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### **Configuration:**

#### Switches configurations:

By accessing the switch's Command Line Interface (CLI) and entering configuration mode to initiate the setup process.

Once in configuration mode, we navigated to the specific switch ports and proceeded to assign each port to the appropriate VLANs that we had previously created.

This step was essential for logically segmenting the network and ensuring that each VLAN could operate independently, aligning with the network design and security requirements.



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### Configuration files:

#### Switch 0 running configuration:

Current configuration : 1426 bytes

version 15.0

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

hostname technical

enable secret 5 \$1\$mERr\$XR0/6OlajVRNk6dNGvwxR1

ip ssh version 1

ip domain-name cisco.com

username admin privilege 1 password 7 08316C5D1A0E550516

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/1

switchport mode trunk

interface FastEthernet0/2-24

interface GigabitEthernet0/1-2





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```
interface Vlan1
ip address 192.168.1.100 255.255.255.0
ip default-gateway 192.168.1.1
```

```
access-list 10 permit host 192.168.1.15
```

```
line con 0
```

```
password 7 083343411D39544541
```

```
login
```

```
line vty 0 4
```

```
access-class 10 in
```

```
login local
```

```
transport input ssh
```

```
line vty 5 15
```

```
login
```

```
end
```



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### Switch 1 running configuration:

Current configuration: 2040 bytes

version 15.0

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

hostname finSales

enable secret 5 \$1\$mERr\$XR0/6OlajVRNk6dNGvwxR1

ip ssh version 1

ip domain-name cisco.com

username admin privilege 1 password 7 08316C5D1A0E550516

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/1

switchport mode trunk

interface FastEthernet0/2

switchport access vlan 30

switchport mode access

interface FastEthernet0/3

switchport access vlan 30



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switchport mode access

interface FastEthernet0/4

switchport access vlan 30

switchport mode access

interface FastEthernet0/5

switchport access vlan 30

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 access vlan 40

switchport mode access



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```
interface FastEthernet0/9
switchport access vlan 40
switchport mode access
```

```
interface FastEthernet0/10
switchport access vlan 40
switchport mode access
```

```
interface FastEthernet0/11
switchport access vlan 40
switchport mode access
```

```
interface FastEthernet0/12-24
```

```
interface GigabitEthernet0/1-2
interface Vlan1
no ip address
shutdown
```

```
interface Vlan30
```



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---

ip address 192.168.30.100 255.255.255.0

interface Vlan40

ip address 192.168.40.100 255.255.255.0

ip default-gateway 192.168.1.1

access-list 10 permit host 192.168.1.15

line con 0

password 7 083343411D39544541

login

line vty 0 4

access-class 10 in

login local

transport input ssh

line vty 5 15

login

End



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### Switch 3 running configuration :

Current configuration : 1888 bytes

version 15.0

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

hostname mangsec

enable secret 5 \$1\$mERr\$XR0/6OlajVRNk6dNGvwxR1

ip ssh version 1

ip domain-name cisco.com

username admin privilege 1 password 7 08316C5D1A0E550516

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/1

switchport mode trunk

interface FastEthernet0/2

switchport access vlan 20



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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 10

switchport mode access

interface FastEthernet0/7

switchport access vlan 10

switchport mode access



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```
interface FastEthernet0/8
switchport access vlan 10
switchport mode access
```

```
interface FastEthernet0/9-24
```

```
interface GigabitEthernet0/1-2
```

```
interface Vlan1
no ip address
shutdown
```

```
interface Vlan10
ip address 192.168.10.100 255.255.255.0
```

```
interface Vlan20
ip address 192.168.20.100 255.255.255.0
```

```
ip default-gateway 192.168.1.100
```





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```
access-list 10 permit host 192.168.1.15
```

```
line con 0
```

```
password 7 083343411D39544541
```

```
login
```

```
line vty 0 4
```

```
access-class 10 in
```

```
login local
```

```
transport input ssh
```

```
line vty 5 15
```

```
login
```

```
end
```



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### **Router configuration:**

current configuration : 2017 bytes

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname Router

ip dhcp excluded-address 192.168.20.1 192.168.20.10

ip dhcp excluded-address 192.168.10.1 192.168.10.10

ip dhcp excluded-address 192.168.30.1 192.168.30.10

ip dhcp excluded-address 192.168.40.1 192.168.40.10

ip dhcp excluded-address 192.168.1.1 192.168.1.10

ip dhcp excluded-address 192.168.1.100

ip dhcp excluded-address 192.168.10.100



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ip dhcp excluded-address 192.168.20.100

ip dhcp excluded-address 192.168.30.100

ip dhcp excluded-address 192.168.40.100

ip dhcp excluded-address 192.168.1.15

!

ip dhcp pool secretary

network 192.168.20.0 255.255.255.0

default-router 192.168.20.1

ip dhcp pool manager

network 192.168.10.0 255.255.255.0

default-router 192.168.10.1

ip dhcp pool sales

network 192.168.30.0 255.255.255.0

default-router 192.168.30.1

ip dhcp pool financial

network 192.168.40.0 255.255.255.0



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```
default-router 192.168.40.1
```

```
ip dhcp pool technical
```

```
network 192.168.1.0 255.255.255.0
```

```
default-router 192.168.1.1
```

```
ip cef
```

```
no ipv6 cef
```

```
license udi pid CISCO2911/K9 sn FTX15246YLW-!
```

```
spanning-tree mode pvst
```

```
interface GigabitEthernet0/0
```

```
ip address 192.168.1.1 255.255.255.0
```

```
duplex auto
```

```
speed auto
```

```
!
```

```
interface GigabitEthernet0/0.10
```

```
encapsulation dot1Q 1
```

```
ip address 192.168.10.1 255.255.255.0
```



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---

```
interface GigabitEthernet0/0.20

encapsulation dot1Q 20

ip address 192.168.20.1 255.255.255.0

interface GigabitEthernet0/0.30

encapsulation dot1Q 30

ip address 192.168.30.1 255.255.255.0

interface GigabitEthernet0/0.40

encapsulation dot1Q 40

ip address 192.168.40.1 255.255.255.0

!

interface GigabitEthernet0/1

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/2
```



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---

no ip address

duplex auto

speed auto

shutdown

interface Vlan1

no ip address

shutdown

ip classless

ip flow-export version 9

line con 0

line aux 0

line vty 0 4

login

end



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### **Conclusion:**

In summary, we successfully designed and implemented a comprehensive small office network project. The DHCP was activated on the router to dynamically allocate IP addresses, and VLANs were meticulously configured on the switches to ensure efficient network segmentation. Additionally, each department was seamlessly connected to another department.