

Title of the Project: Cisco Based Internal Banking System Implementation

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Date: 12/04/24

1. Objective

The purpose of this project is to design and implement a comprehensive network topology for a banking system, which simulates the operations of various departments within the bank. The project aims to provide a secure, efficient, and scalable network structure to ensure seamless communication and data exchange between different branches and departments. The goal is to integrate various network protocols, such as DHCP, DNS, OSPF, RIP, VLAN, ACLs, and firewalls, to optimize network performance, security, and management.

The banking system will include several departments (e.g., Customer Service, IT, HR) each with different network configurations to ensure smooth operations. Additionally, the project will demonstrate how to interconnect these departments and remote branches while implementing essential security measures like ACLs and firewalls to prevent unauthorized access.

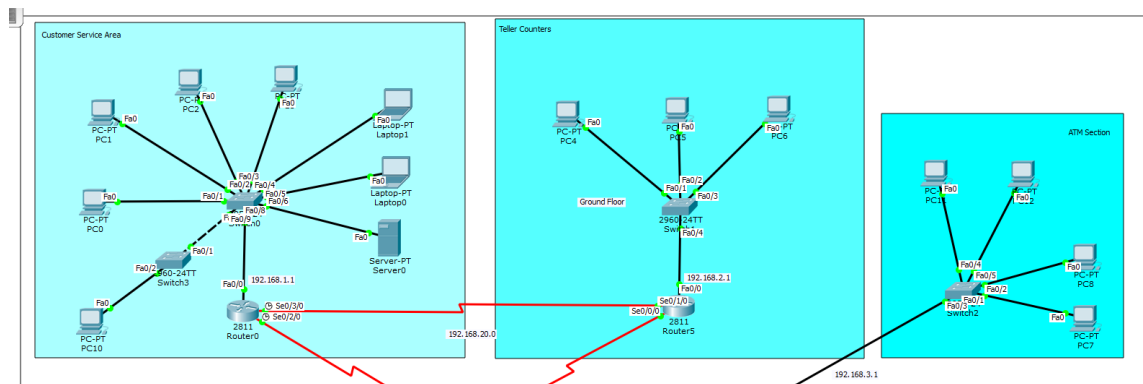
2. Technologies Used

Cisco Packet Tracer

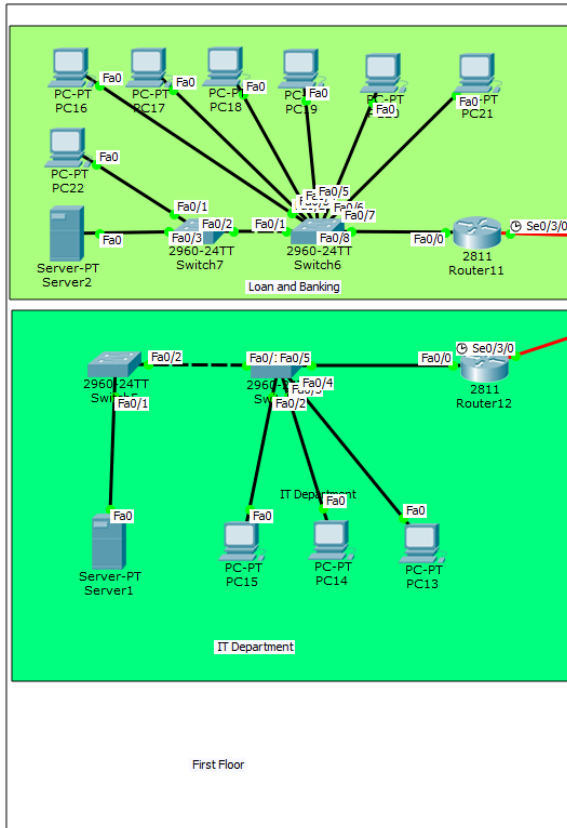
3. Implementation Details

Topology:

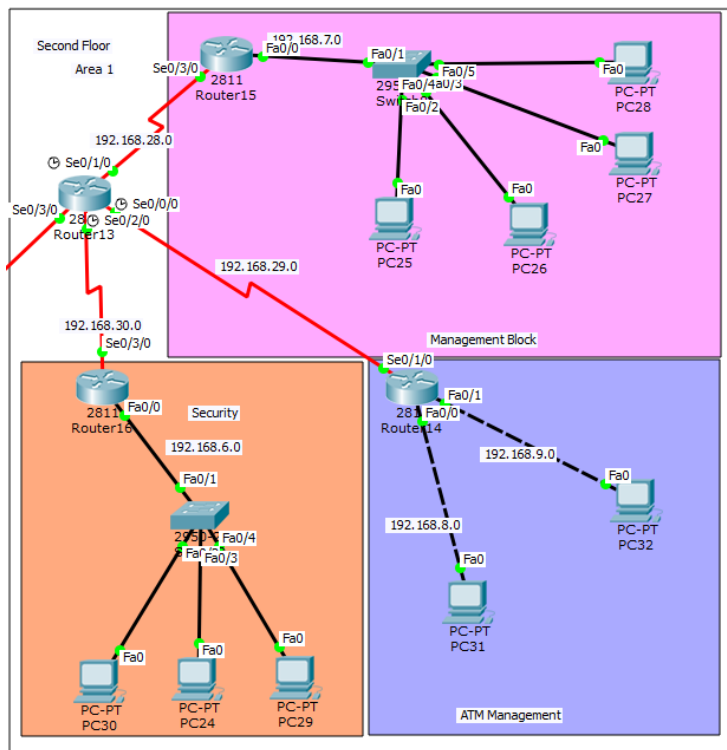
Ground Floor:



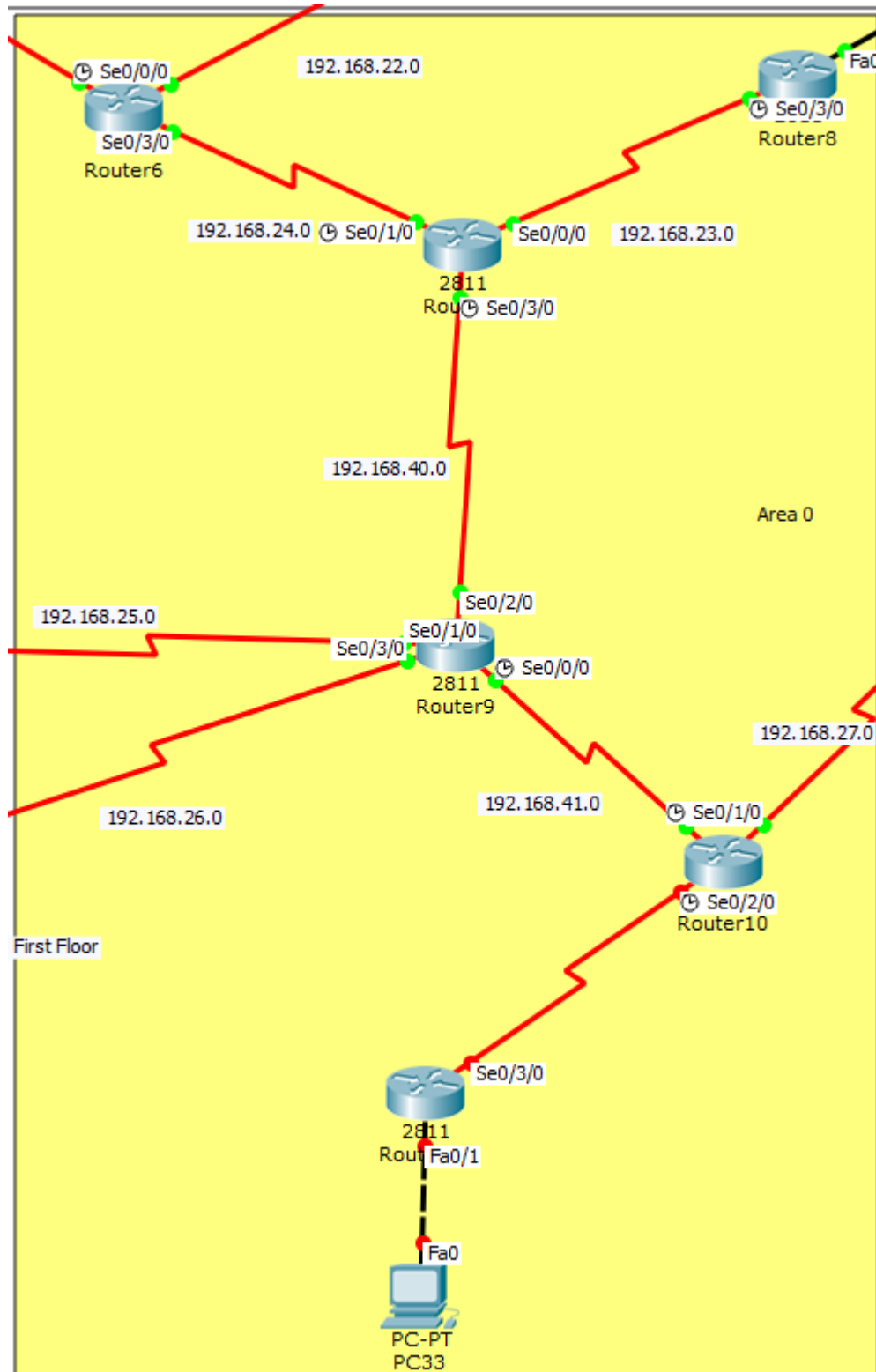
First Floor:



Third Floor:



Network Mainframe:



1. RIP Implementation

Router7

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/1/0

Serial0/2/0

Serial0/3/0

RIP Routing

Network

Network Address
192.168.23.0
192.168.24.0
192.168.40.0

Router9

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/1/0

Serial0/2/0

Serial0/3/0

RIP Routing

Network

Network Address
192.168.25.0
192.168.26.0
192.168.40.0
192.168.41.0

2. DHCP Server Implementation

Server0

Physical Config **Services** Desktop Custom Interface

SERVICES

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 192.168.1.1

DNS Server: 192.168.4.2

Start IP Address : 192 168 1 0

Subnet Mask: 255 255 255 0

Maximum number of Users : 50

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP
server...	192.168.1.1	192.168.4.2	192.168.1.0	255.255....	50	0.0.0.0

Server2

Physical Config **Services** Desktop Custom Interface

SERVICES

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 192.168.5.1

DNS Server: 192.168.4.2

Start IP Address : 192 168 5 0

Subnet Mask: 255 255 255 0

Maximum number of Users : 100

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP
server...	192.168.5.1	192.168.4.2	192.168.5.0	255.255....	100	0.0.0.0

3. OSPF Implementation

Router13

Physical

Config

CLI

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.168.27.0 0.0.0.255 area 0
Router(config-router)#
00:08:56: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.41.2 on Serial0/3/0 from LOADING
to FULL, Loading Done
network 192.168.28.0 0.0.0.255 area 1
Router(config-router)#network 192.168.29.0 0.0.0.255 area 1
Router(config-router)#network 192.168.30.0 0.0.0.255 area 1
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:09:29: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.30.2 on Serial0/2/0 from LOADING
to FULL, Loading Done
```

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Router14

PhysicalConfigCLI

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up

Router(config-if)#
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.168.29.0 area 1
^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.29.0 0.0.0.255 area 1
Router(config-router)#network 192.168.8.0 0.0.0.255 area 1
Router(config-router)#network 192.168.9.0 0.0.0.255 area 1
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:09:46: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.30.1 on Serial0/1/0 from LOADING
to FULL, Loading Done
```

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Router10

Physical Config CLI

IOS Command Line Interface

```
Serial0/3/0      1      2 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
    192.168.41.0
Passive Interface(s):
Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.41.1     120          00:00:13
Distance: (default is 120)
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.41.0 0.0.0.255 area 0
Router(config-router)#network 192.168.27.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

01:14:22: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.30.1 on Serial0/1/0 from LOADING
to FULL, Loading Done
```

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4. DNS Server Implementation

Server1

PhysicalConfigServicesDesktopCustom Interface

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name Type

A Record

Address

Add

Save

Remove

No.	Name	Type	Detail
0	bank.com	A Record	192.168.50.2

DNS Cache

5. Vlan Implementation

Switch2

PhysicalConfigCLI

IOS Command Line Interface

```
accessswitchport mode interface FastEthernet0/5interface FastEthernetswitchport
mode accessswitchport mode switchport access vlan 20switchport access vinterface
FastEthernetinterface FastEthernet0/4inido show vlan breif
show vlan breif
^
% Invalid input detected at '^' marker.

Switch(config)#do show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/3, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24
10	ATM_VLAN	active	Fa0/1, Fa0/2
20	DEPOSIT_VLAN	active	Fa0/4, Fa0/5
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```
Switch(config)#
```

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6. ACL Implementation

Router8

PhysicalConfigCLI

IOS Command Line Interface

```
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up















Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 192.168.3.0
Router(config-router)#network 192.168.23.0
Router(config-router)#exit
Router(config)#access-list 1
% Incomplete command.
Router(config)#access-list 1 deny 192.168.1.0 255.255.255.0
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show access-lists
Standard IP access list 1
  10 deny 0.0.0.0 255.255.255.0
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip access-group 1 out
Router(config-if)#exit
Router(config)#
```

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- 7. EIGRP Implementation
- 8. Firewall Implementation

4. Results and Testing

These result show testing for the basic routing protocols used such as RIP and OSPF. They also show inter Vlan communication for ATM and Deposit Machines.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC2	PC3	ICMP		0.000	N	0	(edit)	
	Successful	PC4	PC6	ICMP		0.000	N	1	(edit)	
	Successful	PC11	PC12	ICMP		0.000	N	2	(edit)	
	Successful	PC20	PC3	ICMP		0.000	N	3	(edit)	
	Successful	PC14	PC19	ICMP		0.000	N	4	(edit)	
	Successful	PC29	PC31	ICMP		0.000	N	5	(edit)	
	Successful	PC32	PC27	ICMP		0.000	N	6	(edit)	

The failures show the implementation of ACL and Vlan preventing access where required to improve security by providing secure channels for critical data transfers.

	Failed	PC11	PC8	ICMP		0.000	N	7	(edit)
	Failed	PC8	PC3	ICMP		0.000	N	8	(edit)
	Failed	PC11	PC8	ICMP		0.000	N	9	(edit)
	Failed	PC7	PC12	ICMP		0.000	N	10	(edit)
	Failed	PC12	PC3	ICMP		0.000	N	11	(edit)
	Failed	PC11	PC10	ICMP		0.000	N	12	(edit)
	Failed	PC22	PC11	ICMP		0.000	N	13	(edit)
	Failed	PC13	PC7	ICMP		0.000	N	14	(edit)

Rest of the testing can be showcased through project.

5. Challenges and Learnings

- The limitation of Networking Concepts to the ones studied in lab was restricting at times.
- Two-way communication blockage in ACL is useful but one way access could be more practical for some of the applications.
- Learnt which protocols benefit which use cases such as balancing security and fast access etc.

6. Conclusion

In conclusion, this project successfully designed and implemented a robust network topology for a banking system, demonstrating the effective use of various network protocols like RIP, OSPF, DHCP, DNS, VLANs, EIGRP, and firewalls. The integration of these protocols ensured the security, efficiency, and scalability of the bank's network infrastructure, with each department's communication needs being met while maintaining optimal network performance.

Key outcomes of the project include the seamless inter-departmental communication and the implementation of security measures such as Access Control Lists (ACLs) and VLANs, which restricted unauthorized access and protected critical data. The deployment of multiple routing protocols, including RIP and OSPF, enabled efficient routing across the network while ensuring redundancy and load balancing.

Despite some challenges, including limitations in networking concepts and practical applications for two-way ACL communication, the project provided valuable insights into network design and the use of advanced routing and security protocols. Moving forward, further improvements can be made in fine-tuning the network configuration and exploring more sophisticated security measures to ensure maximum protection against emerging threats.