University of Asia Pacific

Department of Computer Science & Engineering

Course Name: Computer Networks Lab

Course Code: CSE 320

Name of Project: Bank Management System

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Introduction

The Bank Management System Network Project simulates a multi-departmental bank distributed across three floors, where each department operates on a separate VLAN-based subnet. Using Cisco Packet Tracer, this project illustrates how enterprise-level bank communication, data transfer, and resource sharing can be securely and efficiently managed using a properly segmented and routed IP network. The project emphasizes VLANs, inter-VLAN routing, and robust IP addressing to maintain data integrity, security, and effective departmental isolation.

Motivation

In real-world banking operations, departments like HR, Finance, Customer Service, and IT all require segregated yet interconnected networks for secure operation. The motivation for this project is to:

- Simulate department-level isolation using VLANs.
- Implement scalable network architecture with inter-router connectivity.
- Emulate real-time communication between branches or floors.
- Practice network administration**,** IP planning, and access control for better IT infrastructure understanding.
- Prepare students for real-world bank infrastructure planning through simulation.

Network Topology Used

The project employs a hierarchical star topology and includes three routers (F1, F2, F3) acting as distribution points across three building floors:

Floor-Wise VLAN and Department Distribution:

- **First Floor:**
    - VLAN 60 (Loan & Credit Logistics) – 192.168.6.0/24
    - VLAN 70 (Store Management) – 192.168.7.0/24
    - VLAN 80 (Reception & Customer Service) – 192.168.8.0/24
- **Second Floor:**
    - VLAN 30 (Tax Sales) – 192.168.3.0/24
    - VLAN 40 (HR Administration) – 192.168.4.0/24
    - VLAN 50 (Finance Executive) – 192.168.5.0/24
- **Third Floor:**
    - VLAN 10 (IT & Network) – 192.168.1.0/24
    - VLAN 20 (Risk Management) – 192.168.2.0/24

Devices and Features:

- Each VLAN has:
    - PCs and Printers.
    - Wireless access via Access Points.
- **Routers:** Cisco 2811 series used for inter-floor routing.
- **Switches:** Cisco 2960 series used for VLAN segregation and port management.
- **Inter-router links:** Connected using point-to-point IPs like 10.10.10.0/30.

Configurations

VLAN:

```
Switch>
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#
Switch(config)#int range fa0/2-3
Switch(config-if-range)#switc
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode ac
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#swit
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vlan 80
% Access VLAN does not exist. Creating vlan 80
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#int range fa0/4-5
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 70
% Access VLAN does not exist. Creating vlan 70
Switch(config-if-range)#
Switch(config-if-range)#int range fa0/6-8
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 60
% Access VLAN does not exist. Creating vlan 60
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#
```

Inter-Router IP Configuration:

```
Router(config-if)#in se0/2/0
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#ip add
Router(config-if)#ip address 10.10.10.5 255.255.255.252
Router(config-if)#
Router(config-if)#
Router(config-if)#in se0/2/1
Router(config-if)#ip address 10.10.10.9 255.255.255.252
Router(config-if)#do wr
Building configuration...
[OK]
```

Inter-VLAN Communication:

```
Router(config)#int fa0/0.80
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.80, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.80, changed state
to up

Router(config-subif)#encapsulation dot1Q 80
Router(config-subif)#ip address 192.168.8.1 255.255.255.0
Router(config-subif)#ex
Router(config)#int fa0/0.70
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.70, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.70, changed state
to up

Router(config-subif)#encapsulation dot1Q 70
Router(config-subif)#ip address 192.168.7.1 255.255.255.0
Router(config-subif)#ex
Router(config)#
Router(config)#
Router(config)#int fa0/0.60
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.60, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.60, changed state
to up
```

DHCP:

```
Router(config)#service dhcp
Router(config)#ip dhcp pool Reception
Router(dhcp-config)#network 192.168.8.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.8.1
Router(dhcp-config)#dns-server 192.168.8.1
Router(dhcp-config)#ex
Router(config)#
Router(config)#ip dhcp pool Store
Router(dhcp-config)#network 192.168.7.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.7.1
Router(dhcp-config)#dns-server 192.168.7.1
Router(dhcp-config)#ex
Router(config)#
Router(config)#
Router(config)#ip dhcp pool Logistics
Router(dhcp-config)#network 192.168.6.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.6.1
Router(dhcp-config)#dns-server 192.168.6.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
[OK]
```

OSPF Routing:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 10
Router(config-router)#network 10.10.10.4 255.255.255.252 area 0
Router(config-router)#network 10.10.10.8 255.255.255.252 area 0
Router(config-router)#network 192.168.8.0 255.255.255.0 area 0
Router(config-router)#network 192.168.7.0 255.255.255.0 area 0
Router(config-router)#network 192.168.6.0 255.255.255.0 area 0
Router(config-router)#do wr
Building configuration...
[OK]
Router(config-router)#
00:22:16: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/0/1 from LOADING
to FULL, Loading Done

00:24:25: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/0/0 from LOADING
to FULL, Loading Done
```

OSPF Routing

SSH:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname F3-Router
F3-Router(config)#ip domain-name gtech
F3-Router(config)#username gtech password getech
F3-Router(config)#crypto key generate rsa
The name for the keys will be: F3-Router.gtech
Choose the size of the key modulus in the range of 360 to 2048 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

F3-Router(config)#line vty 0 15
*Mar 1 0:4:48.314:  %SSH-5-ENABLED: SSH 1.99 has been enabled
F3-Router(config-line)#login local
F3-Router(config-line)#transport input ssh
F3-Router(config-line)#do wr
Building configuration...
[OK]
F3-Router(config-line)#ex
% Ambiguous command: "ex"
F3-Router(config-line)#exit
F3-Router(config)#
```

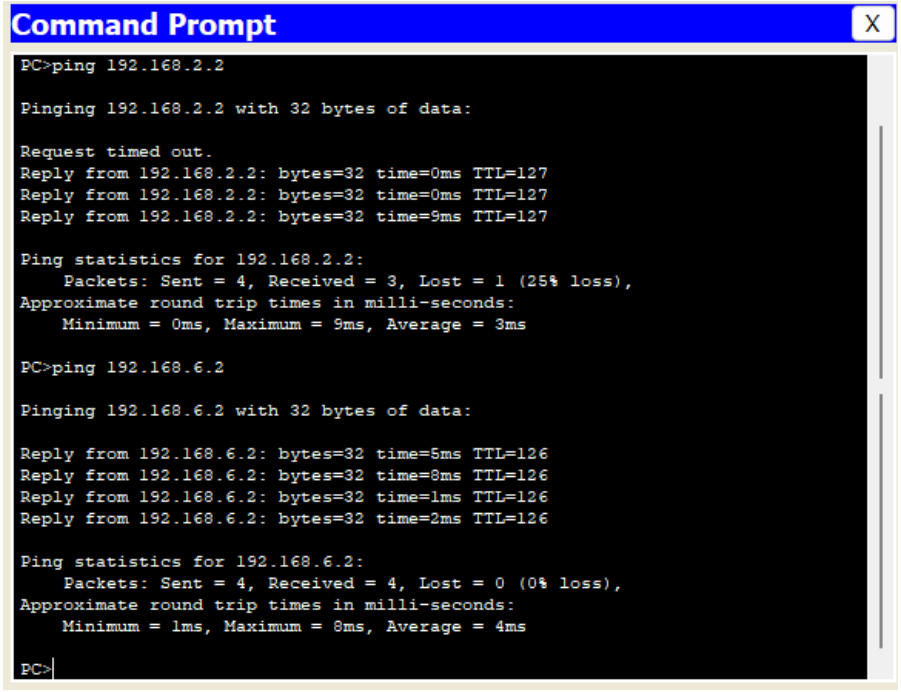
IOS Command Line Interface

```
!
line con 0
!
line aux 0
!
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login local
 transport input ssh
!
!
!
end
```

SSH Port Security enabled.

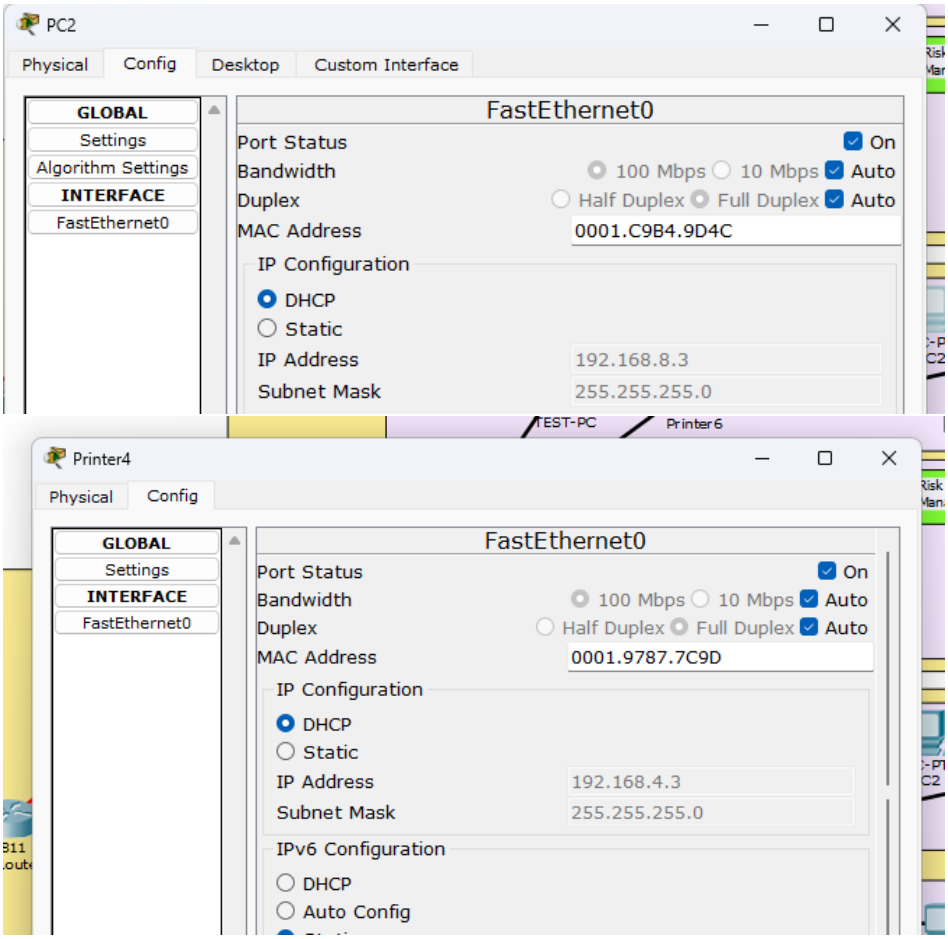
Results

Inter-VLAN Communication



Entire connection is successful.

DHCP Authentication



Correct IP generated as per VLAN host address for both PCs and Printers.

Conclusion

This bank management system simulation in Cisco Packet Tracer successfully demonstrates how VLAN segmentation, IP subnetting, and router-based inter-VLAN communication can be implemented to create a secure and efficient enterprise network. By isolating departments and enabling controlled access, the design enhances both network security and performance. The topology used supports scalability, making it suitable for real-time bank environments where secure communication across multiple departments and floors is critical.