Project Title: Network Design Proposal for Bank.

Abstract:

In this project we will primarily focus on design and implementation of Bank Network using Cisco Packet Tracer (CPT). Security breach in the sector of banks is one of the most important concerns that needs to be addressed in the first place since loss of information can lead to huge losses to the bank overall. This project will help us curb such concerns by understanding the regulated flow of information/data. We will consider a national bank which has its head offices located in big cities like Chennai. The other small branches will be present in cities like Coimbatore, Madurai, Trichy, Salem, and Thirunelveli. These small branches in each state will be connected through LANs. Apart from this, VLANs and WANs will automatically be a part of the project networking since we are working on a Bank Network. Additionally, bank machines will be made available all around each city in specific to ensure better reach and reliable services to the people. Employees use a special software to access user accounts. The level of access to advanced resources within the bank varies from employee to employee based upon several criteria which include the designation of the employee, criticality of the information etc. The typical servers, mail, web, files and directories will be made available to all the employees to understand the flow of work within the bank.

Objectives:

The main objective of this project is to design a network for the bank with the given constrains. In this we have 5 branches and 1 main branch. This network design of bank also has a server for online transaction which is used by the customers of all branches.

Network requirements:

1. Identify the hardware components required to setup the network for the Bank
2. High availability should be available to the application server, which is accessible using https protocol.
3. The application server should be setup in a secure manner with network and host level protection.
4. All traffic into the application server should be scanned for security attacks.
5. IP network design for the branch and main offices.
6. IP addressing range for users and hardware components.
7. The users at different locations should be able to access each other, including the application server.
8. Identify the features and methodology which would be followed to achieve the solution.
9. Network Topology diagram.

Network Requirement analysis:

As the location of the banks are spanned across the different geographical locations, a application server is installed with appropriate failover clustering to provide high availability to the application. We developed a router based network connecting, users to a manageable switch creating VLANs and gateway interface a router. This design was incorporated in all the five branches and the main branch. The routers were interconnected using RIP Protocol which in turn communicated with the server using the WAN router installed in the gateway.

HARDWARE Inventory List:

Device	Nos.
Router	8
Switch	6
PCs	12
Copper straight through cable	18
DCE	6
Server	1
Copper cross-over cable	1

Hardware and Software Analysis:

1) At the main office, a server , two nos. of 1941 routers, one no. of C2960-24TT-L switch connecting the PC is installed.
2) At the branch office, a 1941 router which has 2 serial ports and a C2960-24TT-L switch connecting PCs is installed.
3) At every branch office , there are 50 users connected to the switch.
4) A centralised router C2960-24TT-L is installed connected all the branch routers, which is then connected to the gateway router connecting a server.

Additional requirement:

All the locations have high speed internet connection. At the main office, an additional public IP address would be required to host the application server. The IP address would be registered with a domain name, which would enable users on the outside world, to access the application.

Implementation – Cisco Packet Tracer:

For implementation this bank prototype we have used Router-PT which have serial ports, so that it will be easy for us to connect to the 6 branches and we have also used 2960-24TT switches all over the network to connect to various campuses among the cities which are then interconnected to the servers and users. All The serial ports are assigned with IP addresses so they can be recognized between cities without confusion.

IP Network and Address Design:

Branch	Router IP address	Server IP address	PC IP address	Vlan id	Subnet Mask
Chennai	192.168.100.1	192.162.100.2	192.168.100.21 192.168.100.120	60	255.255.255.0
Coimbatore	192.168.10.1	192.168.10.2	192.168.10.21 192.168.10.70	10	255.255.255.0
Madurai	192.168.20.1	192.168.20.2	192.168.20.21 192.168.20.70	20	255.255.255.0
Salem	192.168.30.1	192.168.30.2	192.168.30.21 192.168.30.71	30	255.255.255.0
Trichy	192.168.40.1	192.168.40.2	192.168.40.21 192.168.40.70	40	255.255.255.0
Tirunelveli	192.168.50.1	192.168.50.2	192.168.50.21 192.168.50.70	50	255.255.255.0

Features and Services:

1) ## VLAN:

Two networks are required at the main office. One network would be for the LAN, where the offices users would be connected. The second network would be the DMZ network, where the application server is hosted.

2) ## Access Control List:

Access control lists are configured on the router at the main office. The ACLs are used to restrict communication from the internet to only the allowed port, which is on the application server. ACL is also configured to allow selective traffic from the branch office networks to the DMZ and LAN network in the main office.

3) ## Static NAT:

NATTING is configured in the gateway router, to allow traffic from the public IP address of the application server to the LAN IP address.

4) Failover cluster:

Failover cluster is configured on the server which is hosted. This would ensure that high availability is provided to the application.

5) Routing information protocol:

Routing Information Protocol (RIP) is a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and the destination network. It is a distance-vector routing protocol that has an AD value of 120 and works on the Network layer of the OSI model. RIP uses port number 520.

Network Topology Diagram:
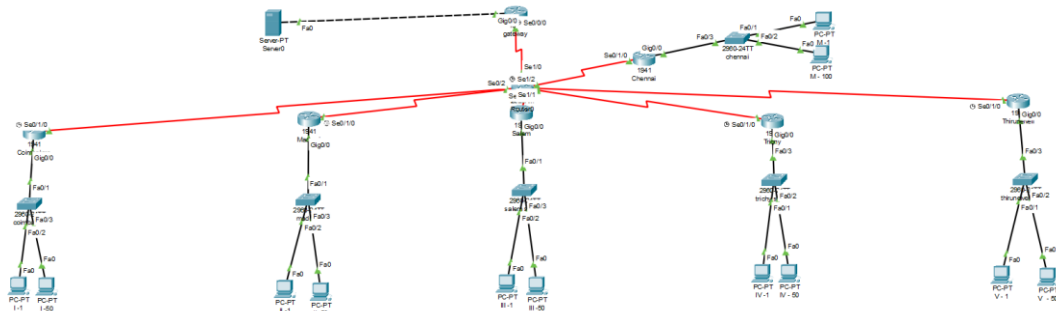
Access Layer:

In this layer, all the end devices are connected to each other to the network and we will be having the layer 2 switch for the future connection

Core layer:

The core layer is the main source of all the layers, where this layer is used to transfer the large amount of traffic very quickly.

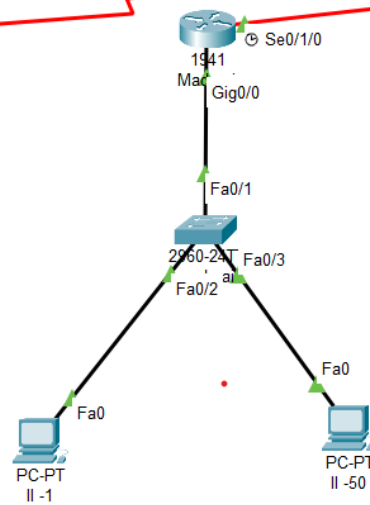There will be 1 main branch and 5 sub-branches for this network topology:

1) Chennai
2) Coimbatore
3) Madurai
4) Trichy
5) Salem
6) Tirunelveli

Each branch is explained separately for better understanding of the network.

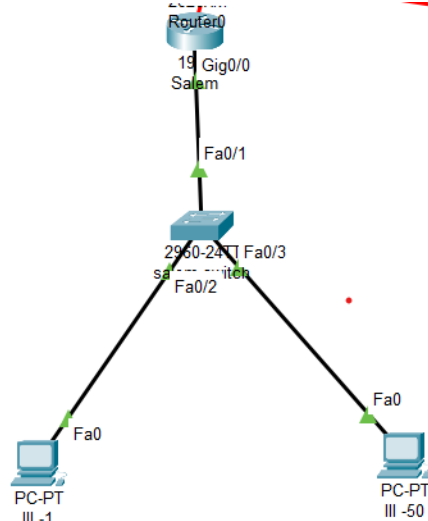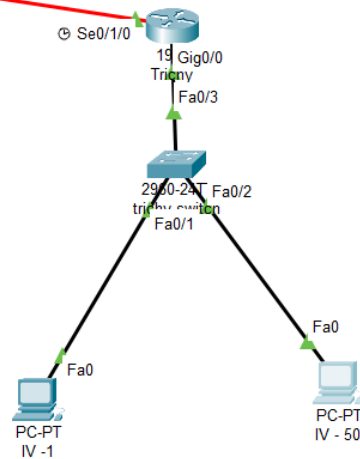## Coimbatore- Network Topology:
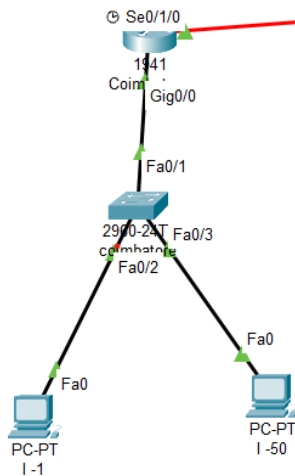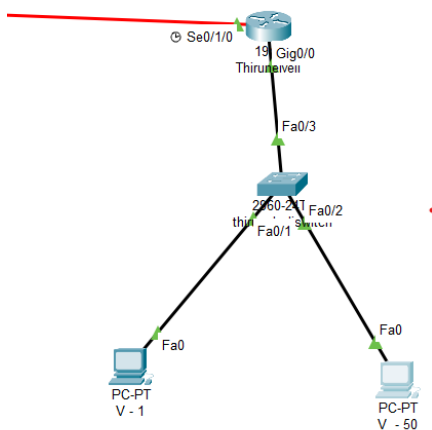

Madurai – Network topology:

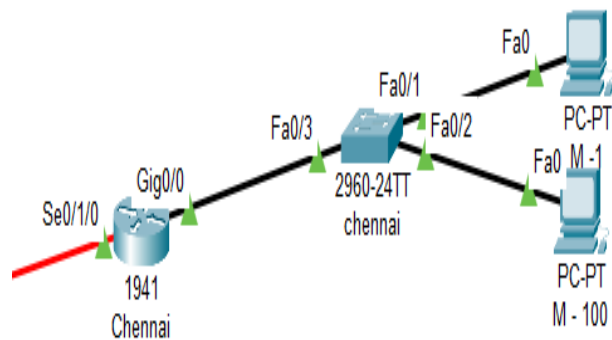## Salem – Network topology:

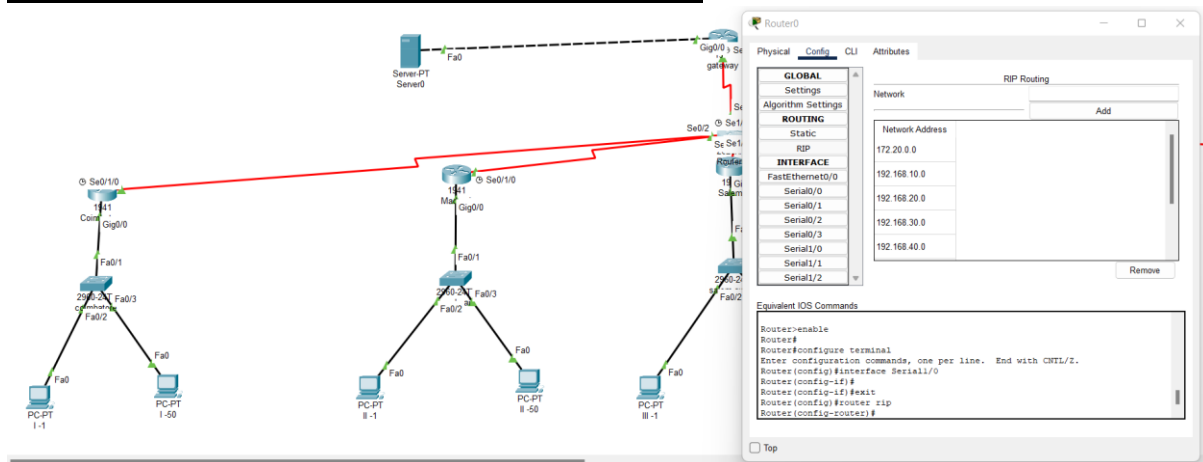## Trichy – Network topology:

Thirunelveli – Network topology:
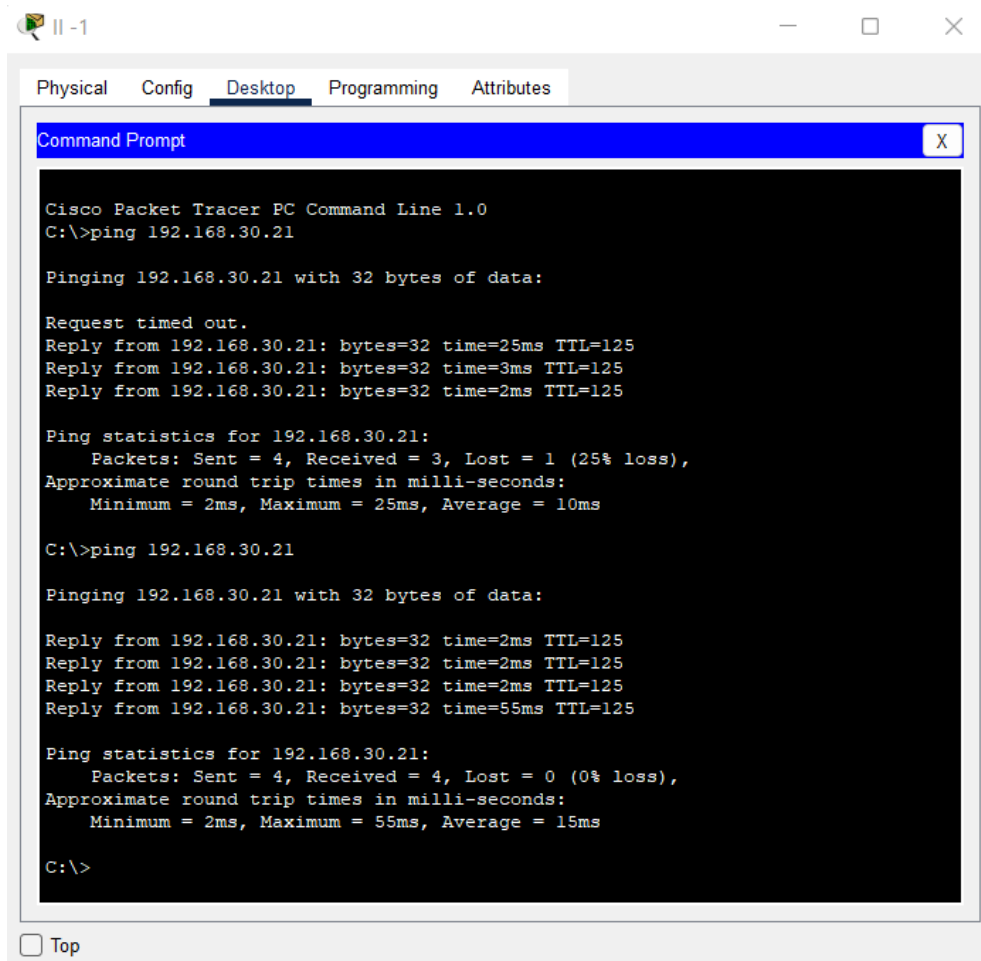

Chennai – Network topology:
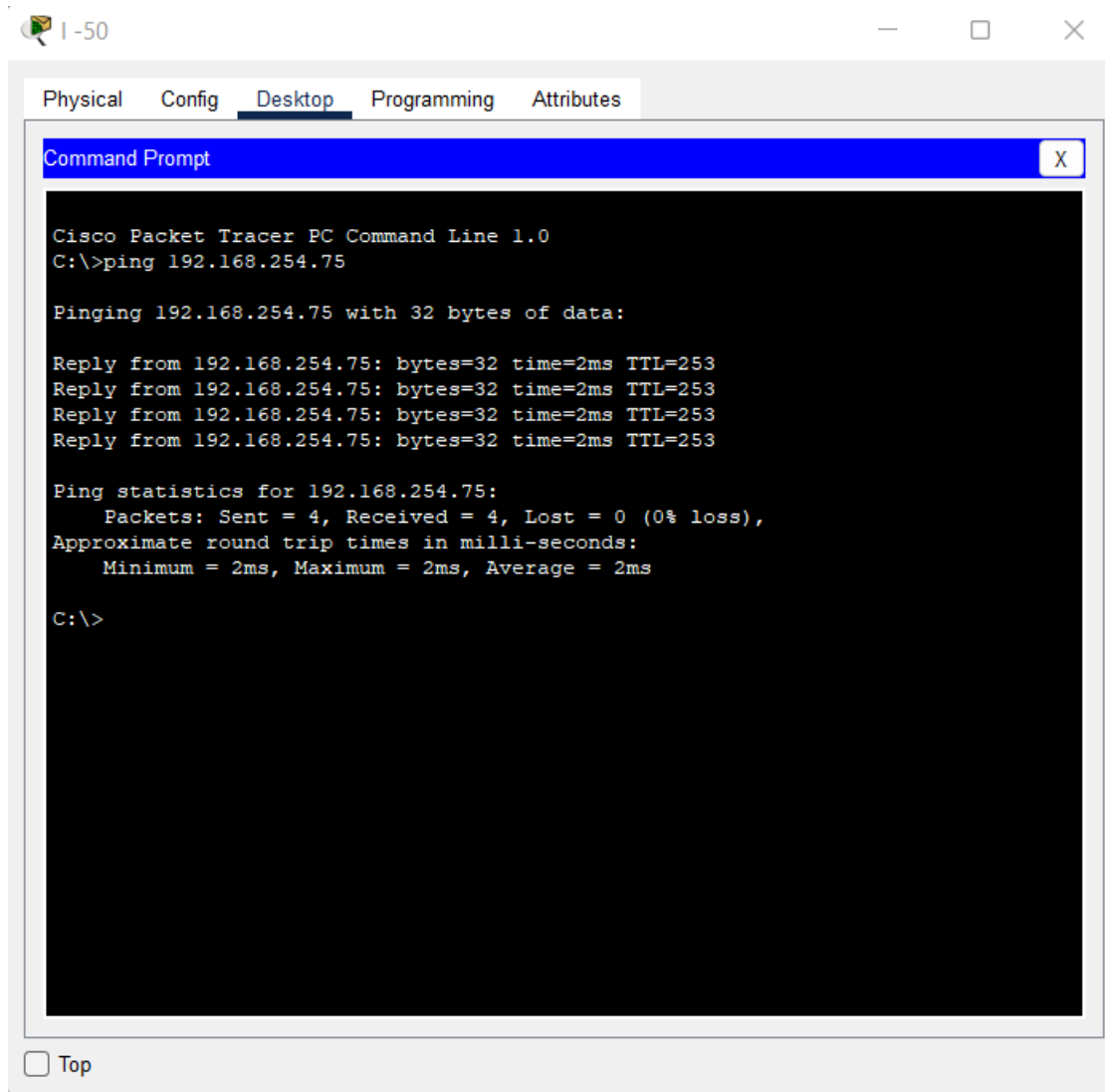
Network design and configuration strategy:

We have manually checked if the network between each user in the branch is connected to one another.
This is done individually with testing from one branch device to other branch device.

Ping from a PC to another PC:

Ping from PC to the Gateway Router:

```
I -50                                                      —   □   ✕

  Physical   Config   Desktop   Programming   Attributes

  Command Prompt                                              X

    Cisco Packet Tracer PC Command Line 1.0
    C:\>ping 192.168.254.75

    Pinging 192.168.254.75 with 32 bytes of data:

    Reply from 192.168.254.75: bytes=32 time=2ms TTL=253
    Reply from 192.168.254.75: bytes=32 time=2ms TTL=253
    Reply from 192.168.254.75: bytes=32 time=2ms TTL=253
    Reply from 192.168.254.75: bytes=32 time=2ms TTL=253

    Ping statistics for 192.168.254.75:
        Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

    C:\>

  □ Top
```

References:

- https://www.manageengine.com/network-configuration-manager/configlets/configure-static-nat-cisco.html
- https://docs.oracle.com/cd/E19859-01/820-3252-11/FP44ucgACL.html
- https://www.papercut.com/support/resources/manuals/ng-mf/common/topics/cluster-server-2012-2016.html