Assumptions:

- **3 offices**: Each has at least 15 computers.
- **1 main headquarters**: Will have the centralized servers and the connection to the internet.
- You will use **Cisco routers, switches, and PCs** to implement the network in Cisco Packet Tracer.

Steps to Implement the Network in Cisco Packet Tracer

1. Create the Network Topology in Packet Tracer

- **Add Devices**:
    1. **Router**: Add routers to each office and the headquarters. For simplicity, you can use routers like **Cisco 2900**series.
    2. **Switches**: Add switches (such as **Cisco 2960** switches) for LANs in each office. One switch per office is enough unless you need more ports.
    3. **PCs**: Add PCs to represent the workstations in each office. You need at least 15 PCs in each office. For example, add 15 PCs for each of the three offices.
    4. **Servers**: Add one server in the headquarters that will act as the centralized file server or database server.
    5. **Internet Connection**: You can simulate the internet with an external cloud device in Packet Tracer.

2. Configure the LAN for Each Office

For each office, you'll set up a Local Area Network (LAN) to connect the PCs to the switch.

- **Configure IP addressing**:
    1. **PC IP Configuration**: Assign static IP addresses to the PCs within each office's subnet. For example:
        - **Office 1**: `192.168.1.10` to `192.168.1.24`
        - **Office 2**: `192.168.2.10` to `192.168.2.24`
        - **Office 3**: `192.168.3.10` to `192.168.3.24`
    2. **Router Interface Configuration**: Set up the router interfaces for each office:
        - **Router 1 (Office 1)**: `192.168.1.1`
        - **Router 2 (Office 2)**: `192.168.2.1`
        - **Router 3 (Office 3)**: `192.168.3.1`
    3. Connect the routers to the switches and PCs with appropriate cables (typically copper straight-through for router-to-switch and switch-to-PC).
- **Verify Connectivity**: Use the **ping** command to test connectivity between PCs in the same office and make sure they can communicate.

3. Set Up the Wide Area Network (WAN)

Each office needs to connect to the headquarters via a secure WAN. You'll use routers and possibly VPN tunnels (to simulate secure connections between the offices and the headquarters).

- **Router WAN Interfaces**:
    1. For each office, connect a router to the headquarters router via serial links or Ethernet, representing the WAN connection.
    2. **Router interfaces for WAN**:
        - **Office 1 Router (Router 1)**: Connect to the HQ router interface (e.g., `10.0.0.1`).
        - **Office 2 Router (Router 2)**: Connect to the HQ router interface (e.g., `10.0.0.2`).
        - **Office 3 Router (Router 3)**: Connect to the HQ router interface (e.g., `10.0.0.3`).
    3. Use **copper straight-through cables** to connect routers to other routers, representing inter-office WAN connections.

4. Configure Routing Between Offices and Headquarters

- **Routing Protocol**: You can use **static routing** or **RIP/OSPF** to allow communication between the offices and the main headquarters.
    1. **Static Routing**:
        - On each router, configure static routes to allow traffic between the offices and the headquarters.

For example, on **Router 1 (Office 1)**:
plaintext
Copy code

```
ip route 192.168.2.0 255.255.255.0 10.0.0.2
ip route 192.168.3.0 255.255.255.0 10.0.0.3
```

        -
        - Similarly, configure the other routers.
    2. **Dynamic Routing (RIP/OSPF)**:
        - You can enable **RIP** or **OSPF** on the routers to allow automatic route exchange between them.

Example for RIP on **Router 1**:
plaintext
Copy code

```
router rip
version 2
```

```
network 192.168.1.0
network 10.0.0.0
```

-
- Repeat this on each router.

5. Internet Connectivity at Headquarters

- **Simulate Internet Connection**:
  - Add an **External Cloud** device in Packet Tracer to represent the internet. Connect the **HQ Router** to the cloud using a serial or Ethernet cable.
- **Configure Default Route**:

On the headquarters router, configure a **default route** to the cloud.
plaintext
Copy code
```
ip route 0.0.0.0 0.0.0.0 [cloud IP]
```

  -
  - This will allow internet traffic from all offices to go through the headquarters router.
- **Test Internet Access**:
  - From a PC in any office, try to **ping an external IP** to ensure internet connectivity is working.

6. Configure the Server at Headquarters

- **Centralized Server Configuration**:
  - Add a server in the headquarters to act as a centralized file server.
  - Configure a static IP address (e.g., `192.168.0.10`).
  - Set up services like **FTP**, **HTTP**, or **DNS** on the server to represent company applications.
- **Test Server Access**:
  - From the PCs in all offices, try to **ping** the server at headquarters to ensure connectivity.
  - You can also try accessing a website or file sharing service hosted on the server.

7. Configure Network Security

- **Firewall (Optional)**: In Packet Tracer, you can use a **router ACL (Access Control List)** to simulate basic security for limiting access.

Example to block access to a certain IP:
plaintext

Copy code

```
access-list 100 deny ip 192.168.2.0 0.0.0.255 any
access-list 100 permit ip any any
```

    -
    - Apply this ACL to the router's incoming or outgoing interface.

8. Final Verification

- **Ping Test**: From the PCs in each office, perform ping tests to other PCs, routers, and the headquarters server.
- **Traceroute**: Run a traceroute command to verify the path taken by packets between offices and the headquarters.
- **Check Internet Access**: Verify that the PCs in each office can access the internet and the company server.