The Crystal Empire Network

Emperor Solaris rules the **Crystal Empire of AURORIA**, a technologically advancing land surrounded by diverse regions. The Emperor lives in the **Solar Palace** with Empress Solaris and Princess Lumina. The **Tech Sages** live in **Neon Hills**, where they operate all core computational services and data centers.

The **Frost Farmers** live in **Glacier Fields**, where they practice cold-climate agriculture and livestock farming. The **Sky Pirates** live in **Storm Harbor**, a floating coastal base near the black sea. They secretly plan their attacks using a completely isolated network and never communicate directly with the Crystal Empire.

The **Stone Giants** live in **Titan Valley**, a mountainous region rich in minerals. Princess Lumina enjoys flying races with the Sky Riders at **Aurora Ridge**.

Now, Emperor Solaris has ordered the Tech Sages to establish a **secure and efficient communication network** across the Empire. However, the Head Sage refuses to interfere directly and assigns **you as the Network Architect** to design the entire infrastructure.

You are given the **location list, population size, and distances** between locations. Your task is to **design and configure a complete enterprise network** that enables communication across all regions efficiently and securely.

Location	**Population**
Solar Palace	40
Neon Hills	126
Glacier Fields	350
Storm Harbor	900
Titan Valley	4050
Aurora Ridge	150

From / To	**Solar Palace**	**Neon Hills**	**Glacier Fields**	**Storm Harbor**	**Titan Valley**	**Aurora Ridge**
Solar Palace (40)	0					
Neon Hills (126)	200	0				
Glacier Fields (350)	480	180	0			

Location	Population					
Storm Harbor (900)	140	330	450	0		
Titan Valley (4050)	700	90	360	60	0	
Aurora Ridge (150)	260	410	120	800	140	0

Note:

- Values in brackets () indicate population size.
- Values in the table represent distances between locations.

Network Design Rules & Restrictions

You must strictly follow the rules below while designing the network:

1. **Each location must be treated as a separate LAN**, connected using **routers**.

2. Select the student ID of the last member of your group. Now take the last 4 digits of that ID and divide them into two parts containing two digits each. These two parts are the first two octets of the network address of the location. The third and fourth octets are 0, and the prefix mask is 16. Suppose the ID is 20201002. Then the last four digits are 1002. Now dividing it into two parts gives 10 and 02. So, the Network address is 10.2.0.0/16.

   You must:

   - Perform VLSM subnetting
   - Assign one unique subnetwork address for each location

3. **All routers and all end devices must be assigned valid IP addresses.**
4. Each location must contain **at least two end devices (PCs/Laptops)**.
5. **Neon Hills must contain:**
   - One **Web Server**
   - One **DNS Server**
   - One **Email Server**
6. The web server must display the homepage message:
   “Welcome to the Crystal Empire of AURORIA”
   and be accessible using **www.auroria.net** from all locations.
7. Email service is available only among the users of Solar Palace, Neon Hills, and Titan Valley.
8. There must be **at least one floating static route** in the entire network.
9. **No default route is allowed** anywhere in the system.
10. You must configure:

- **Static routing** between:
  - Solar Palace ↔ Neon Hills (using recursive static route)
  - Neon Hills ↔ Titan Valley (using directly attached exit interface)
- **Dynamic routing (RIP v2)** for all other routes.

11. **Glacier Fields and Aurora Ridge must receive IP addresses via DHCP**, and the **DHCP server must be in Neon Hills**.
12. After all configurations:
    - You must successfully **ping between any two locations** in the Empire.

Software Requirement

The entire network must be **implemented in Cisco Packet Tracer** with:

- Routers
- Switches
- End devices
- Servers
- Proper cabling
- Full IP configuration
- Routing protocols fully functional

Final Deliverables

You will have to submit the following:

- Work Distribution among the group members [Who did which part]
- The pkt/pka file
- Picture of the Network topology diagram with proper labels [You have to show the network addresses using notes for each network]
- A PDF containing
  - VLSM tree
  - IP address table
  - The configuration commands of all the routers you have implemented.