The Metro

Dhaka Mass Transit Company Limited (DMTCL) has recently established a metro rail route from Agargaon to Uttara which will be extended throughout the megacity in near future. Current project MRT-6 line has a total of nine metro stations covering three major areas - Agargaon, Mirpur and Uttara. DMTCL wants to connect the stations altogether to carry out their daily operations securely and with ease over the internet as well as plans to provide free internet/Wi-Fi access to the daily commuters within the range of these metro stations.

You have been hired as a network engineer to construct an efficient and sustainable network among the metro stations in order to achieve the above goals. While doing so you have to abide by the requirements set by DMTCL.

DMTCL has imposed these network specifications that you need to abide by while creating the network infrastructure:

Initially, DMTCL will provide internet access to six of its most crowded metro stations to test and further utilize the facilities. They are expecting the daily maximum number of users will be as such -

- ★ Uttara-North - 1200
- ★ Uttara-Center - 1700
- ★ Agargaon - 2250
- ★ Mirpur-10 - 2500
- ★ Shewrapara - 700
- ★ Pallabi - 1100

- The temporary head office will be situated in Agargaon. Therefore, **Agargaon** will act as a **centerpiece** for all the other stations.
- **Uttara-Center**, **Uttara-North** and **Agargaon** will be **interconnected** to ensure seamless and uninterrupted connectivity between these metro stations.
- On the special request of the Ministry of Road Transport and Bridges, **Mirpur-10** will be directly connected to **Agargaon**.
- **Mirpur-10** will also be connected to **Shewrapara** and **Pallabi** to ensure less cost in setting up connections in those two stations.
- Choose an appropriate network address and create subnets to assign to each of the metro stations so that the **least amount of IP addresses are wasted**.
- The stations in **Uttara-Center** and **Mirpur-10** will use **static addressing** to ensure secure transmission of data while the other stations will get their IP addresses through a dedicated DHCP Server. This **DHCP Server** will be present in **Uttara-Center**.
- Email has to be exchanged between all the offices located within the metro stations. So an **Email Server** has to be set up and it will be located in **Mirpur-10**.

- **Uttara-North** and **Pallabi** stations will require **printers** to print metro tickets and important documents in large numbers.
- **Uttara-Center** will also have a **Web Server** and a **DNS Server**. If anyone types the URL **www.dhaka.metro**, they will see a webpage that says **"Welcome to DMTCL!"**.
- All the servers have to be **configured manually**.

- **Routing** in the whole network infrastructure should follow these rules:

    - **Uttara-North** and **Uttara-Center** stations must use **static routing**. **Uttara-Center** will be directly connected to **Agargaon** and **Uttara-North** station will communicate with **Agargaon** via **Uttara-Center**.
    - As mentioned earlier, **Uttara-North** and **Agargaon** stations will be connected but it will **not be the primary route**. A **backup route** has to be configured here.
    - The rest of the metro stations i.e. **Mirpur-10**, **Shewrapara** and **Pallabi** will use **dynamic routing**.
    - Note that the **default route cannot be used** while exchanging data/packets. Data must be delivered using **static or dynamic routes only**.

- You may represent each metro station as a router and use the necessary amount of switches to connect the devices altogether. Showing **2 end devices per network** is good enough to represent the whole user base at the metro stations. You are allowed to **make any valid and necessary assumptions** while designing the network infrastructure.
- You need to be able to **ping each metro station from another** after all the configurations are complete.

Deliverables

- The network mentioned above should be implemented in Cisco Packet Tracer, with necessary devices and full configuration.
- After completion you should be able to test the conditions imposed.
- You will have to submit the followings:
    1. Cisco Packet Tracer file
    2. Network topology diagram with proper labels
    3. Configuration commands of all the routers
    4. VLSM tree
    5. IP/Network address table
    6. Any assumptions made