NASA - SpaceX

NASA and SpaceX, two leading agencies responsible for space exploration are rebuilding their network from the ground up. The goal is to connect the NASA and SpaceX headquarters and sub-offices situated in different states between themselves and with the White House so that the connected offices can exchange information among themselves and in addition the POTUS will be able to observe the ongoing operations with ease.

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

Given below are the names of the offices situated in different states and the number of hosts (in first brackets) required in each of those offices:

- White House [Washington, D.C.] **(128)**
- NASA HQ [Washington, D.C.] **(40)**
- Johnson Space Center [Houston, TX] **(560)**
- SpaceX Satellite Facility [Redmond, WA] **(210)**
- SpaceX Rocket Development and Test Facility [McGregor, TX] **(350)**
- SpaceX HQ [Hawthorne, CA] **(80)**

While creating the network infrastructure, these are the specific rules that you need to follow:

- The POTUS will observe the operations from his residence, White House located in Washington, D.C. Therefore, White House will act as a centerpiece for all the other HQs and sub-offices.
- NASA HQ, Johnson Space Center and White House will be interconnected, to ensure 24/7 connectivity between these offices.
- On special request from Elon Musk, SpaceX HQ will be directly connected to the White House.
- SpaceX HQ will also be connected to two of its sub-offices, the SpaceX Satellite Facility, SpaceX Rocket Development and Test Facility, to ensure less cost in setting up internal connections in those two sub-offices.
- Choose an appropriate network address and create subnets to assign to each of the offices mentioned above so that the least amount of IP addresses are wasted.
- The headquarters - NASA HQ and SpaceX HQ will use **static addressing** to ensure security while the other offices will get their IP addresses through a **dedicated DHCP server**. This DHCP server will be located in NASA HQ.

- Emails have to be exchanged between all the offices. So an **Email server** has to be set up and it will be located in SpaceX HQ.
- White House and the headquarters will require **printers** to print out important documents generated via the exploration missions.
- NASA HQ and SpaceX HQ will also have **two separate web servers**. The **DNS server** will be located in NASA HQ. If anyone types the URL "**www.nasa.gov**" the web server located at NASA HQ will handle the query and the user will see a webpage that says "Public Service Broadcasting - Go!". Similarly, the web server located at SpaceX HQ will handle requests for "**www.spacex.com**" and return "Atlas Bound - Landed on Mars" when visited through the URL.
- All servers must be configured **manually**.

- Routing in the whole network should follow these rules:

    - ➔ Johnson Space Center and NASA HQ must use static routing. NASA HQ will be directly connected to White House, and Johnson Space Center will communicate with White House via NASA HQ.
    - ➔ Johnson Space Center and White House will also be connected, as mentioned earlier, but it will not be the primary route. A backup route has to be configured here.
    - ➔ The rest of the offices i.e. SpaceX HQ, SpaceX Satellite Facility, SpaceX Rocket Development and Test Facility will use dynamic routing.
    - ➔ You have to remember that the default route cannot be used while exchanging packets. Data will be delivered using static or dynamic routes only.

- Showing 2 end devices per network is good enough to represent the whole population.
- You need to be able to ping each office 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. Network topology diagram with proper labels
    2. The configuration commands of all the routers that you have implemented
    3. VLSM tree
    4. IP address table