NETWORK MANAGEMENT SYSTEM

ASSIGNMENT-3: MOBILE NETWORK AND SNMP MANAGEMENT

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INTRODUCTION TO MOBILE NETWORKS

Mobile networks are wireless communication systems that allow mobile devices to connect and communicate with each other and the internet. These networks consist of various components, including base stations, mobile switching centers, and user equipment. The evolution of mobile networks has progressed through several generations, each bringing advancements in technology and capabilities.

- 1G: The first generation of mobile networks, primarily focused on analog voice communication.
- 2G: Introduced digital voice services and SMS (Short Message Service).
- 3G: Enabled mobile data services, allowing users to access the internet on their devices.
- 4G: Provided high-speed internet access with improved bandwidth and reduced latency.
- 5G: Represents the latest generation, offering ultra-reliable low-latency communication and support for massive machine-type communications.

MOBILE NETWORK FUNDAMENTALS

Components:

- **User Equipment (UE):** Devices like smartphones and tablets.
- **Base Stations:** Radio towers for coverage.
- **Core Network:** Central network for data management.
- **Backhaul Network:** Connection between base stations and core network.

Protocols:

- **GPRS:** Early packet-switched data service.
- **UMTS:** 3G standard for higher data rates.
- **LTE:** 4G standard for high-speed data.

Architecture:

- **Radio Access Network (RAN):** Connects devices to the core network.
- **Evolved Packet Core (EPC):** Core network for LTE, providing IP-based services.

SETTING UP GNS3

1. INTRODUCTION TO GNS3:

GNS3 (Graphical Network Simulator-3) is a powerful network simulation tool that allows users to design, configure, and troubleshoot virtual networks. It supports various network devices, including Cisco routers and switches.

2. INSTALLATION STEPS:

i. **Download GNS3:**

Visit the GNS3 website and download the latest version.

ii. **Install GNS3:**

Follow the installation wizard for your operating system (Windows, macOS, Linux).

iii. **Install Cisco IOS:**

Obtain the Cisco IOS image and import it into GNS3.

iv. **Configure GNS3:**

Open GNS3 and configure the preferences to set up the paths for the IOS images and other settings.

CONFIGURING BASIC SWITCH AND ROUTER OPERATIONS

1. Creating a Simple Network Topology

- Open GNS3 and create a new project.

- Drag and drop a router and a switch onto the workspace.
- Connect them using the appropriate interfaces.

2. **Basic Configuration Commands**

   i. **Router Configuration:**

      - Access the router console and enter the following commands:

```
enable
configure terminal
hostname Router1
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
```

   ii. **Switch Configuration:**

      - Access the switch console and enter the following commands:

```
enable
configure terminal
hostname Switch1
interface VLAN 1
ip address 192.168.1.2 255.255.255.0
no shutdown
exit
```

PYTHON SCRIPTS FOR OVERVIEW

1. **Python Script Overview**

Python can be used to automate network configuration tasks using libraries such as **Netmiko** or **Paramiko**. Below is an example of a Python script that connects to a Cisco router and configures it.

2. **Example Python Script**

```
from netmiko import ConnectHandler


# Device details
router = {
   'device_type': 'cisco_ios',
   'host': '192.168.1.1',
   'username': 'admin',
   'password': 'password',
}
```

CONCLUSION

Python scripting offers a promising approach to automating network configurations, demonstrating its potential to reduce manual errors and increase efficiency. While the theoretical exploration provided valuable insights, the practical implementation was limited by the lack of a network simulation environment.

Key takeaways from this exercise include:

- **Automation Potential:** Python can significantly streamline network configuration tasks.
- **Skill Development:** Network engineers should prioritize acquiring programming skills.
- **Educational Needs:** Hands-on experience and accessible learning environments are crucial for comprehensive skill development in network automation.

In conclusion, while the practical application was constrained, the theoretical exploration highlights the immense potential of Python in network automation.

It underscores the importance of bridging the gap between theory and practice to foster a robust understanding of network automation principles.

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