Computer Networks and Communications(CEN3002)

Project Title: Home Network Design and Performance Evaluation

Group 5

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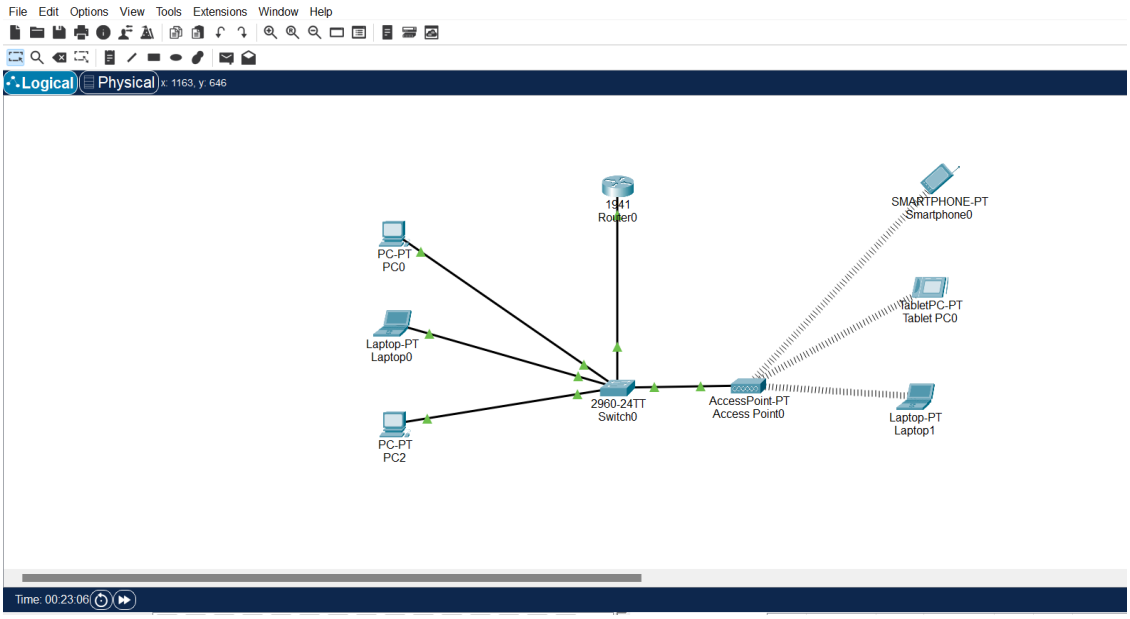
Introduction

LANs have become a backbone in homes and offices, facilitating device communication and internet-dependent tasks. This project focuses on creating a robust local network that combines both wired and wireless connections using various devices. Additionally, it includes assessing network performance through comprehensive tests to enhance connectivity and performance.

Part 1: Designing a Local Network (Sarah Abdullah Al-Amari)

• Objective: Create two local network at home with a mix of wired and wireless connections



describe their selected devices and equipment and explain their role in the network design.

Router

Description: Directs data between different networks, connects to the Internet and provides connectivity between the local and public networks

Role in network design: Transfers data between networks.

Switch

Description: A device that connects computers and other devices in the local network.

Role in network design: Connects devices within the local network and directs data between them efficiently.

Access Point

Description: A device that provides a wireless connection to the network and acts as a link between wireless devices and the wired network.

Role in network design: The access point provides wireless coverage, allowing devices to connect to the network without the need for cables.

Personal Computer PC

Description: It is a multi-purpose device and is used in a variety of important.

Role in Network Design: Acts as a workstation in the network, can be configured to access shared resources such as servers and printers, and allows users to monitor the network and troubleshoot problems by running network management software.

Laptop

Description: A portable computer that combines the power of a desktop computer with the mobility features.

Role in Network Design: Enhances flexibility of network access, allowing users to connect in different locations and typically supports both wired and wireless connections.

Smartphone

Description: A portable device that combines the features of a mobile phone with advanced computing capabilities.

Role in Network Design: A smartphone connects to the network via Wi-Fi or cellular data, enabling continuous connectivity.

Tablet

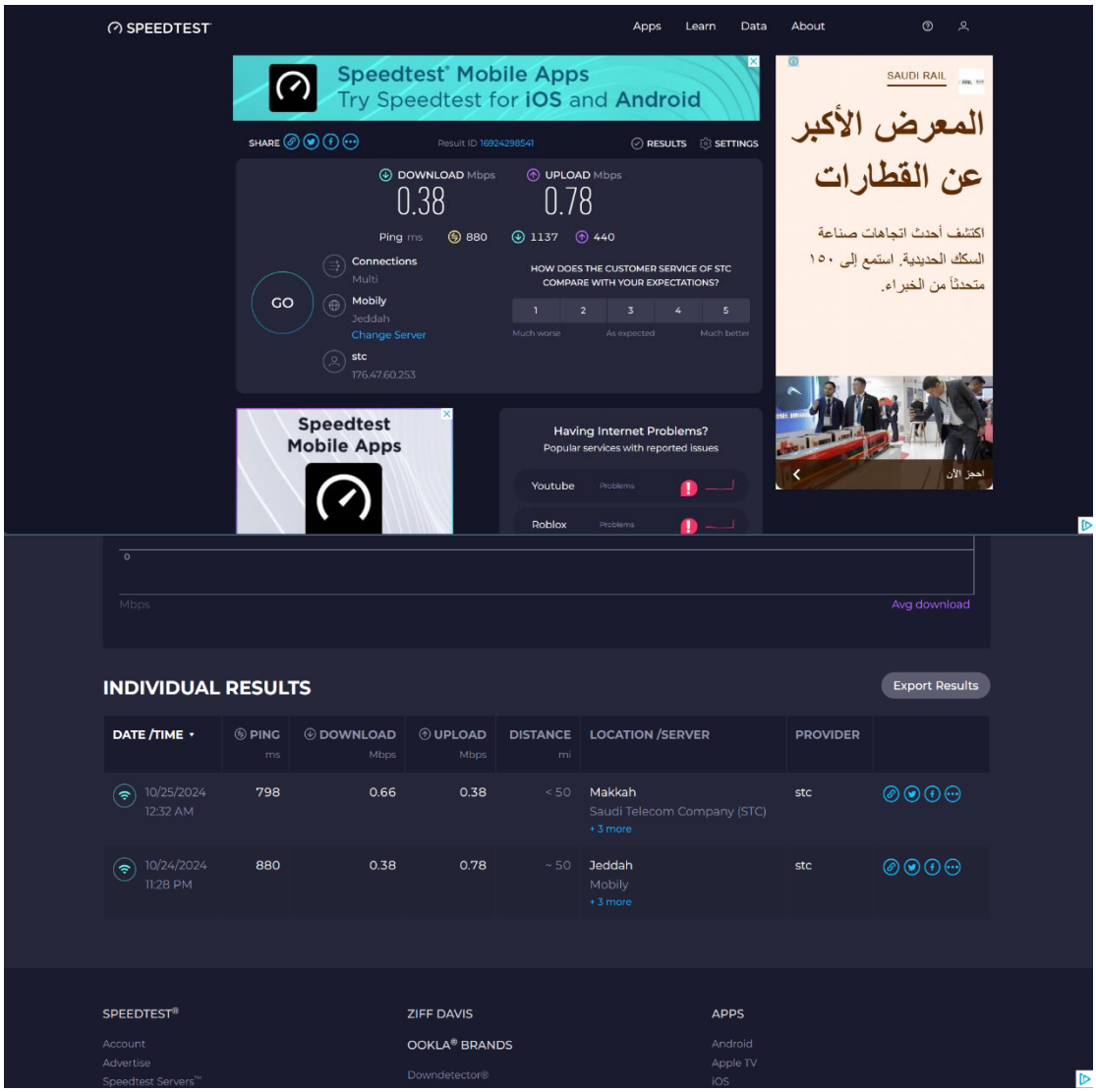
Description: A portable device with a touch screen used for a variety of purposes.

Role in Network Design: Provides another level of mobility and can be used in both personal and professional settings, typically connected via Wi-Fi.

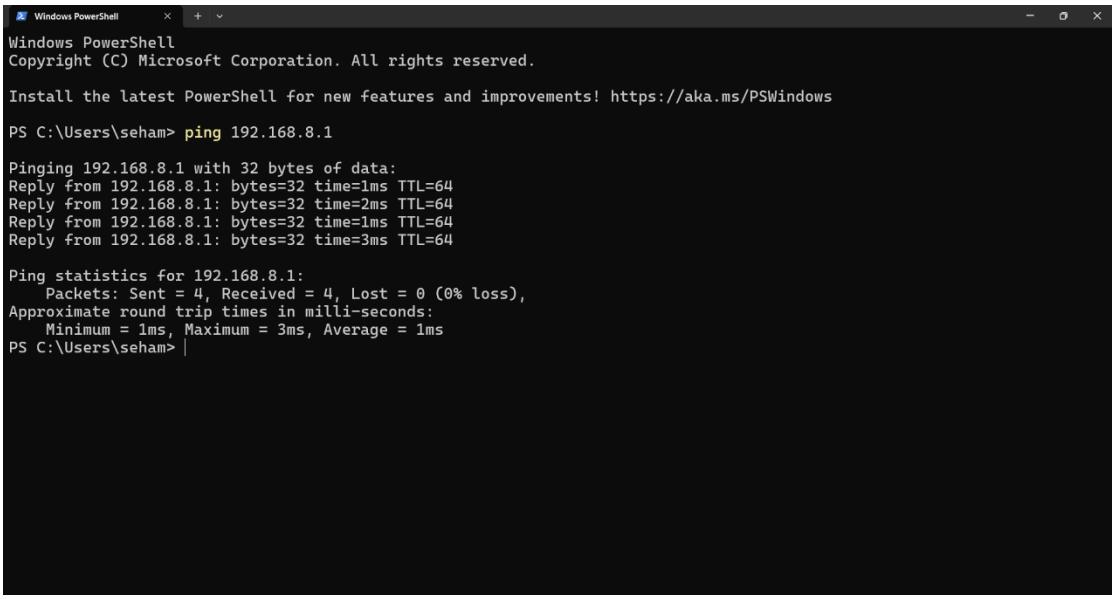
in conclusion, all these devices contribute to the network's functions and flexibility, which contributes to improving performance and user experience.

Part 2: Evaluating Network Performance (Saham Al-Harbi)

1. Speed Test:

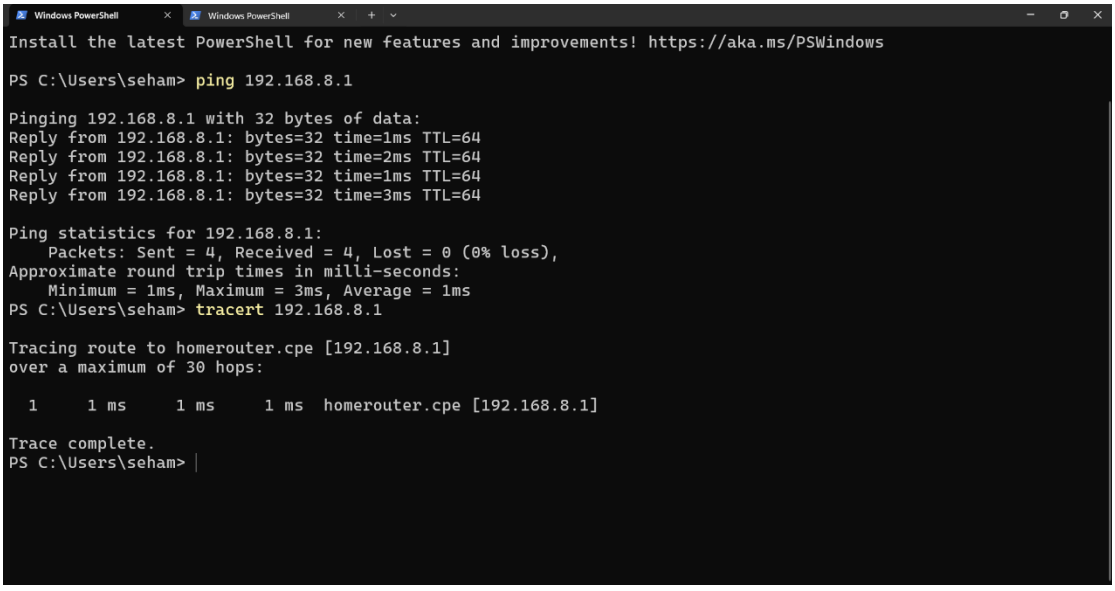


2. Ping Test:



3. Traceroute:

1- Type tracert [IP address or domain]



2- Analysis:

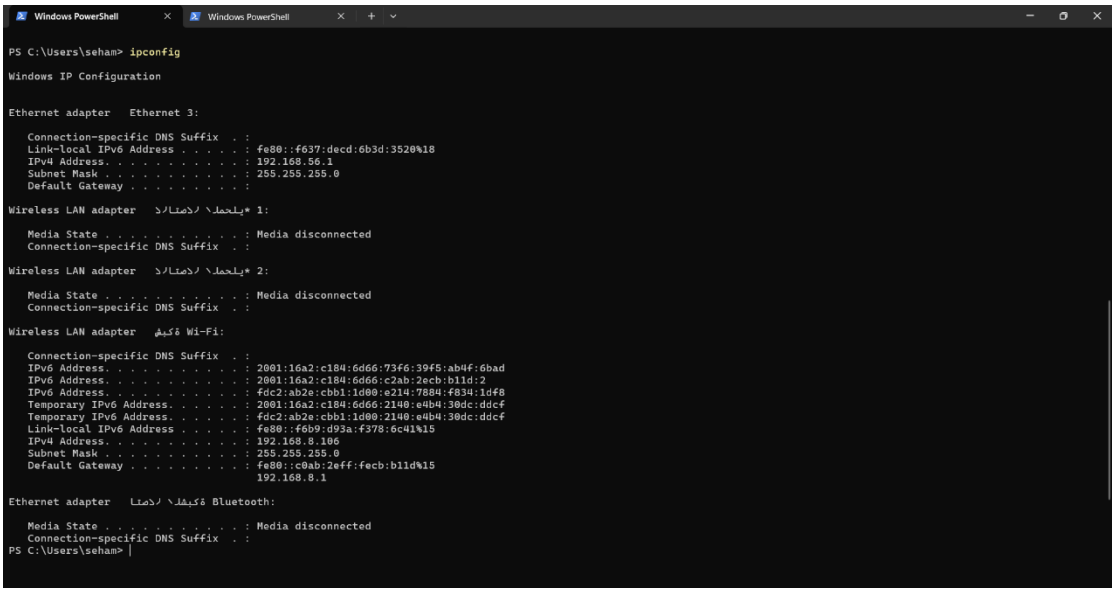
1. Number of hops: The traceroute shows only 1 hop, indicating the destination 192.168.8.1 is directly connected on the local network with no intermediate routers.
2. Latency at each hop: The latency is consistently 1 ms for all 3 packets sent. This is an extremely low latency, suggesting a high-speed, uncongested connection to the destination.
3. No timeouts or lost packets: The trace completed successfully without any

timeouts or lost packets, further confirming the stability and reliability of the network path.

Based on these results, we can conclude that:

- The network path to 192.168.8.1 is direct and local, without any intermediate hops or routers.
- The connection is extremely fast, with negligible latency, indicating no congestion or performance issues.
- There are no connectivity problems along the route, as all packets were successfully delivered.

3- Check Network Configuration:



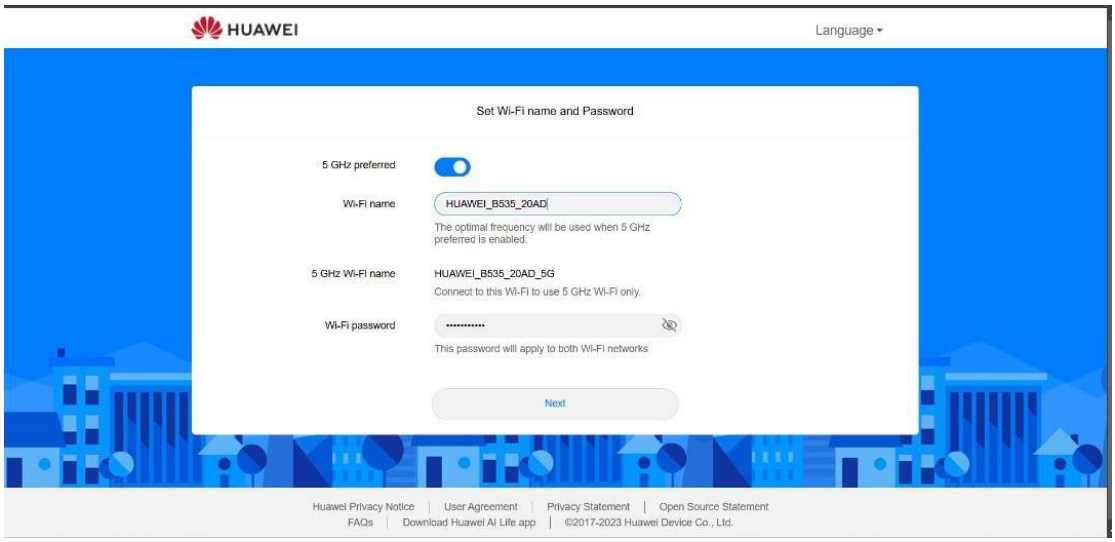
Part3: Checking Network Security (lujain al-kenani , shaima lafi)

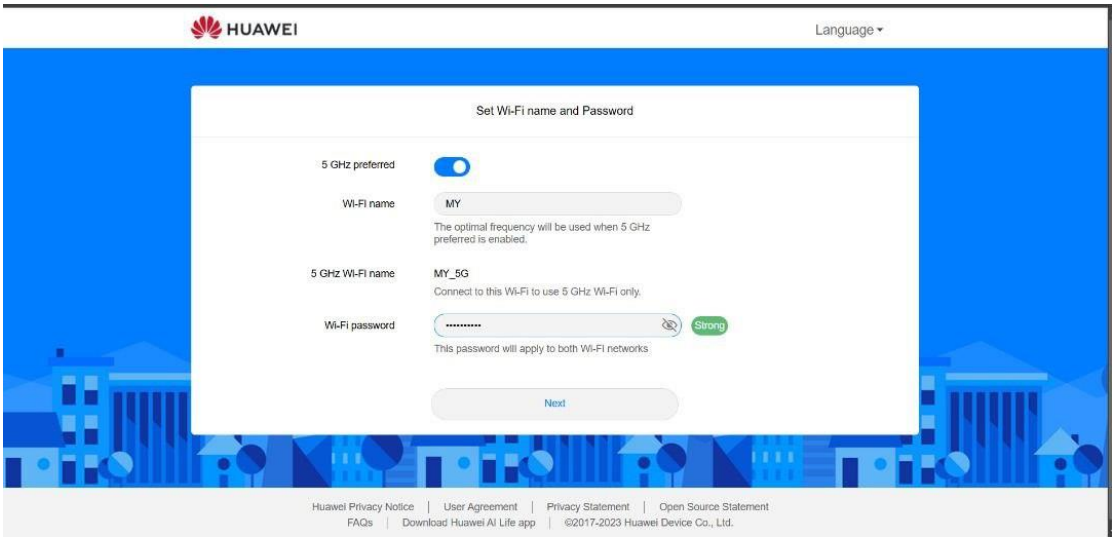
It will focus on securing the network by implementing several basic steps. We will analyze how to update the security settings in the router, enable advanced encryption protocols, and ensure the protection of data transmitted over the network. This part aims to enhance network security, protect connected devices, and ensure user privacy.

1.Connect to your router's web interface using its IP address 192.168.8

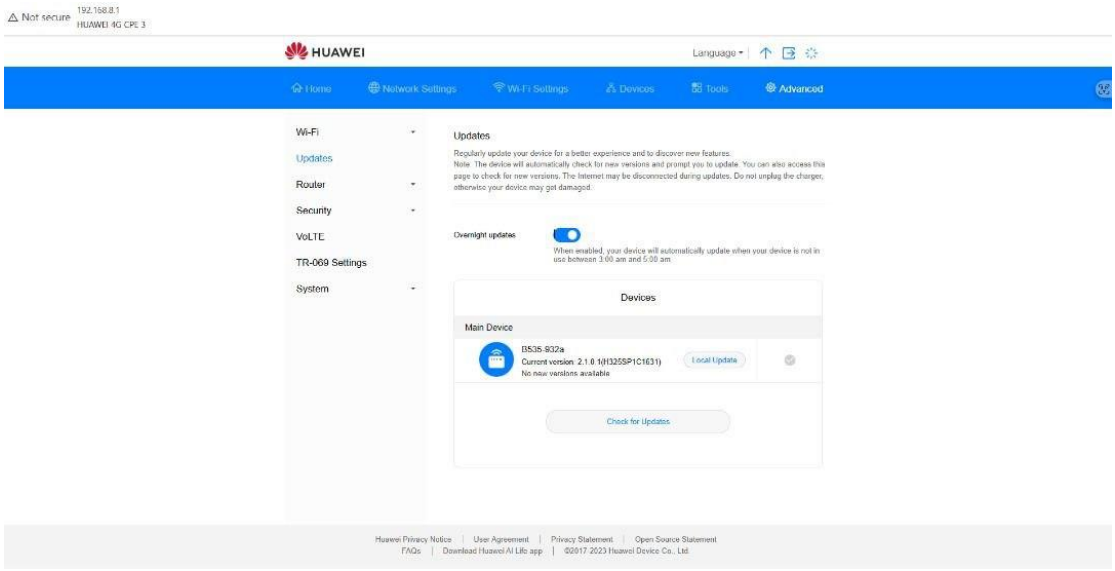
Log in with the admin credentials (password)

Changing Default Credentials: And Changing the Network Name (SSID)

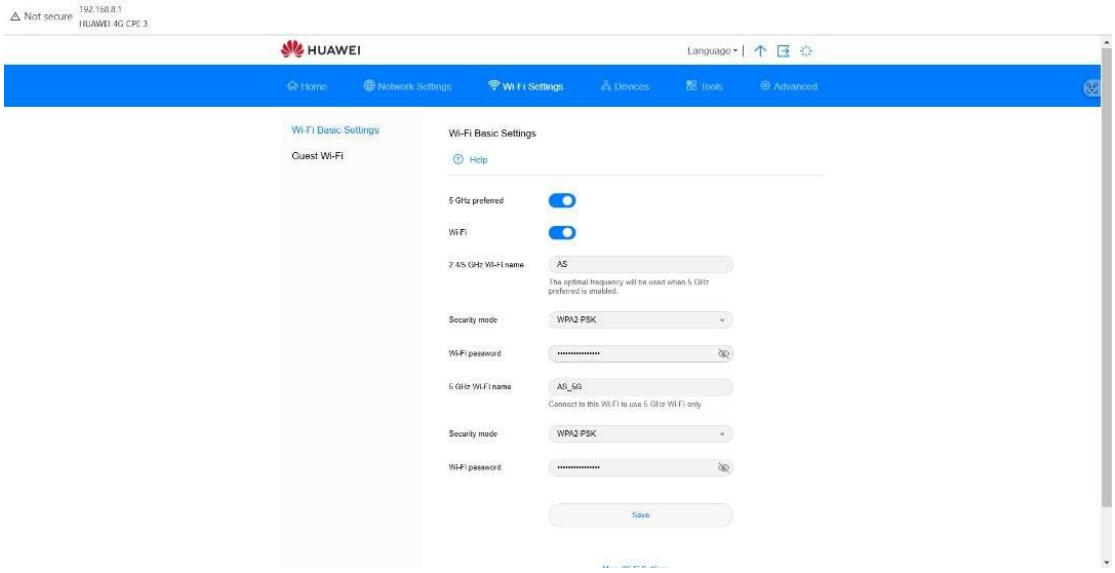




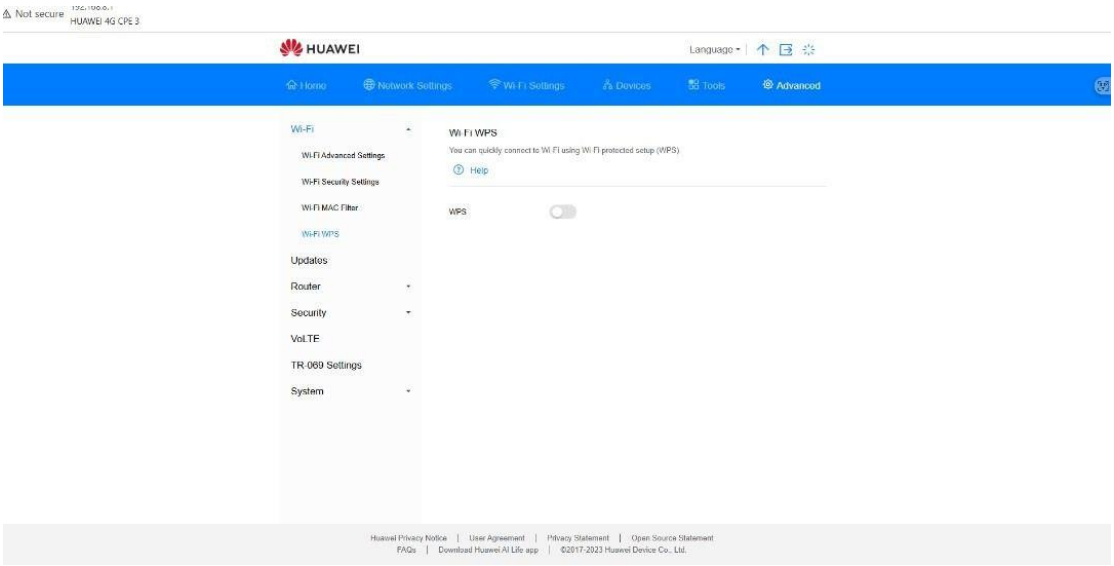
Updating Firmware:



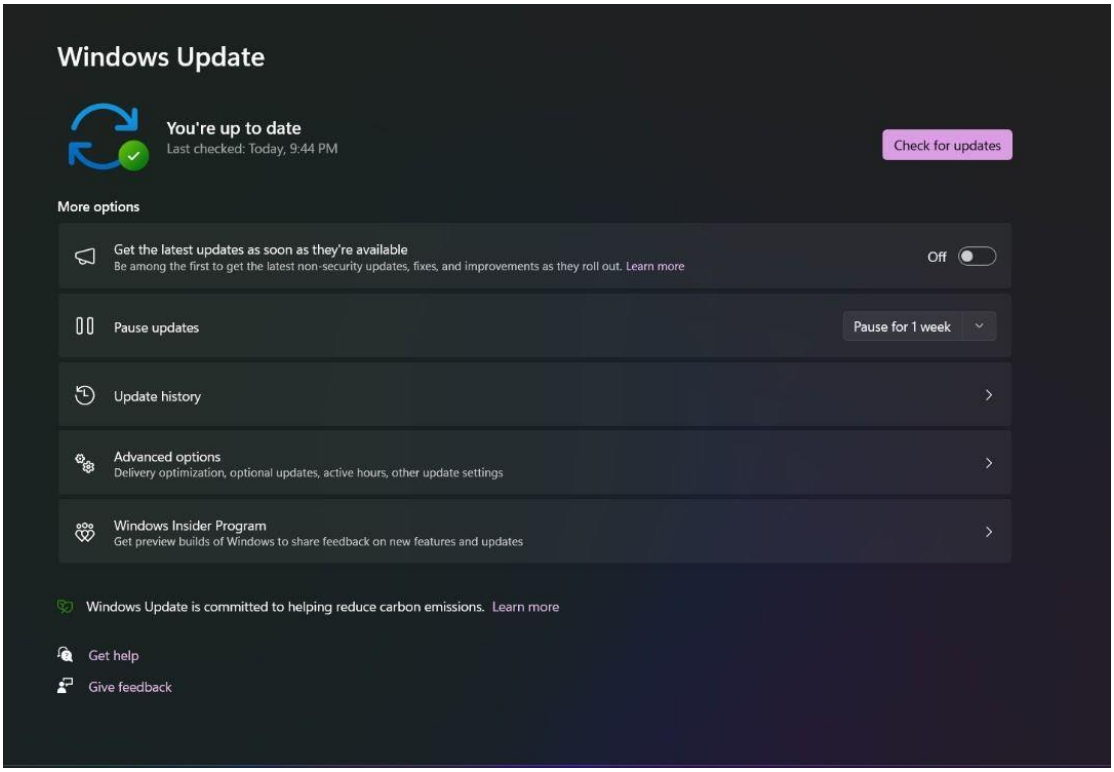
Wireless Network Security Protocol:



Disabling WPS:



Make sure that operating systems and applications are updated on all devices connected to your network, such as smartphones and computers, to enhance their security.



Network Traffic Analysis (Optional):