جامعة بيرزيت
BIRZEIT UNIVERSITY

Faculty of Engineering & Technology
Electrical & Computer Engineering Department
ENCS3320 COMPUTER NETWORKS
First Semester – 2024/2025

Project #2
Cisco Packet Tracer

Prepared by:
Name:Abdulrahman Atyani Id:1221808
Name:Ahmad Karmi Id:1220003
Name:Abdulrahim Shuaibi Id:1220148

Instructor: Dr. Mohammad Jubran
Section:3
Date:18/1/2025

Abstract

This project focuses on designing and implementing a comprehensive network topology using Cisco Packet Tracer. The project aims to enhance student practical skills in IP sub-netting, static and dynamic routing (OSPF and BGP), wireless security, and the configuration of essential network services, including Web, Email, DNS, and DHCP servers. It involves building interconnected networks for Google, the Faculty of Engineering and Technology, and a Home-ISP environment. The project emphasizes dynamic NAT with PAT, secure wireless LAN setup.

Contents

Table of Figure

Table of Tables

1 Theory and Procedure

In this section, we talk about two important parts which project depends on them and this parts is Protocols and components of any Network Topology

1.1 Protocols and main concepts

There are many types of protocols and basic concepts that used in project and they are as follows

1.1.1 NAT

Network Address Translation (NAT) is a process in which one or more local IP addresses are translated into one or more Global IP addresses and vice versa to provide Internet access to the local hosts. It also does the translation of port numbers, i.e., masks the port number of the host with another port number in the packet that will be routed to the destination. It then makes the corresponding entries of IP address and port number in the NAT table. NAT generally operates on a router or firewall. Generally, the border router is configured for NAT i.e. the router which has one interface in the local (inside) network and one interface in the global (outside) network. When a packet traverse outside the local (inside) network, then NAT converts that local (private) IP address to a global (public) IP address. When a packet enters the local network, the global (public) IP address is converted to a local (private) IP address. [1]

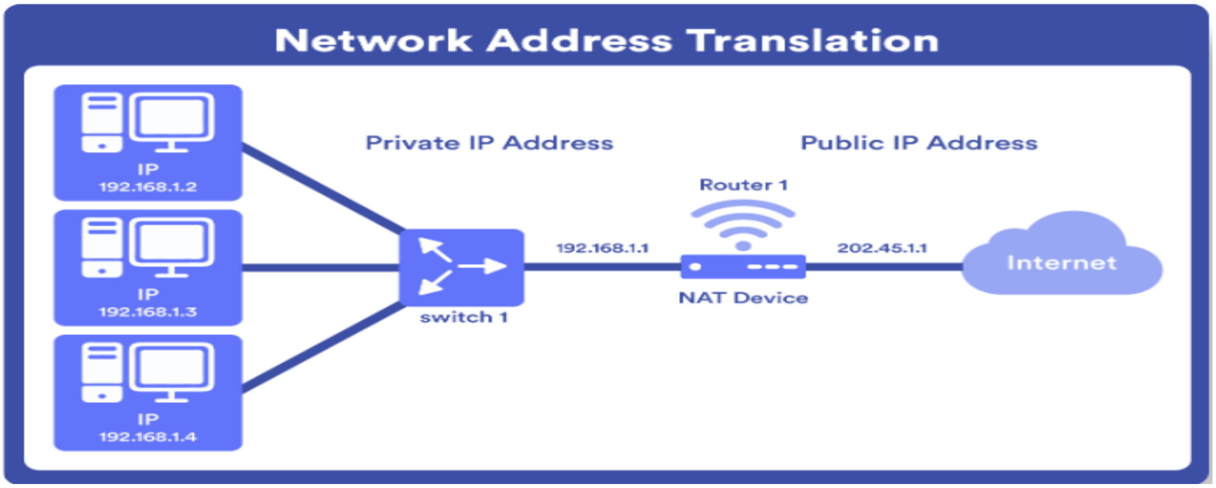


Figure 1: Nat

1.1.2 DHCP

Dynamic Host Configuration Protocol (DHCP) is a system for assigning Internet Protocol (IP)addresses to each network device (known as a host) on an organization's network. A host may be a desktop computer, a laptop, a tablet, a mobile device, a thin client, or other types of devices. Each host must have an IP address to communicate with other devices over the internet. The DHCP network protocol assigns addresses automatically, rather than requiring network administrators to make manual assignments. DHCP is also responsible for automatically assigning new IP addresses when devices move to new locations on the network. In addition to IP addresses, a DHCP service assigns configuration parameters like Domain Name System (DNS) addresses, subnet masks, and default gateways that are essential to network communications. when a device (also called a DHCP client) joins the network, it broadcasts a "DHCP discover" message to the subnet of the network, requesting an IP address along with other configuration information. When DHCP servers on the network receive the DHCP discover message, they respond with DHCP offers that may include an IP address selected from a pool of IP addresses, along with network parameters and DHCP information like DNS servers , subnet mask, default gateway, and duration of the IP address lease. While a DHCP client may receive multiple responses, it selects just one of the offered IP addresses and sends a return message confirming which offer it is accepting. The DHCP server acknowledges the acceptance with a message that contains the final, confirmed IP configuration details, which the client uses to configure its network interface. With DHCP, most clients are offered a lease for a specific period of time and can renew the lease by requesting an extension from the server. When a client is leaving a network, it sends a DHCP release message that lets the server know the IP address is now free and may be reallocated. [2]

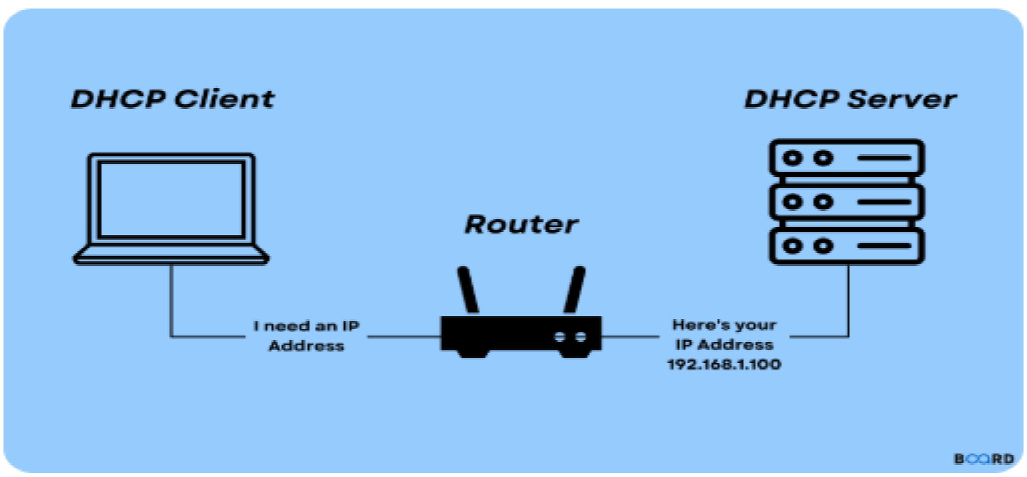


Figure 2: DHCP

1.1.3 Web

The World Wide Web (WWW or simply the Web) is an information system that enables content sharing over the Internet through user-friendly ways meant to appeal to users beyond IT specialists and hobbyists.[1] It allows documents and other web resources to be accessed over the Internet according to specific rules of the Hypertext Transfer Protocol (HTTP).[1]

Figure 3: web

1.1.4 Email

Electronic mail (usually shortened to **email**; alternatively hyphenated **e-mail**) is a method of transmitting and receiving digital messages using electronic devices over a computer network. It was conceived in the late–20th century as the digital version of, or counterpart to, mail (hence *e-* + *mail*). Email is a ubiquitous and very widely used communication medium; in current use, an email address is often treated as a basic and necessary part of many processes in business, commerce, government, education, entertainment, and other spheres of daily life in most countries.

Email operates across computer networks, primarily the Internet, and also local area networks. Today's email systems are based on a store-and-forward model. Email servers accept, forward, deliver, and store messages. Neither the users nor their computers are required to be online simultaneously; they need to connect, typically to a mail server or a webmail interface to send or receive messages or download.[1]

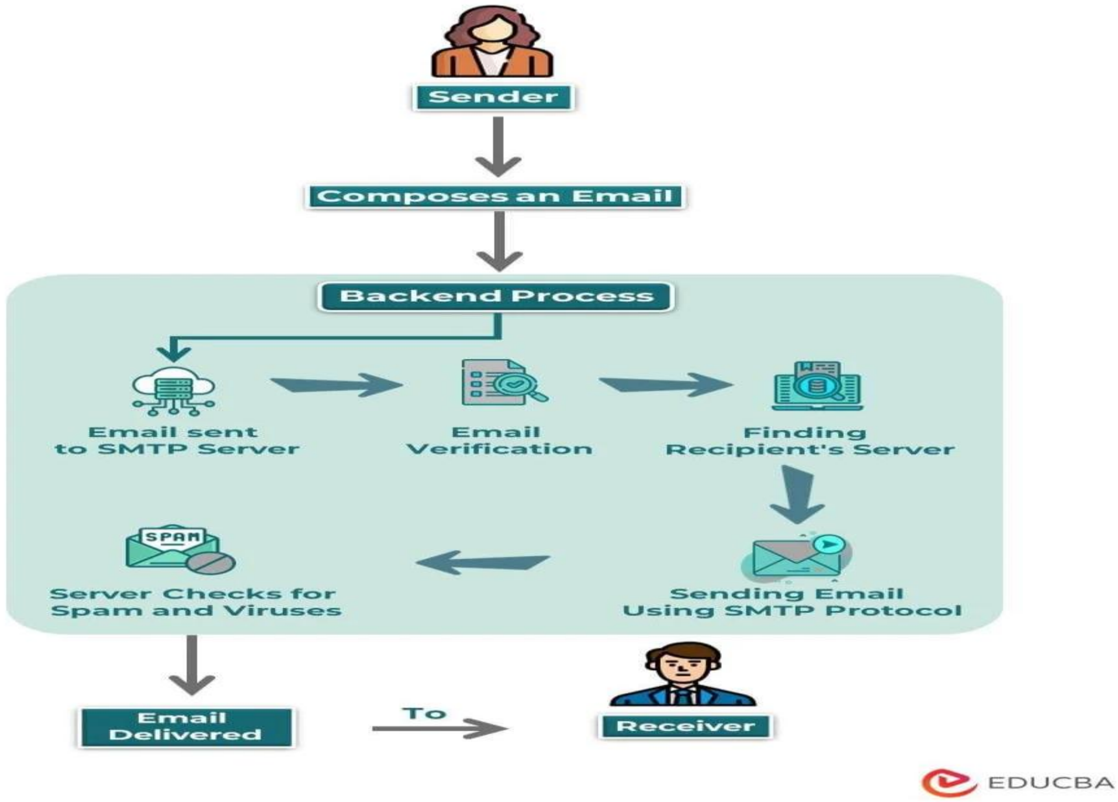


Figure 4: EMAIL

1.1.5 DNS

The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources. The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1). An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home. When a user wants to load a webpage, a translation must occur between what a user types into their web browser (example.com) and the machine-friendly address necessary to locate the example.com webpage. [3]

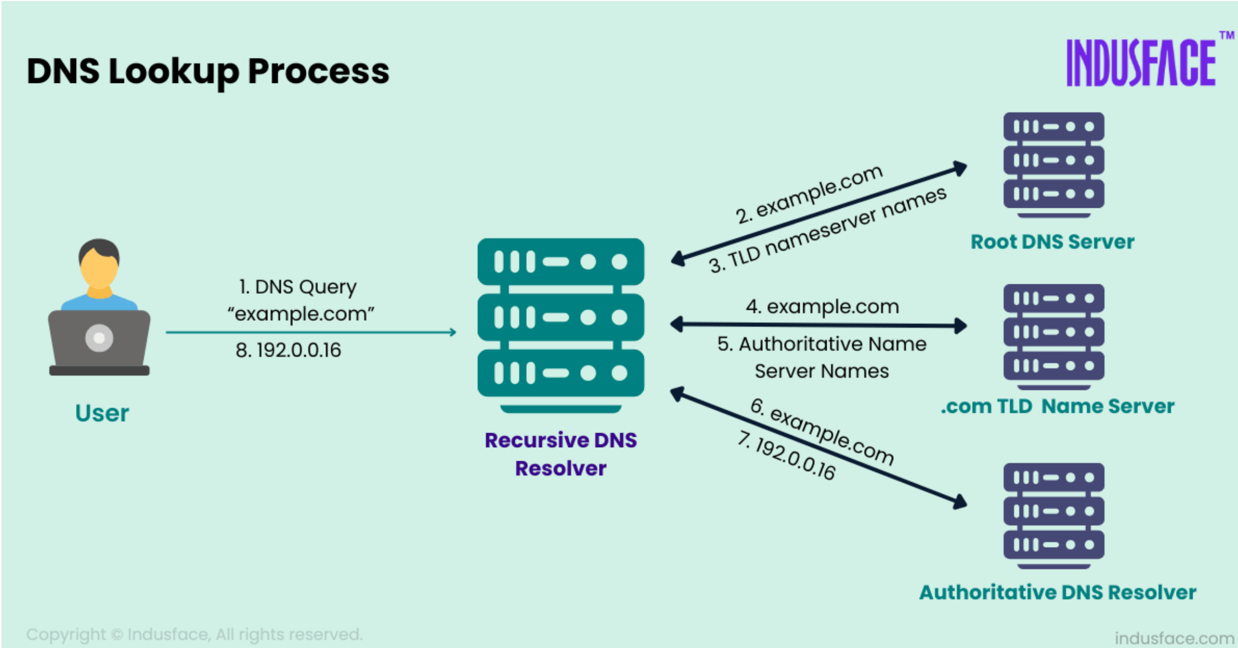


Figure 5: DNS

1.1.6 OSPF

Open Shortest Path First (OSPF) is a dynamic, link-state routing protocol widely used in IP networks to determine the most efficient path for data transmission. It operates within an Autonomous System (AS) and uses Link-State Advertisements (LSAs) to share information about routers' directly connected networks. Each router compiles this information into a Link-State Database (LSDB), representing the complete network topology. OSPF employs Dijkstra's Shortest Path First (SPF) algorithm to calculate the optimal path based on a cost metric, typically influenced by bandwidth, with lower-cost routes being preferred.

To enhance scalability and manageability, OSPF organizes networks into hierarchical areas, with all areas connected through a central backbone area (Area 0). This structure reduces routing overhead and improves performance. Additionally, OSPF supports Variable Length Subnet Masking (VLSM) and Classless Inter-Domain Routing (CIDR), enabling efficient IP address allocation. Its fast convergence ensures that network routes are quickly updated in response to topology changes, making OSPF a reliable and scalable solution for large enterprise networks.

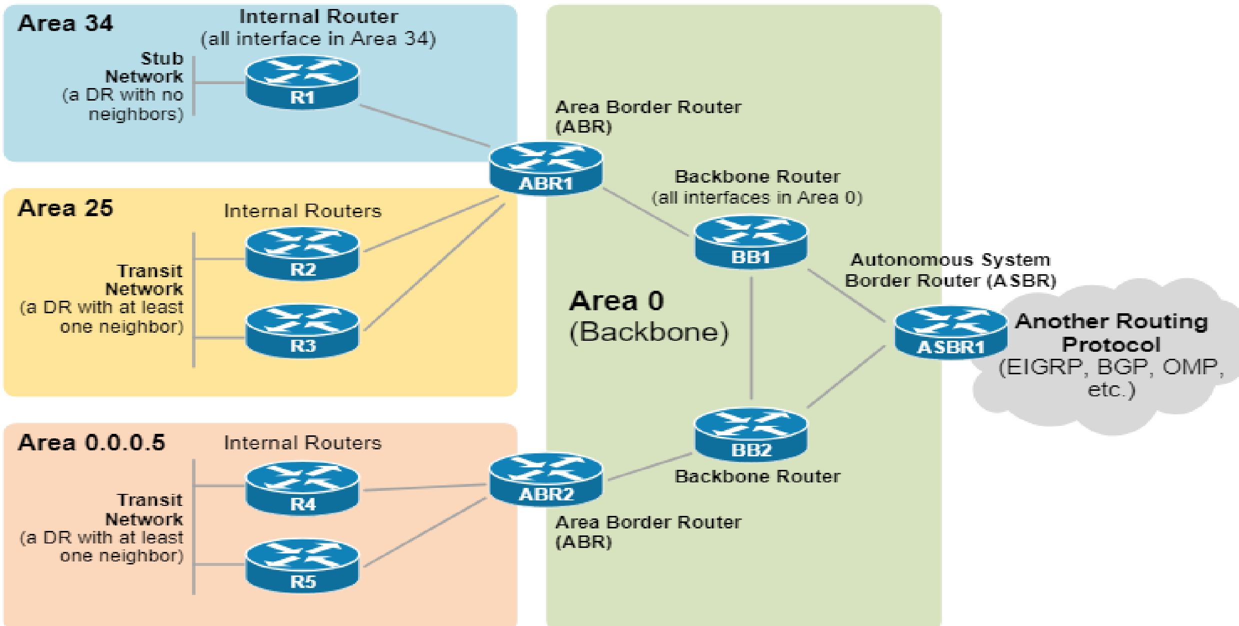


Figure 6:OSPF

1.1.7 BGP

Border Gateway Protocol (BGP) is the postal service of the Internet. When someone drops a letter into a mailbox, the Postal Service processes that piece of mail and chooses a fast, efficient route to deliver that letter to its recipient. Similarly, when someone submits data via the Internet, BGP is responsible for looking at all of the available paths that data could travel and picking the best route, which usually means hopping between autonomous systems.

BGP is the protocol that makes the Internet work by enabling data routing. When a user in Singapore loads a website with origin servers in Argentina, BGP is the protocol that enables that communication to happen quickly and efficiently.[3]

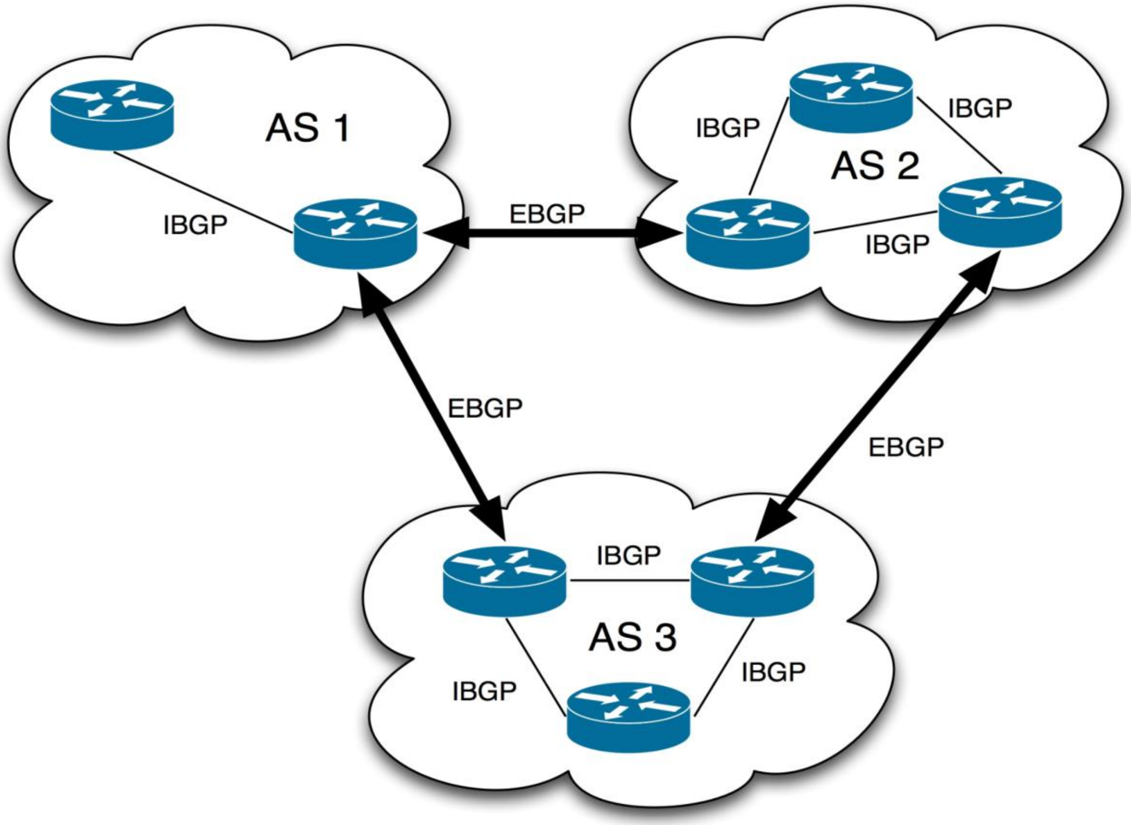


Figure 7:BGP

1.2 Basic Components of any Network Topology

1.2.1 Router

A router is a device that connects two or more packet-switched networks or subnetworks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses, and allowing multiple devices to use the same Internet connection. Think of a router as an air traffic controller and data packets as aircraft headed to different airports (or networks). Just as each plane has a unique destination and follows a unique route, each packet needs to be guided to its destination as efficiently as possible. In the same way that an air traffic controller ensures that planes reach their destinations without getting lost or suffering a major disruption along the way, a router helps direct data packets to their destination IP address.

In order to direct packets effectively, a router uses an internal routing table — a list of paths to various network destinations. The router reads a packet's header to determine where it is going, then consults the routing table to figure out the most efficient path to that destination. It then forwards the packet to the next network in the path. [3]

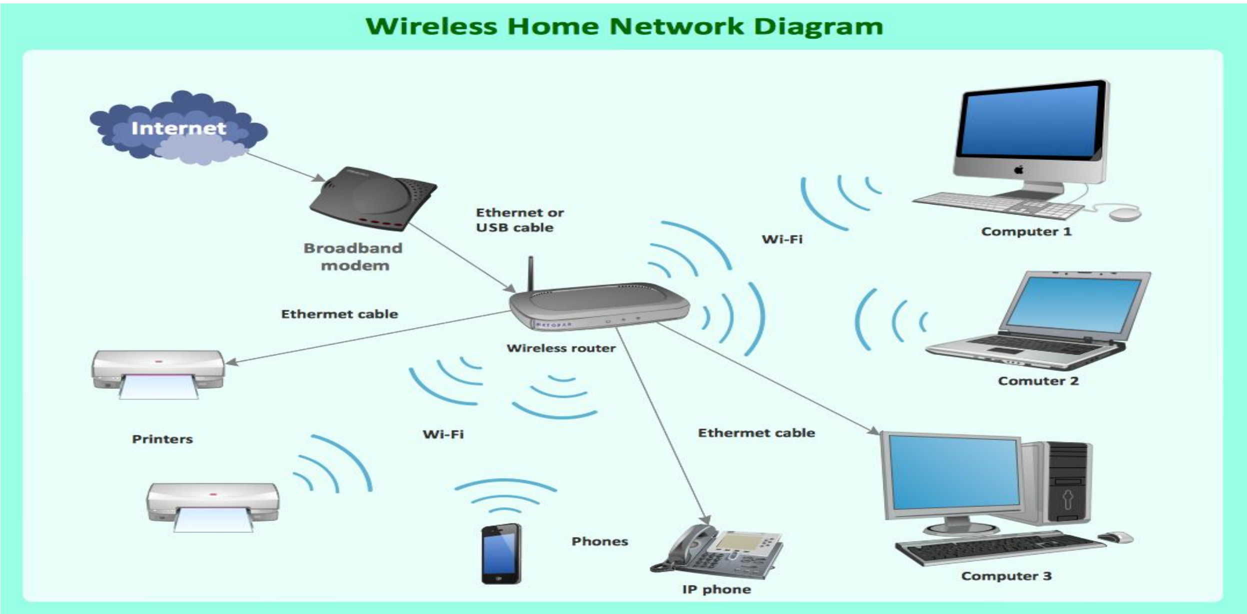


Figure 8:Router

1.2.2 Access point

In computer networking, a **wireless access point** (**WAP**) (also just **access point** (**AP**)) is a networking hardware device that allows other Wi-Fi devices to connect to a wired network or wireless network. As a standalone device, the AP may have a wired or wireless connection to a switch or router, but in a wireless router it can also be an integral component of the networking device itself. A WAP and AP is differentiated from a hotspot, which can be a physical location or digital location where Wi-Fi or WAP access is available.An AP connects directly to a wired local[3] area network, typically Ethernet, and the AP then provides wireless connections using wireless LAN technology, typically Wi-Fi, for other devices to use that wired connection. APs support the connection of multiple wireless devices through their one wired connection.[1]

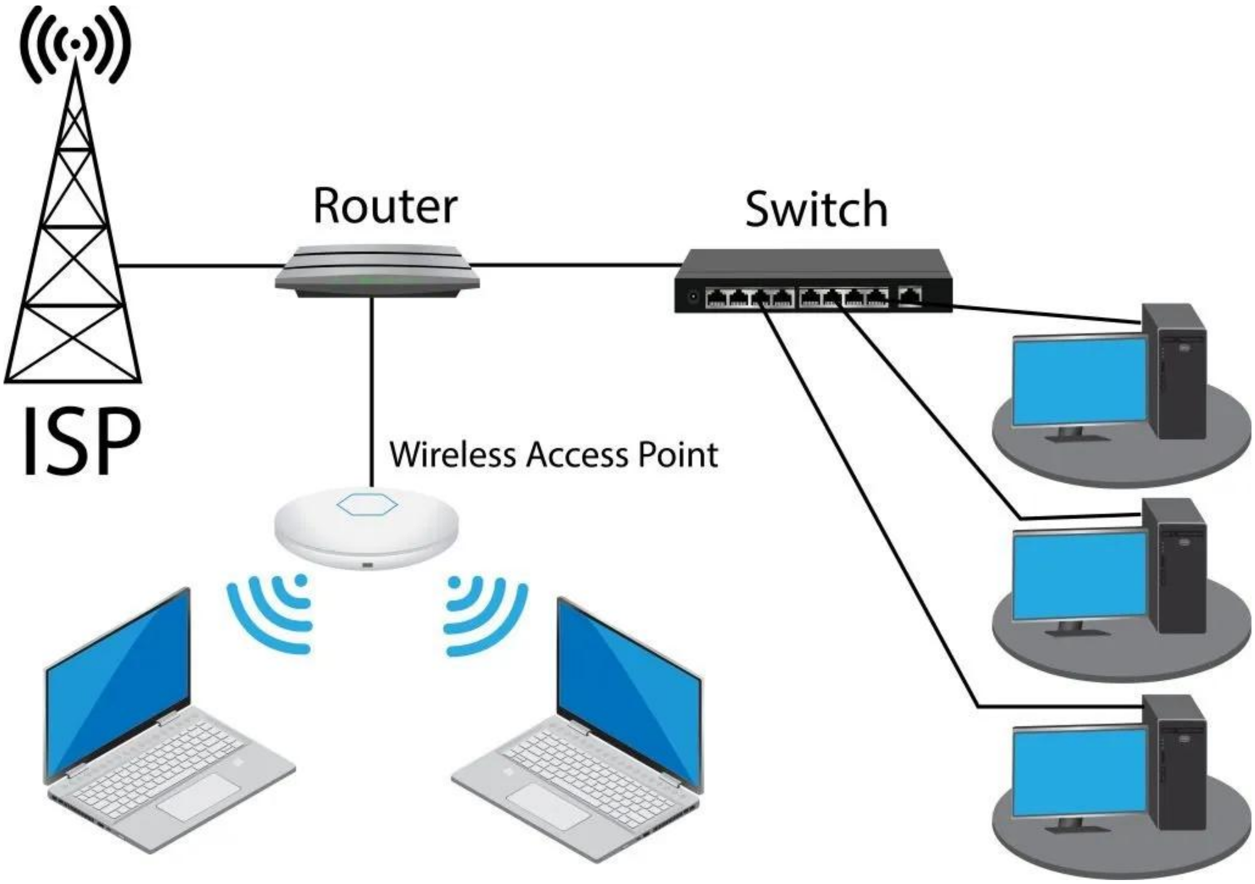


Figure 9:Access point

1.2.3 Switch

A network switch is a hardware device used in computer networks to connect multiple devices (such as computers, printers, and servers) within a Local Area Network (LAN). It operates primarily at Layer 2 (Data Link Layer) of the OSI model but can also function at Layer 3 (Network Layer) when performing routing tasks.

The core principle of a switch is to efficiently forward data frames between devices based on their Media Access Control (MAC) addresses. When a switch receives a data frame, it examines the destination MAC address and consults its MAC address table to determine which port is associated with that address. The switch then forwards the frame only to the specific port connected to the destination device, rather than broadcasting it to all ports. This targeted communication reduces network congestion and enhances performance compared to traditional hubs, which broadcast data to all devices. Advanced switches may also support features like VLANs, Quality of Service (QoS), and network security measures.

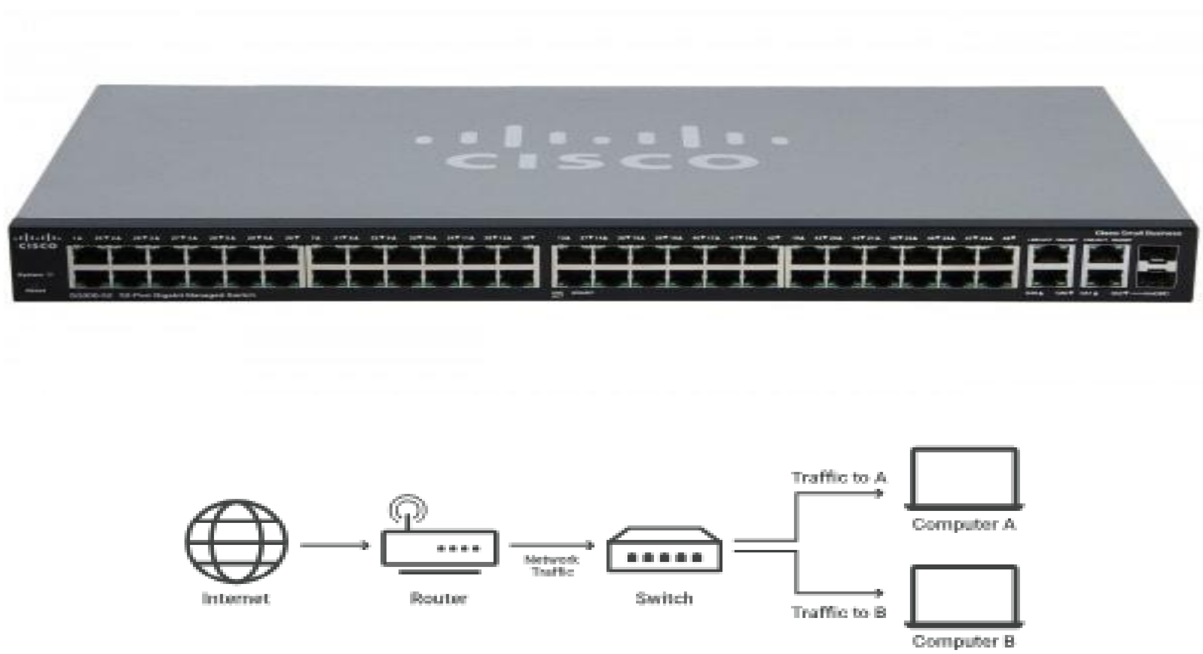


Figure 10:Switch

1.2.4 End devices

End devices are network components that serve as the source or destination of data in a network. Common end devices include **PCs (Personal Computers)**, **laptops**, and **servers**. These devices are essential for user interaction, data processing, and service delivery within a network.

- **PCs and Laptops** act as client devices that allow users to access network resources, browse the internet, use applications, and communicate with other devices. They connect to the network via wired (Ethernet) or wireless (Wi-Fi) connections and rely on network protocols (like TCP/IP) to send and receive data.

- **Servers** are specialized end devices designed to provide services, applications, and resources to other devices (clients) over a network. Servers can host websites, manage databases, handle emails, or store files, ensuring that multiple users can access shared resources efficiently.

End devices operate mainly at the **Application Layer (Layer 7)** of the OSI model, enabling user-level interaction, but they also interact with lower layers to manage data transmission.

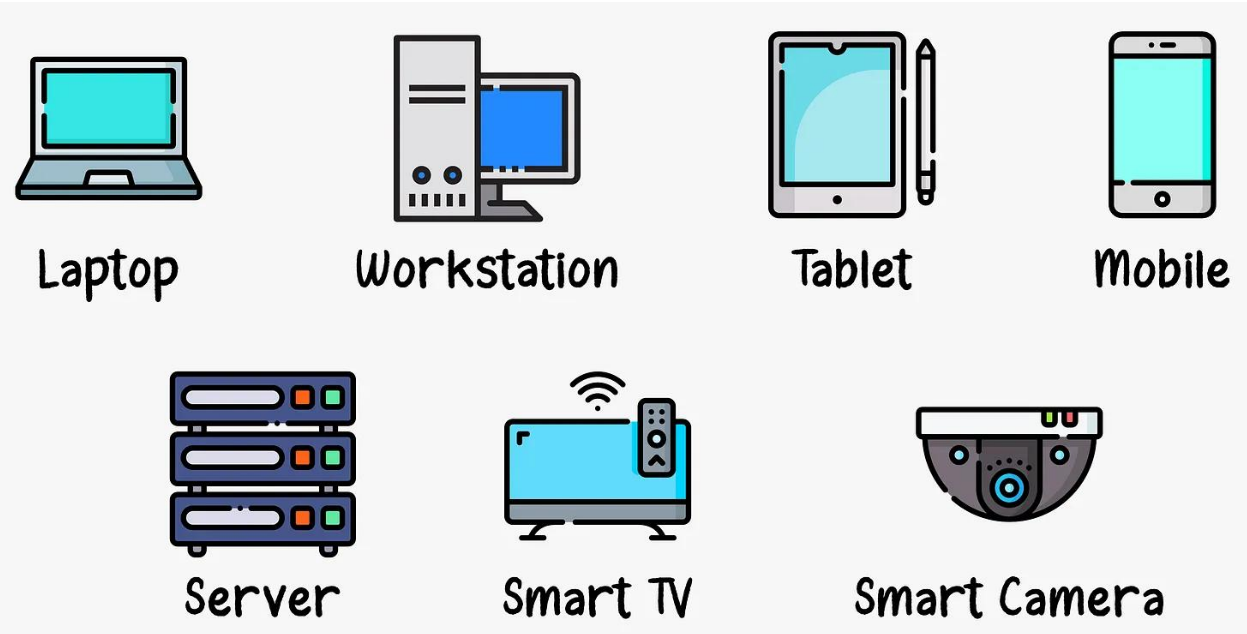


Figure 11:End devices

2 Results and Discussions

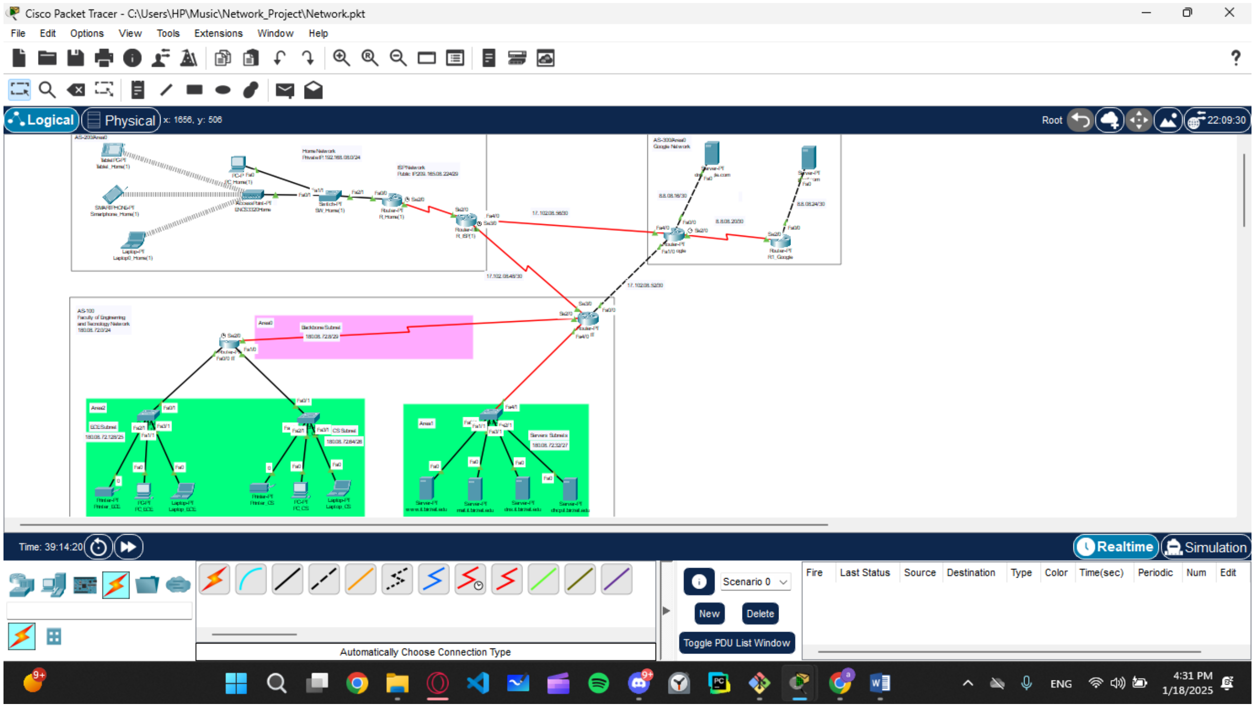


Figure 12:System graph

Table 1: System Subnet

Connection	# Served IPSs	IP	Subnet-Mask
Router0 IT – Router0 Google	2	8.8.08.16/30	255.255.255.252
Router0 IT – Router0 Home	2	8.8.08.24/30	255.255.255.252
Router0 Google – Router0 Home	2	8.8.08.20/30	255.255.255.252

2.1 Google Network (AS-300)

2.1.1 Sub-netting

Table 2: Google (AS300) Subnet

Connection	# Served IPSs	IP	Subnet-Mask
DNS – Router0	2	8.8.08.16/30	255.255.255.252
Gmail – Router1	2	8.8.08.24/30	255.255.255.252
Router0 – Router1	2	8.8.08.20/30	255.255.255.252

2.2 Faculty of Engineering and Technology Network (AS-100)

2.2.1 Sub-netting

Table 3: ENCS (ASS100) Subnet

Area	# Requested IPs	IP	Subnet-Mask
Area0 (Backbone Subnet)	4	180.08.72.8/29	255.255.255.248
Area1 (Servers Subnet)	28	180.08.72.32/27	255.255.255.224
Area2 (ECE Subnet)	120	180.08.72.128/25	255.255.255.128
Area2 (CS Subnet)	55	180.08.72.64/26	255.255.255.192

2.2.2 Results

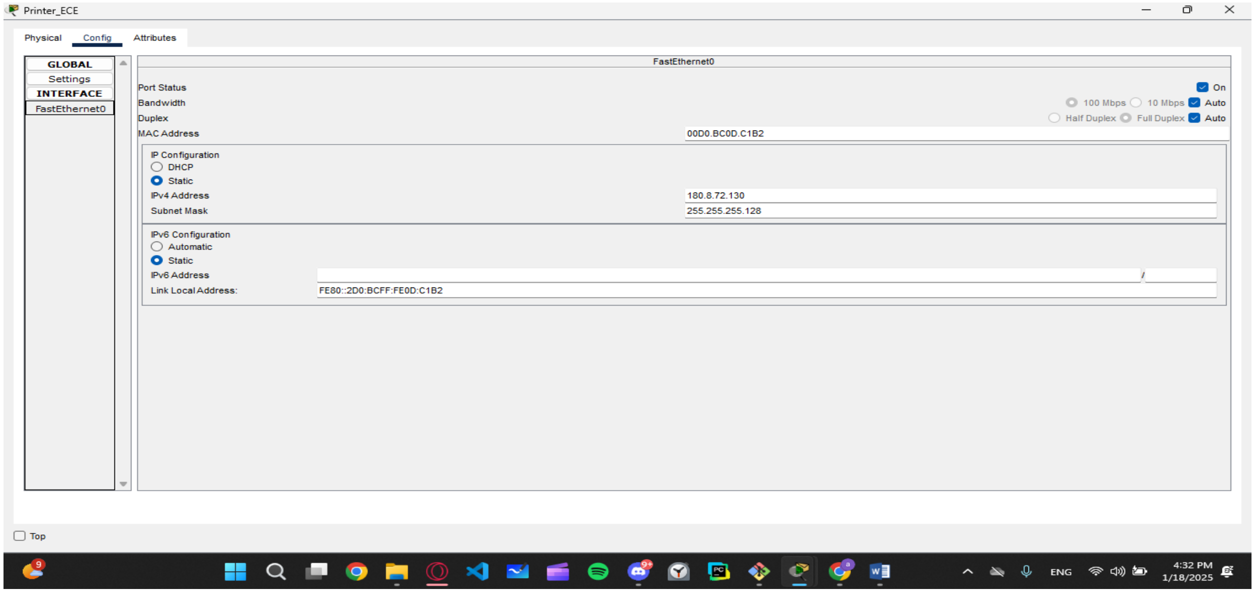


Figure 13:Printer_ECE IP

The ECE printer is configured with a static IP address of **180.8.72.130**, which is excluded from the DHCP pool. This address falls within the range of the first 10 reserved IPs designated for static assignment.

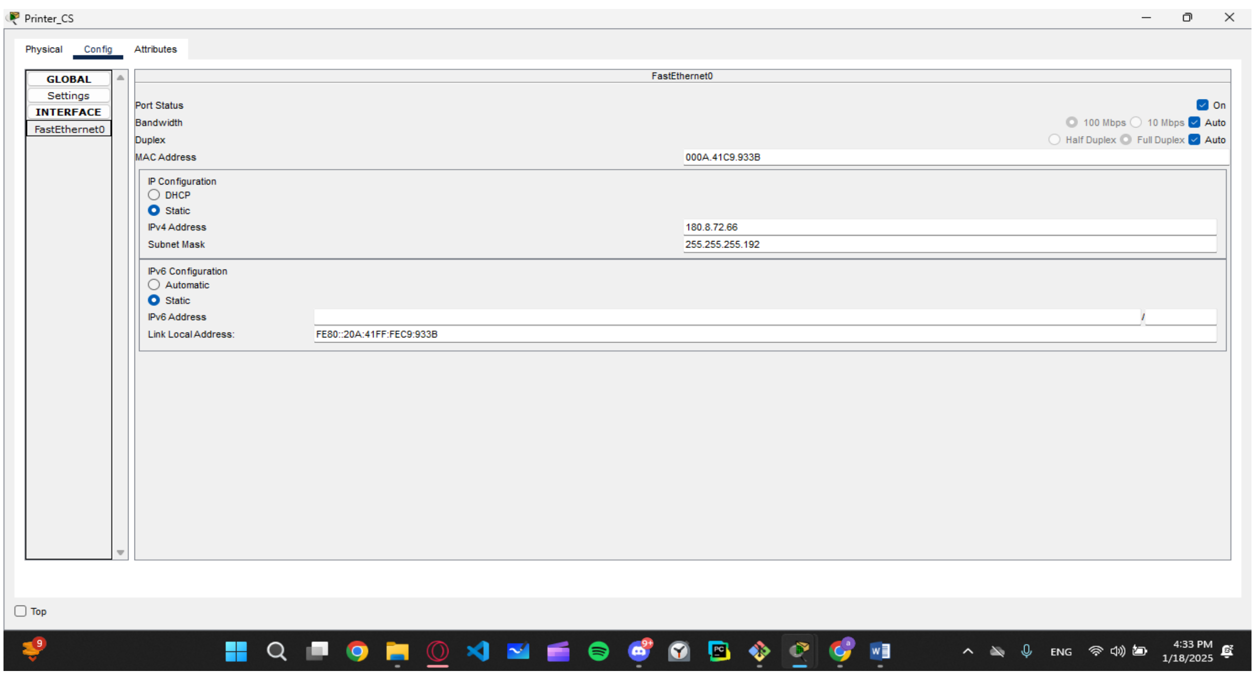


Figure 14:Printer_CS IP

The CS printer is configured with a static IP address of **180.8.72.66**, which is excluded from the DHCP pool. This address falls within the range of the first 10 reserved IPs designated for static assignment.

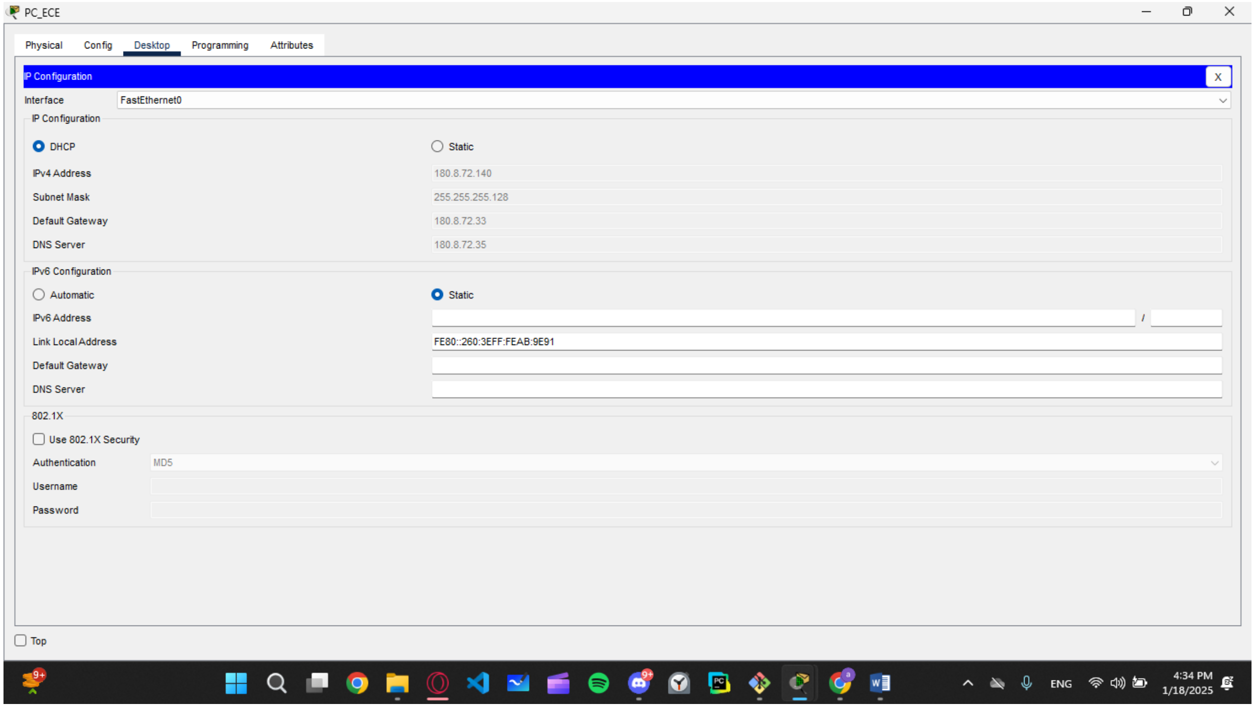


Figure 15:PC_ECE IP

The ECE PC uses DHCP for dynamic IP address of **180.8.72.140** which is a part of its subnet range as shown in table3, receiving an address ECE_Pool excluding the first 10 reserved addresses, along with the default gateway and DNS details.

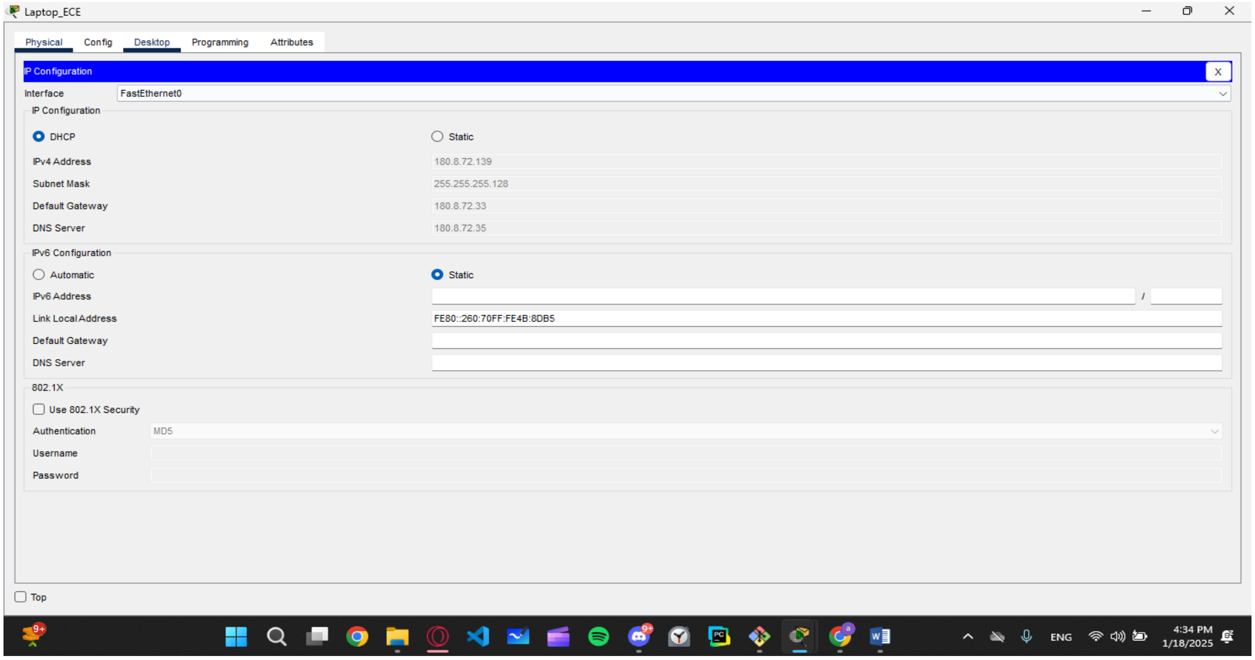


Figure 16:Laptop_ECE IP

The ECE Laptop uses DHCP for dynamic IP address of **180.8.72.139** which is a part of its subnet range as shown in table3, receiving an address ECE_Pool excluding the first 10 reserved addresses, along with the default gateway and DNS details.

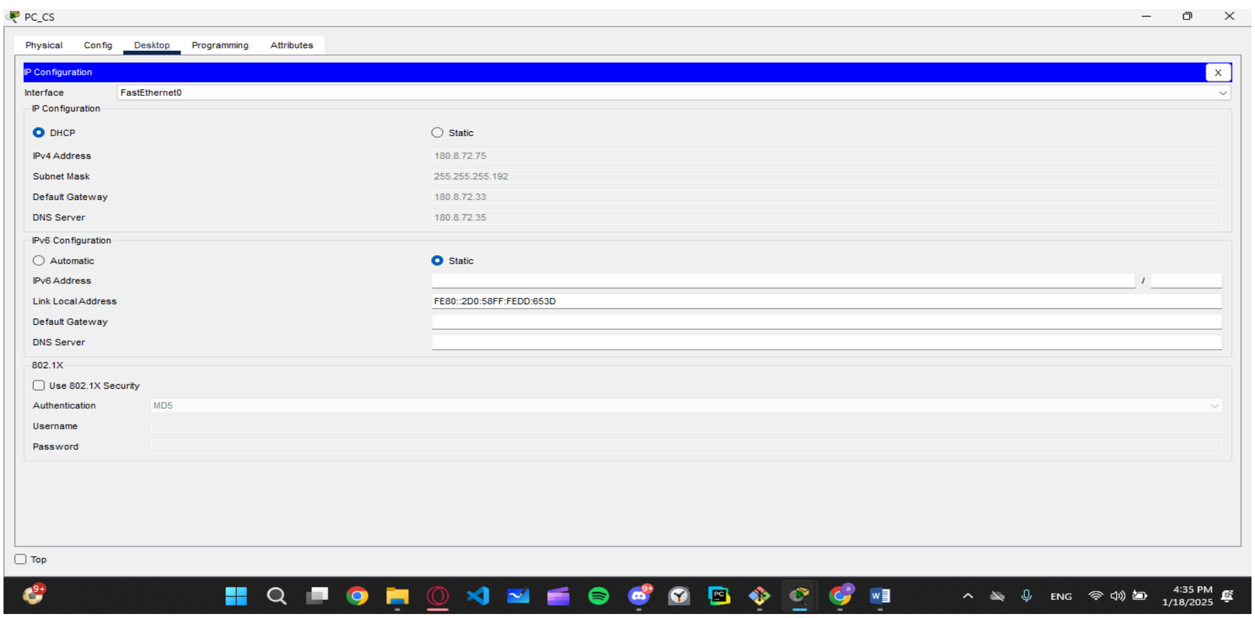


Figure 17:PC_CS IP

The CS PC uses DHCP for dynamic IP address of **180.8.72.75** which is a part of its subnet range as shown in table3, receiving an address ECE_Pool excluding the first 10 reserved addresses, along with the default gateway and DNS details.

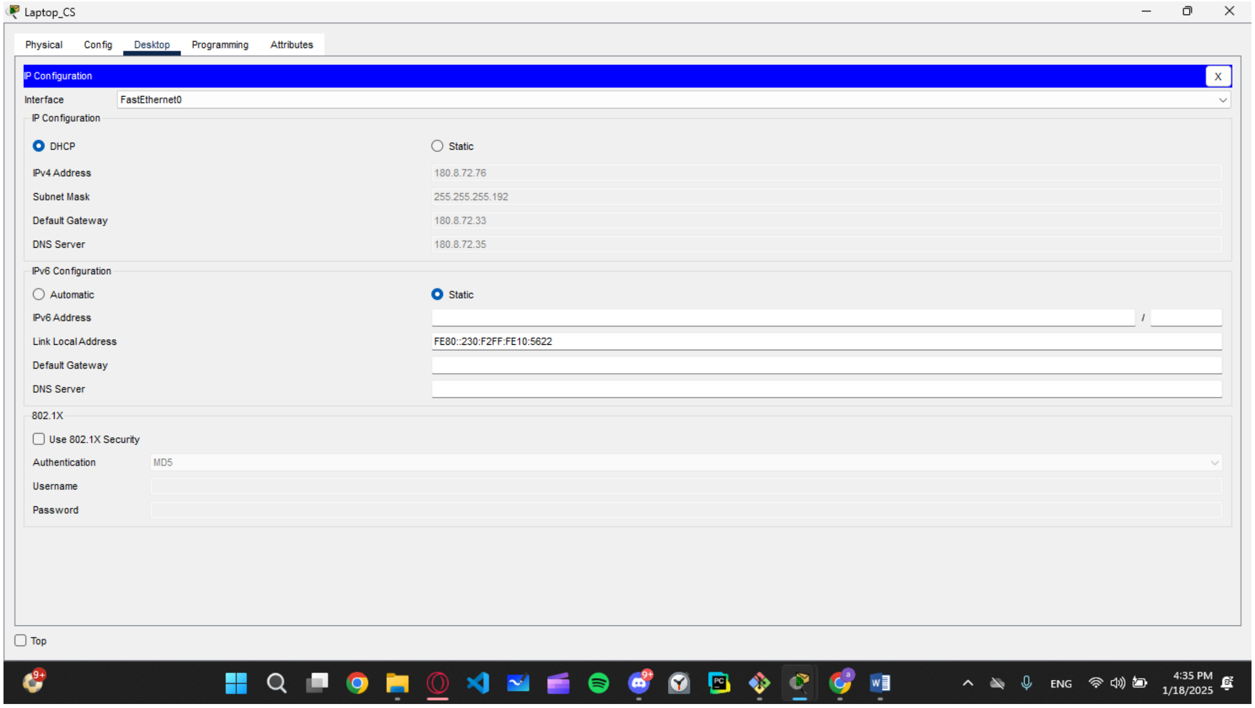


Figure 18: Laptop_CS IP

The CS Laptop uses DHCP for dynamic IP address of **180.8.72.139** which is a part of its subnet range as shown in table3, receiving an address ECE_Pool excluding the first 10 reserved addresses, along with the default gateway and DNS details.

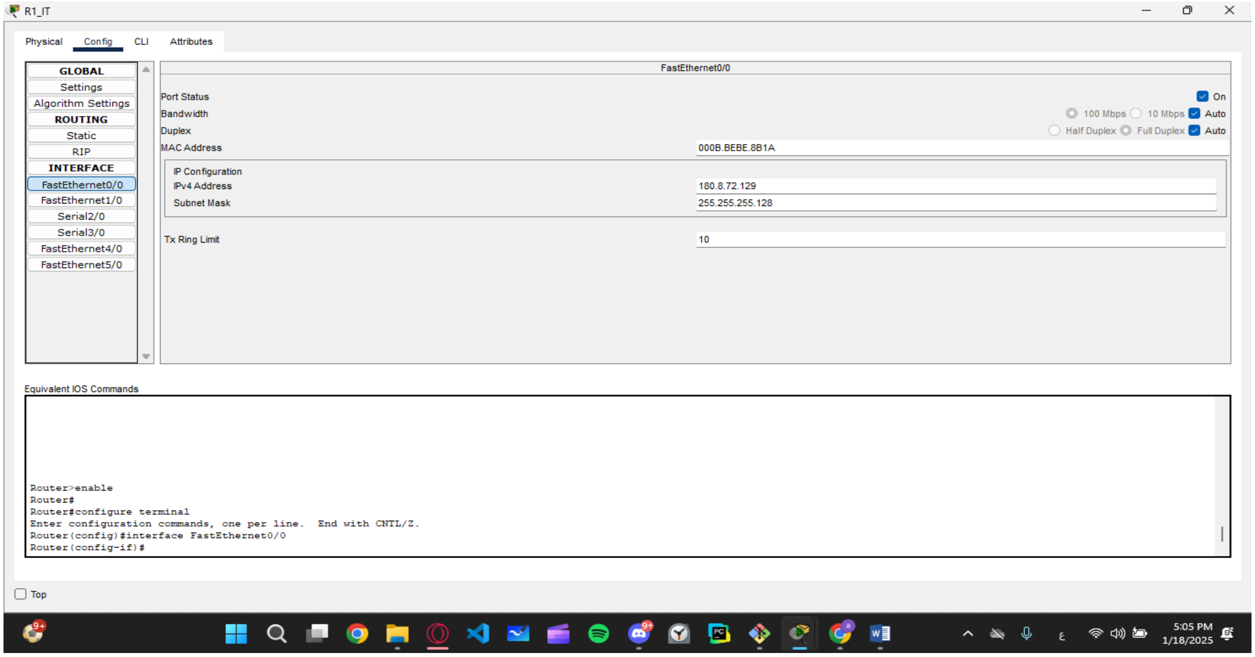


Figure 19:R1_IT Fa0/0

Router1's FastEthernet0/0 port, connected to Area2 (ECE Subnet), is assigned a static IP address of **180.8.72.129**, which is appropriate for the subnet, as detailed in Table 3.

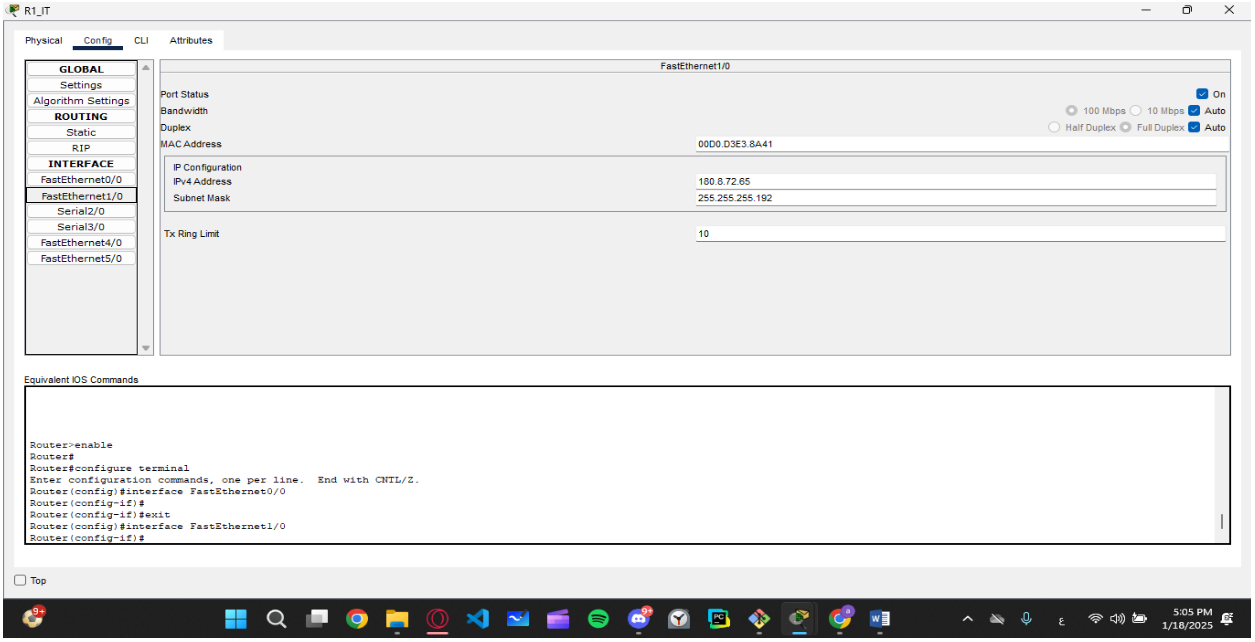


Figure 20:R1_IT Fa1/0

Router1's FastEthernet1/0 port, connected to Area2 (CS Subnet), is assigned a static IP address of **180.8.72.65**, which is appropriate for the subnet, as detailed in Table 3.

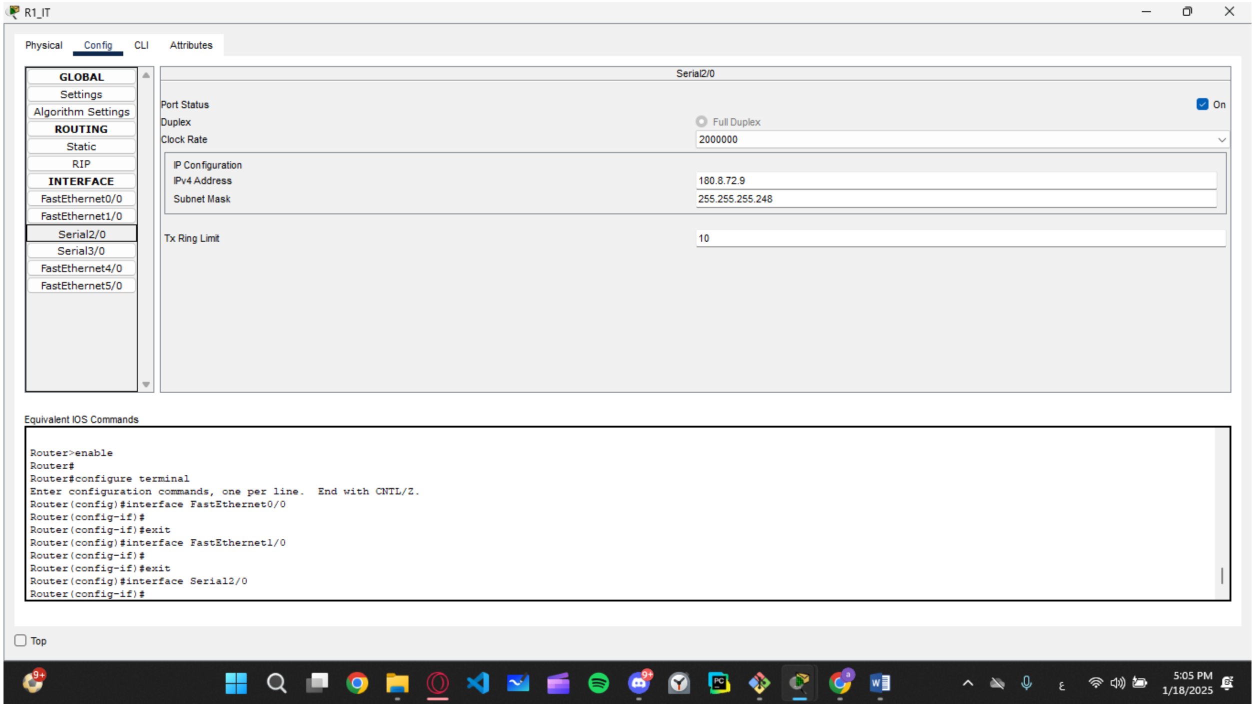


Figure 21:R1_IT Se2/0

Router1's Serial2/0 port, connected to Area0 (Backbone Subnet), is assigned a static IP address of **180.8.72.9**, which is appropriate for the subnet, as detailed in Table 3.

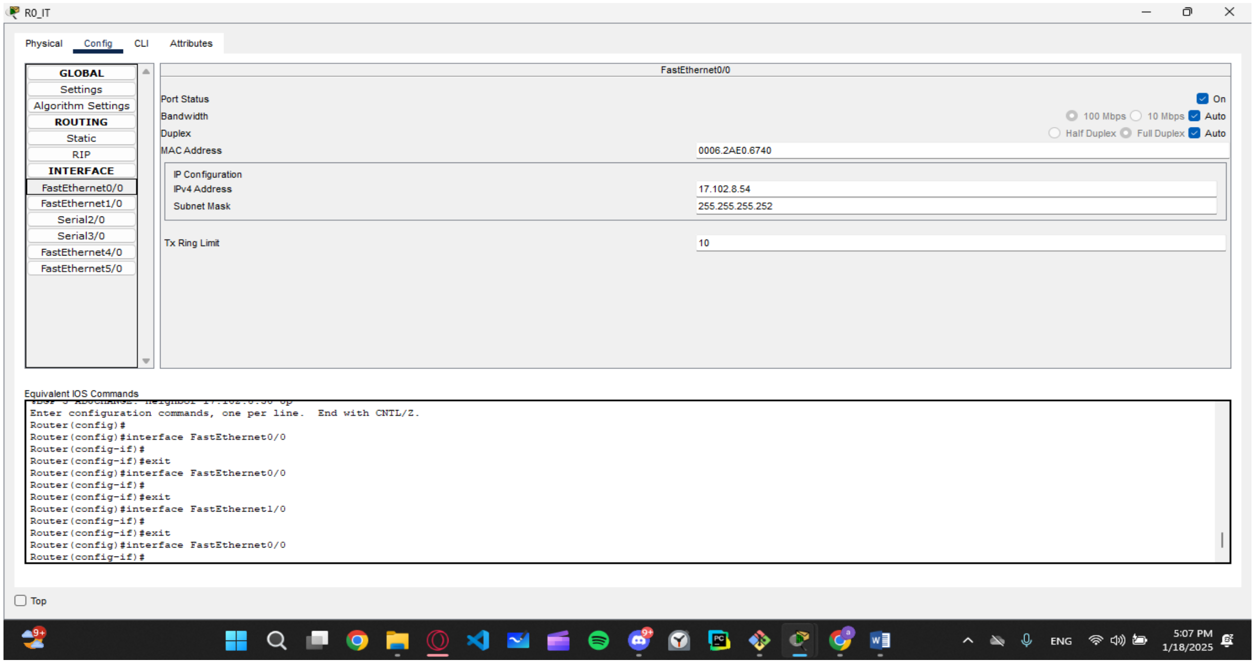


Figure 22:R0_IT Fa0/0

Router0's FastEthernet0/0 interface, which connects to the Google router, has been configured with a static IP address of **180.8.72.54**. This address aligns with the subnet specifications outlined in Table 1.

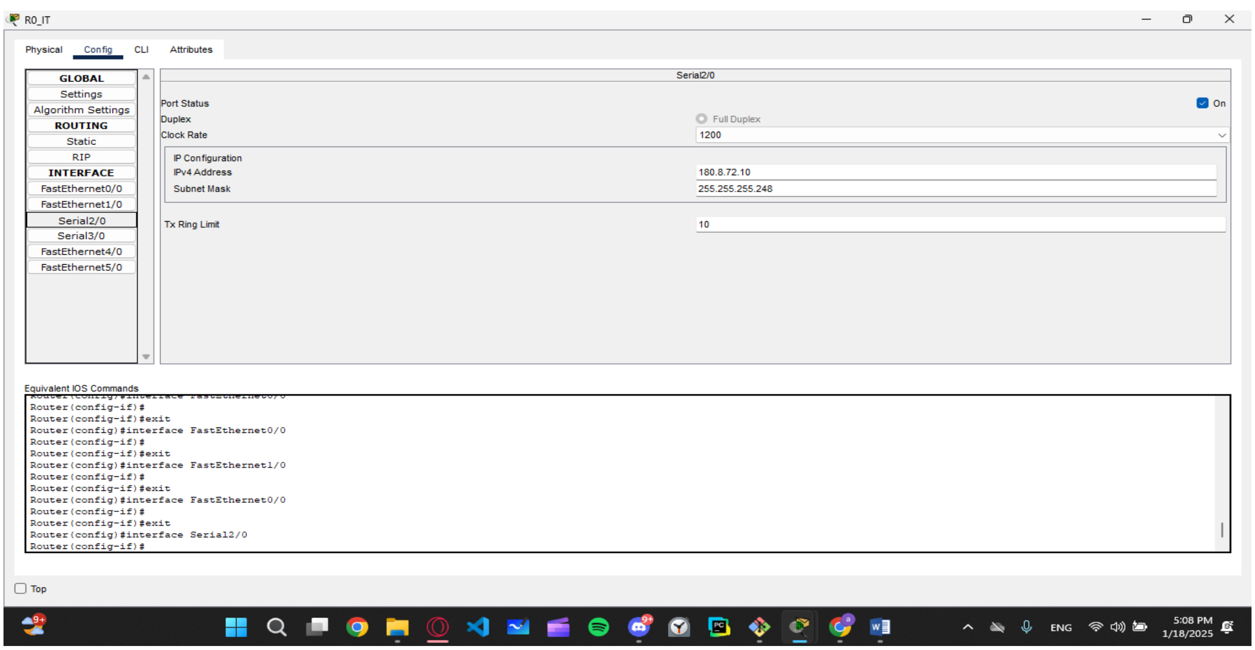


Figure 23:R0_IT Se2/0

Router0's FastEthernet0/0 interface, which connects to the Google router, has been configured with a static IP address of 180.8.72.54. This address aligns with the subnet specifications outlined in Table 1.

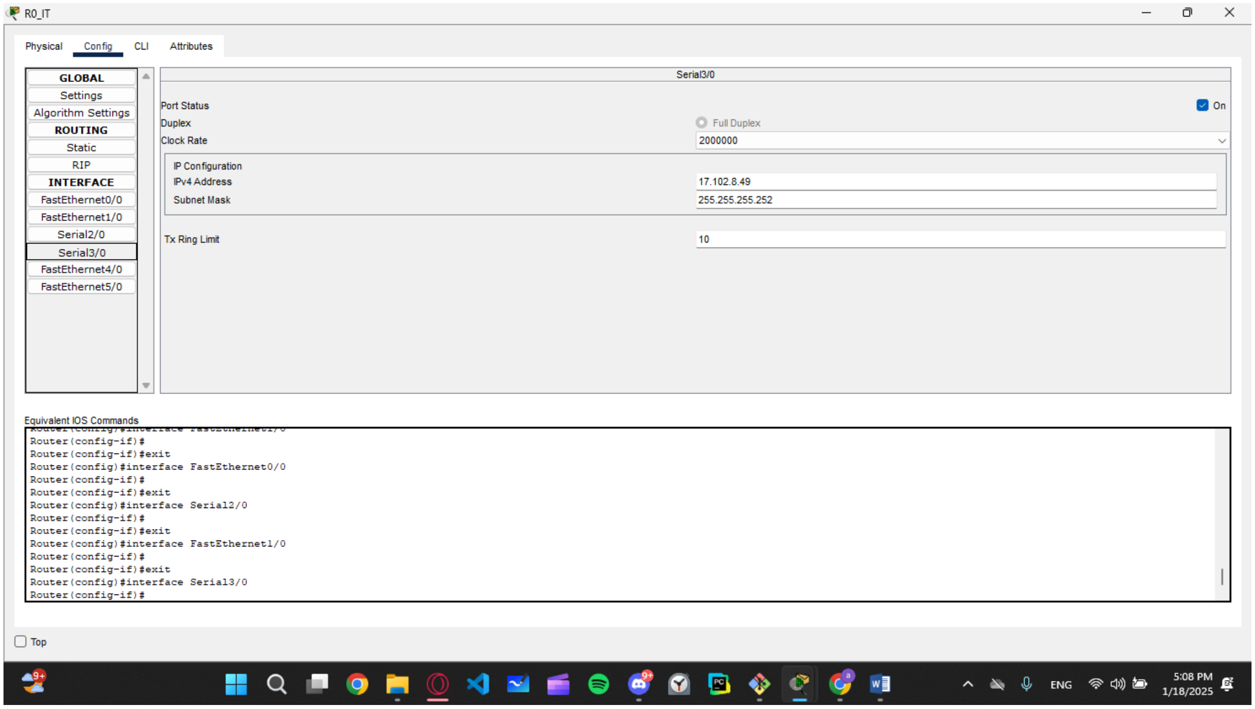


Figure 24:R0_IT Se3/0

Router0's Serial2/0 port, connected to Area0 (Backbone Subnet), is assigned a static IP address of **180.8.72.10**, which is appropriate for the subnet, as detailed in Table 3.

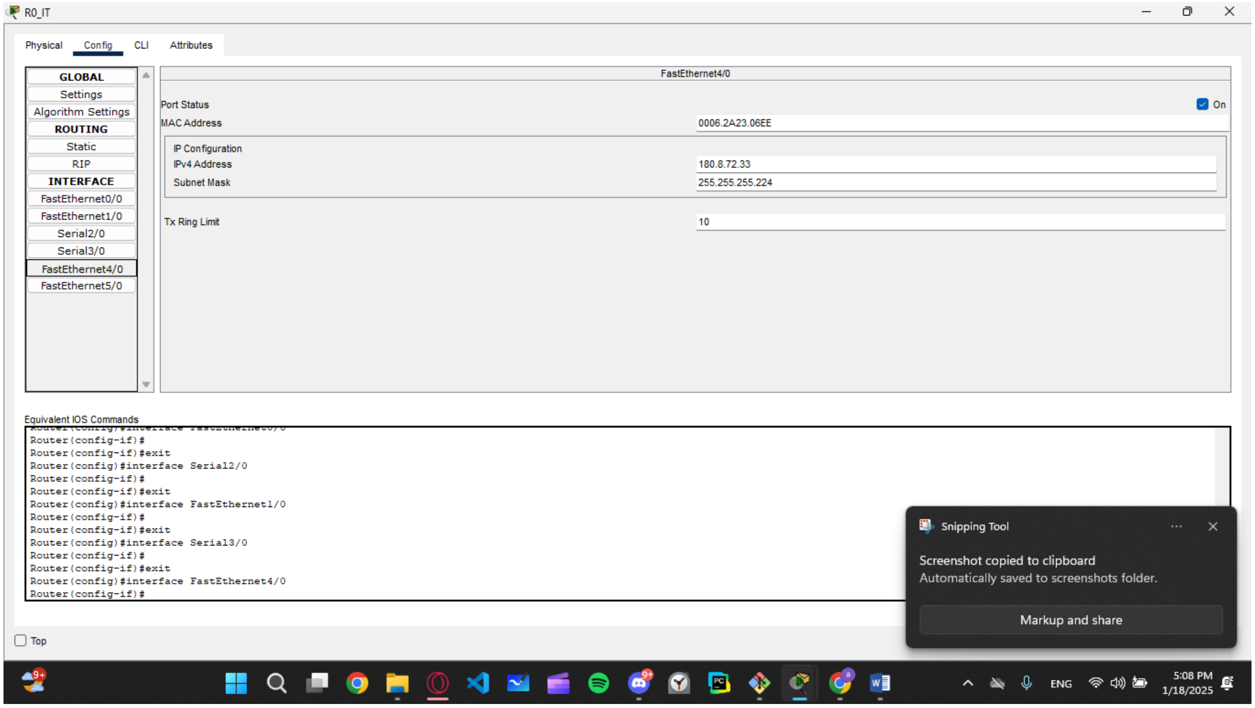


Figure 25:R0_IT Fa4/0

Router0's FastEthernet4/0 port, connected to Area0 (Servers Subnet), is assigned a static IP address of **180.8.72.129**, which is appropriate for the subnet, as detailed in Table 3.

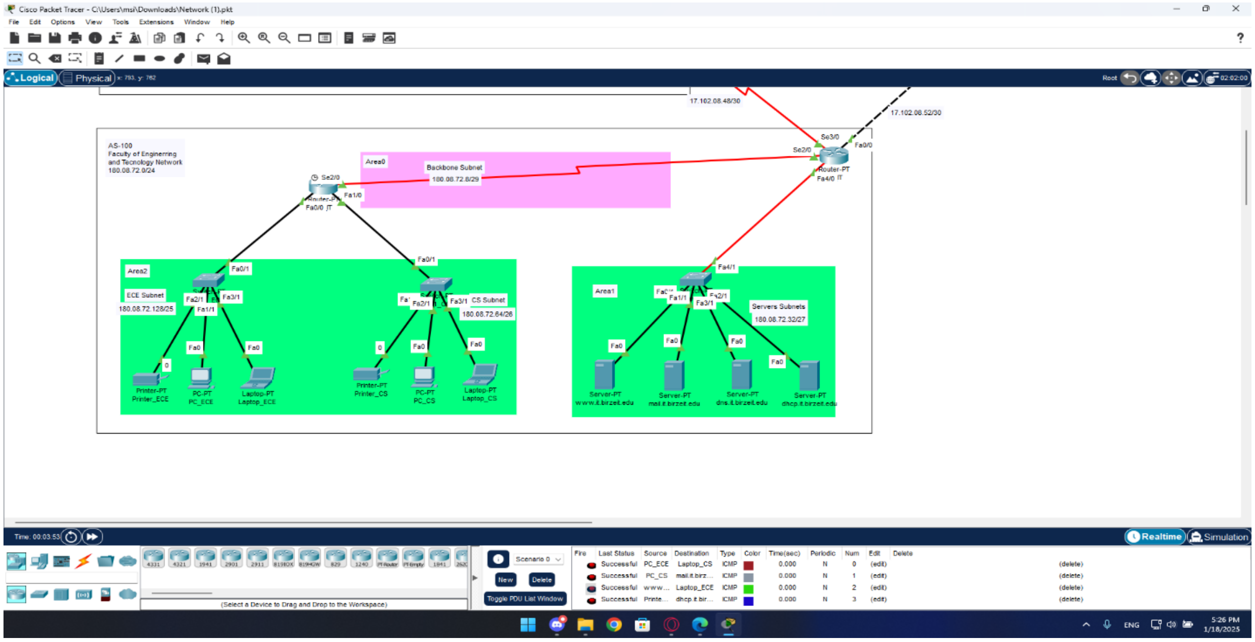


Figure 26: successful Pings Area100

A multiple of successful pings.

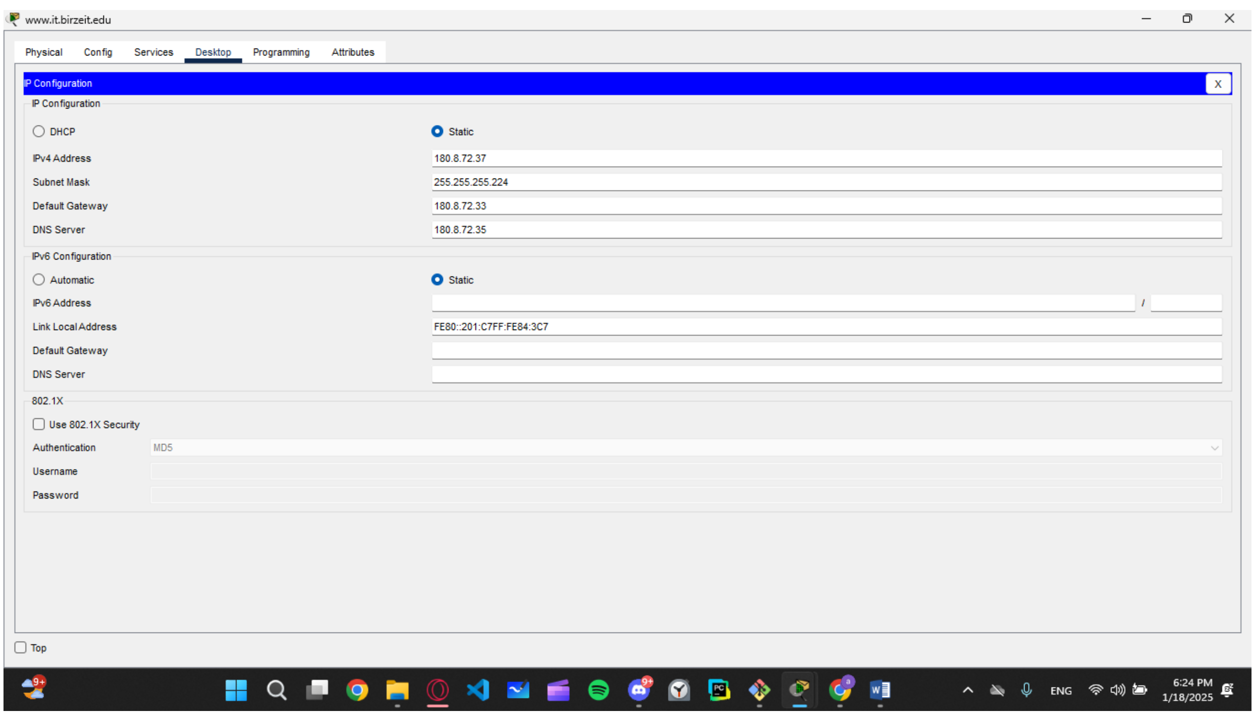


Figure 27: www.it.birzeit.edu IP

The web server **www.it.birzeit.edu**, responsible for hosting and serving the main IT HTML page, is assigned a static IP of **180.8.72.37**, according to the sub-netting rules as shown in Table3. Below are the details of its configuration:

- **Subnet Mask**: 255.255.255.224
- **Default Gateway**: 180.8.72.33
- **DNS Server**: 180.8.72.38

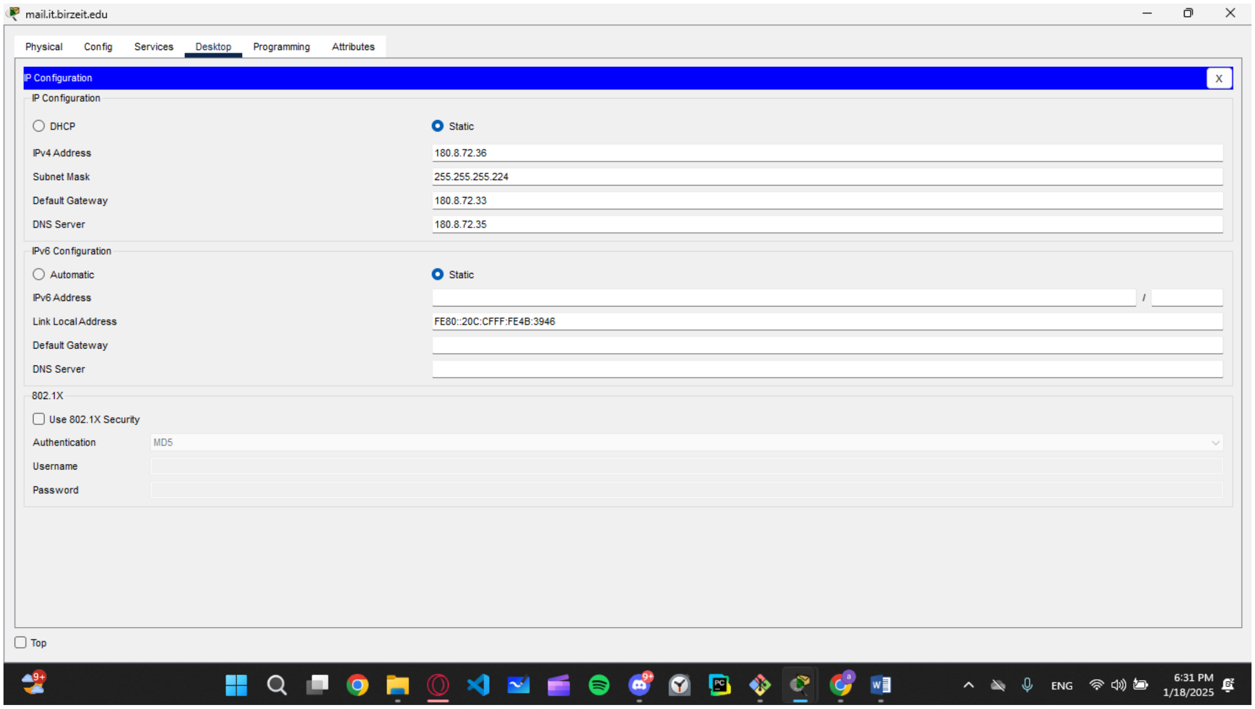


Figure 28: mail.it.birzeit.edi IP

The mail server **mail.it.birzeit.edu**, responsible for handling email services within the network, is configured with a static IP of **180.8.72.36**, according to the sub-netting rules as shown in table3. Below are the details of its configuration:

- **Subnet Mask**: 255.255.255.224
- **Default Gateway**: 180.8.72.33
- **DNS Server IP**: 180.8.72.35

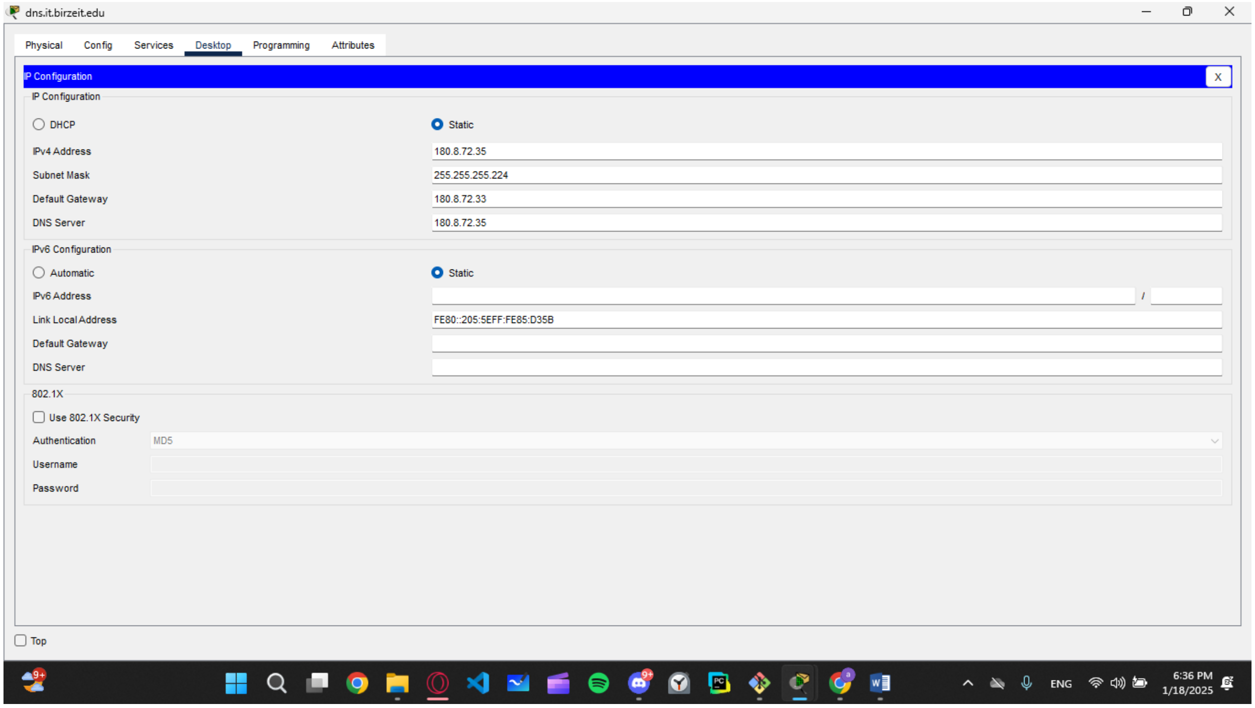


Figure 29: dns.it.birzeit.edu IP

The DNS server **dns.it.birzeit.edu,** which is responsible for resolving domain names within the network, is configured with a static IP address of **180.8.72.35**, according to the sub-netting rules as shown in table3. Below are the configuration details:

- **Subnet Mask**: `255.255.255.224`
- **Default Gateway**: `180.8.72.33`
- **DNS Server**: `180.8.72.35`

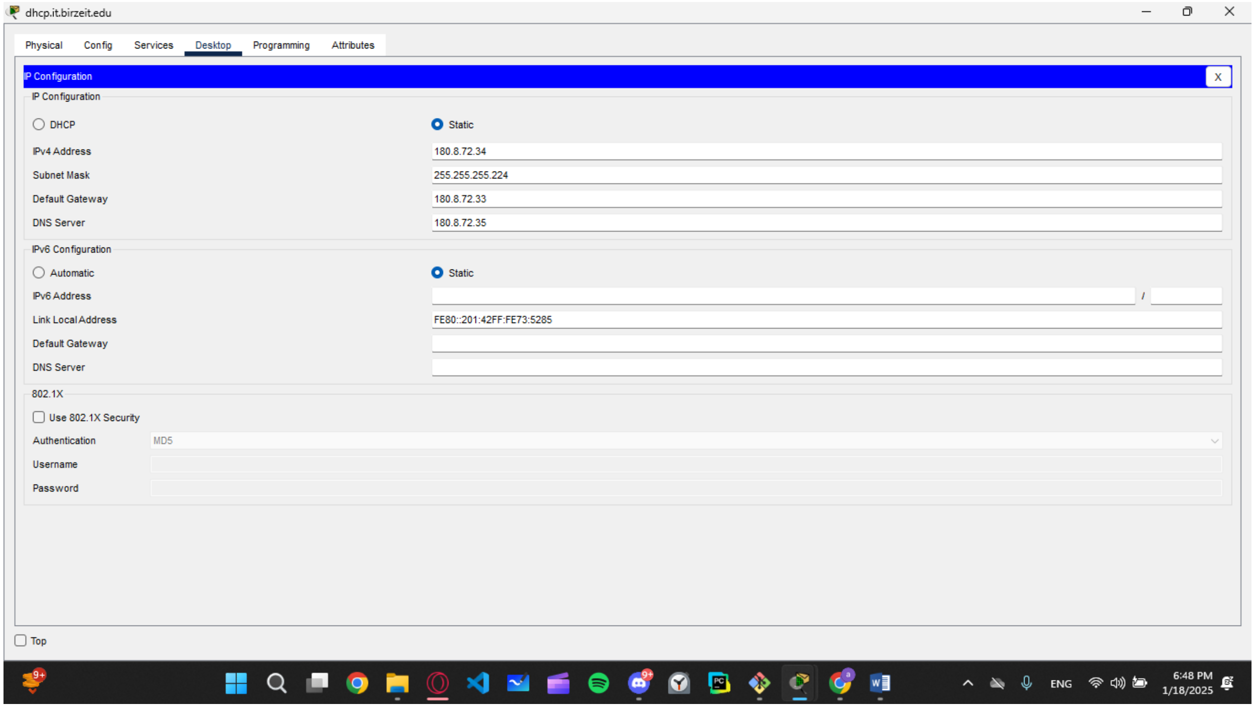


Figure 30: dhcp.it.birzeit.edu IP

The DHCP server **dhcp.it.birzeit.edu**, which is responsible for dynamically assigning IP addresses to devices within the network, is configured with a static IP address of **180.8.72.34**, according to the sub-netting rules as shown in **Table 3**. Below are the configuration details:

- **Subnet Mask**: `255.255.255.224`
- **Default Gateway**: `180.8.72.33`
- **DNS Server**: `180.8.72.35`

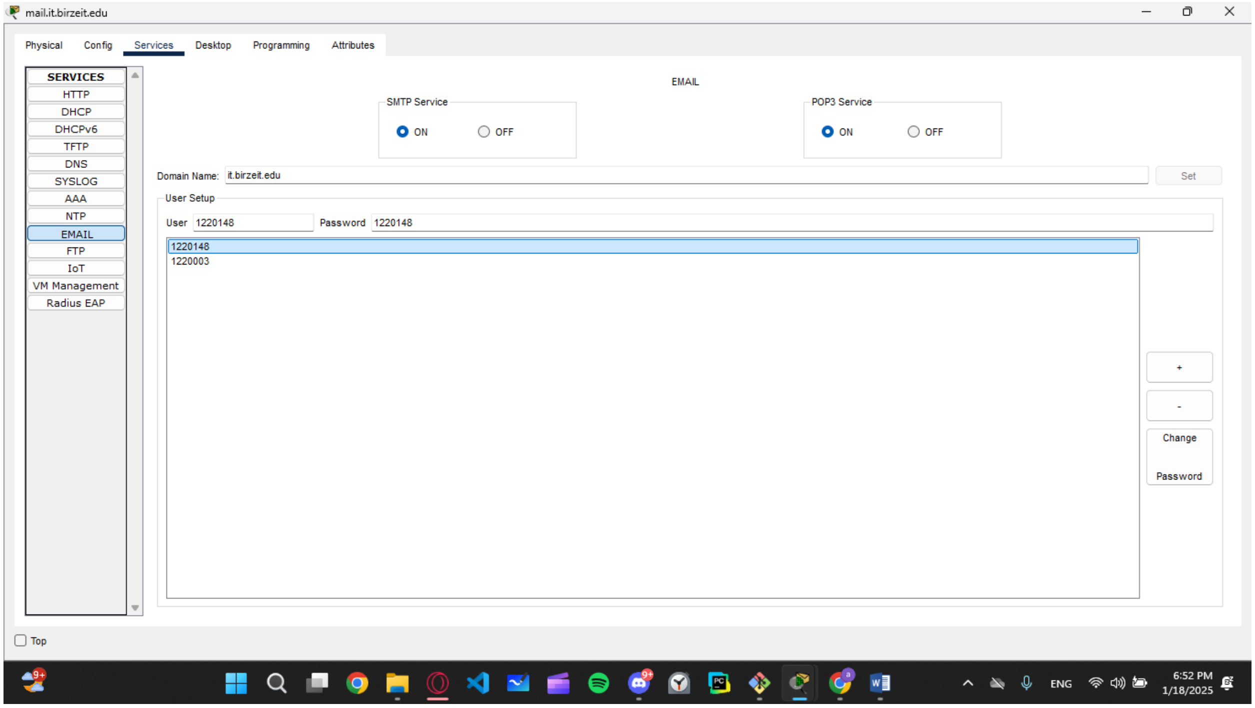


Figure 31: mail.it.birzeit.edu service

The email server **mail.it.birzeit.edu** is configured with SMTP and POP3 services. The following user accounts are created:

- **1220148**: Password `1220148`
- **1220003**: Password `1220003`

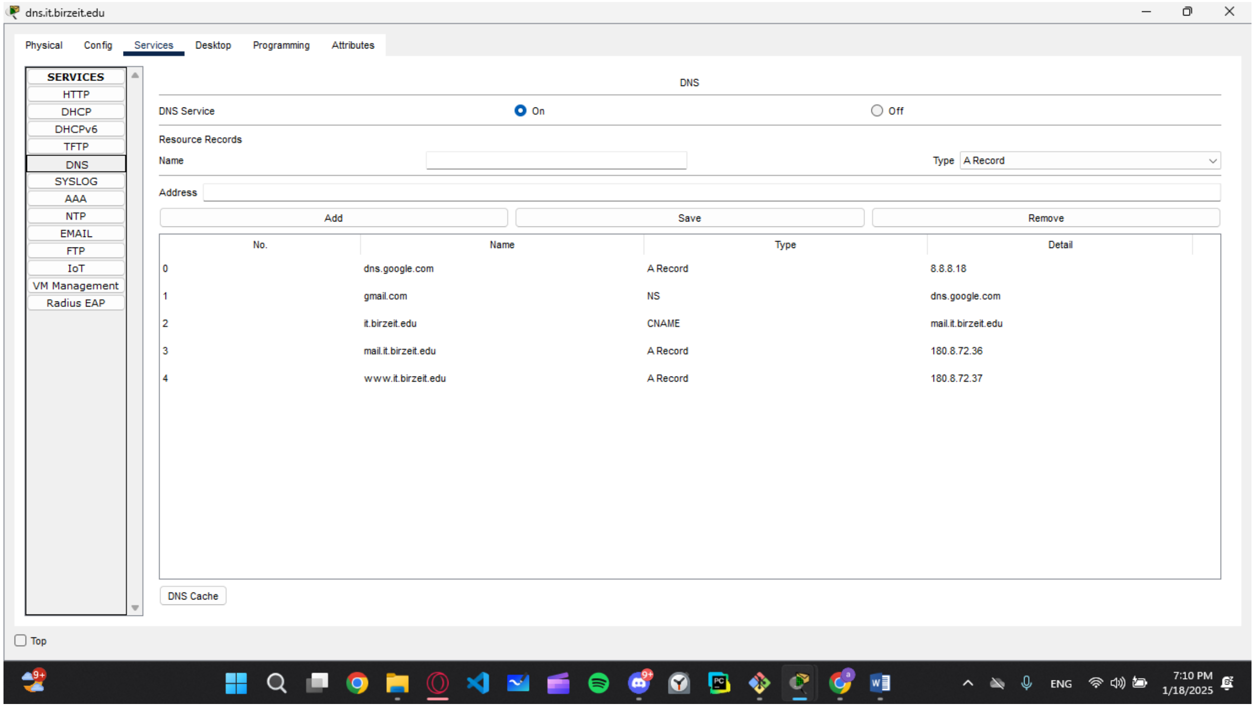


Figure 32: dns.it.birzeit.edu service

The DNS server `dns.it.birzeit.edu` is configured to resolve domain names within the network. Below are the configured resource records:

- **dns.google.com**: `A Record` with IP `8.8.8.18`
- **gmail.com**: `NS Record` pointing to `dns.google.com`
- **it.birzeit.edu**: `CNAME Record` pointing to `mail.it.birzeit.edu`
- **mail.it.birzeit.edu**: `A Record` with IP `180.8.72.36`
- **www.it.birzeit.edu**: `A Record` with IP `180.8.72.37`

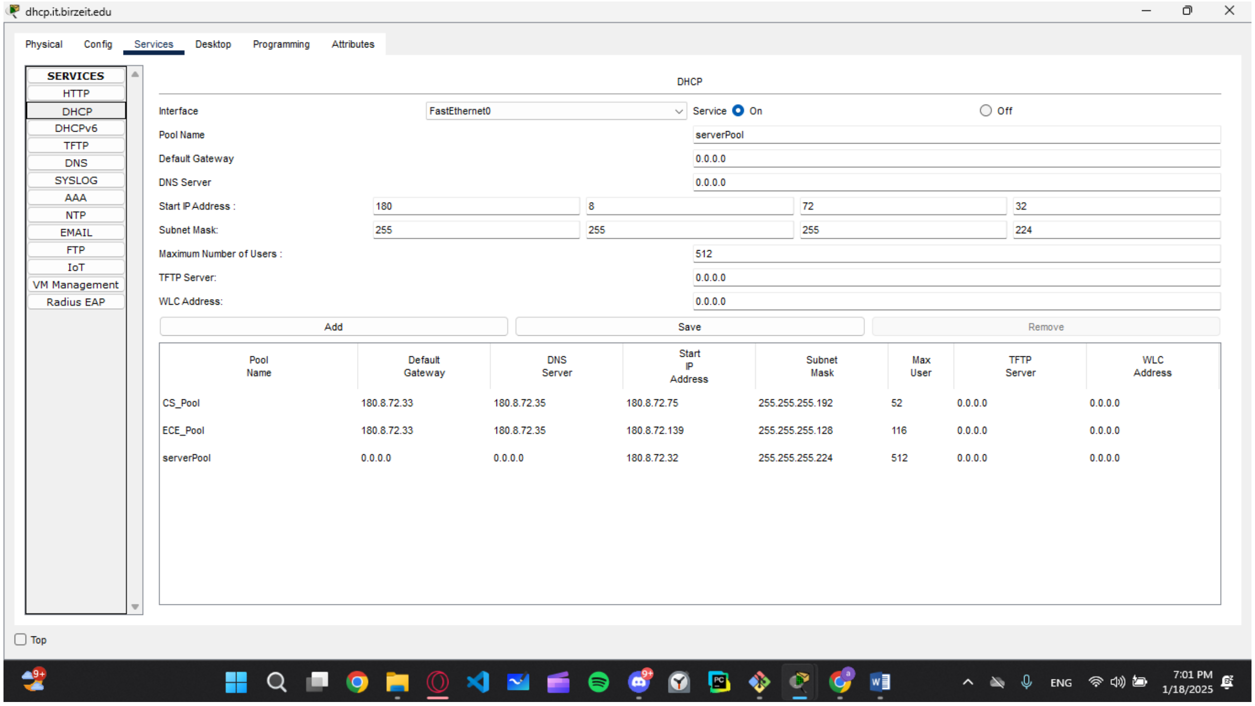


Figure 33: dhcp.it.birzeit.edu service

The DHCP server **dhcp.it.birzeit.edu** is configured to manage IP address allocation for multiple pools within the network. Below are the details of the configured pools:

- **CS_Pool**:
  - Default Gateway: `180.8.72.33`
  - DNS Server: `180.8.72.35`
  - Start IP Address: `180.8.72.75`
  - Subnet Mask: `255.255.255.192`
  - Maximum Users: `52`
- **ECE_Pool**:
  - Default Gateway: `180.8.72.33`
  - DNS Server: `180.8.72.35`
  - Start IP Address: `180.8.72.139`
  - Subnet Mask: `255.255.255.128`
  - Maximum Users: `116`
- **ServerPool**:
  - Start IP Address: `180.8.72.32`
  - Subnet Mask: `255.255.255.224`

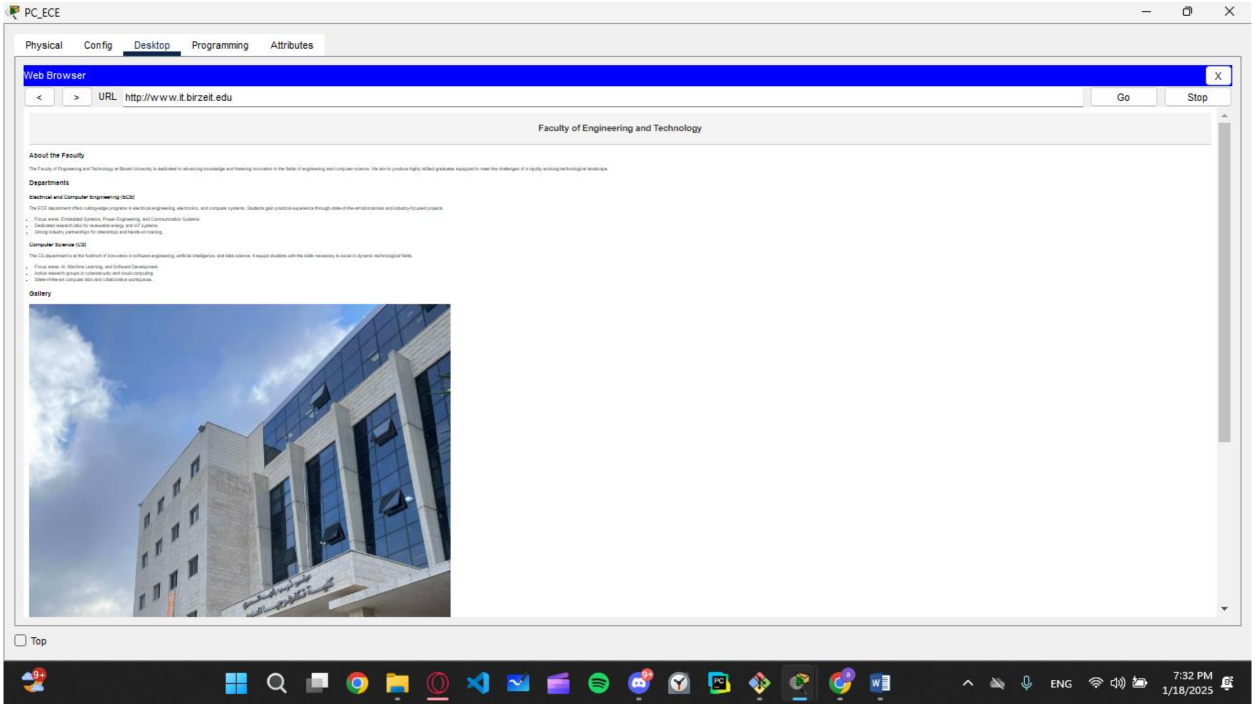


Figure 34: Successful access HTTPS

The webpage hosted on www.it.birzeit.edu was successfully accessed from the ECE network, particularly the PC browser.

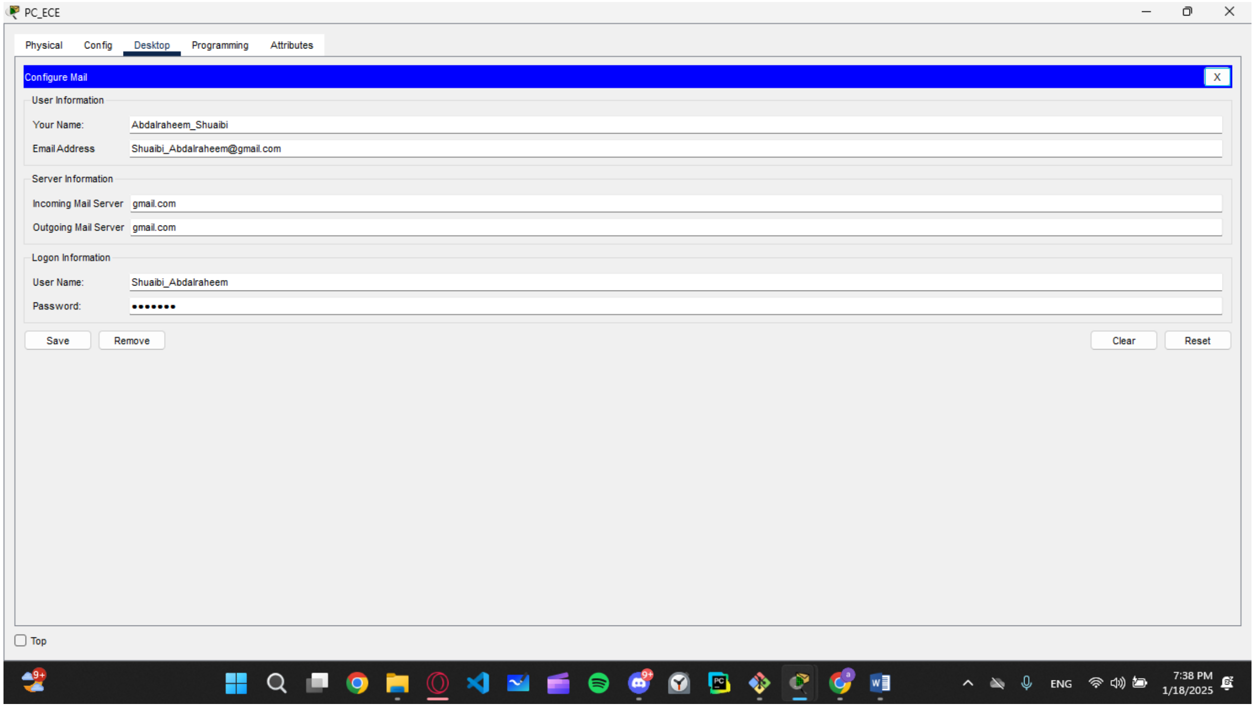


Figure 35: PC_ECE email

The email was added to the PC on Area2, ECE part, with the details as follows:

User Information:
• Your Name: Abdalraheem Shuaibi
• Email Address: Shuaibi_Abdalraheem@gmail.com

Server Information:
• Incoming Mail Server: gmail.com
• Outgoing Mail Server: gmail.com

Logon Information:
• Username: Shuaibi_Abdalraheem
• Password: 1220148

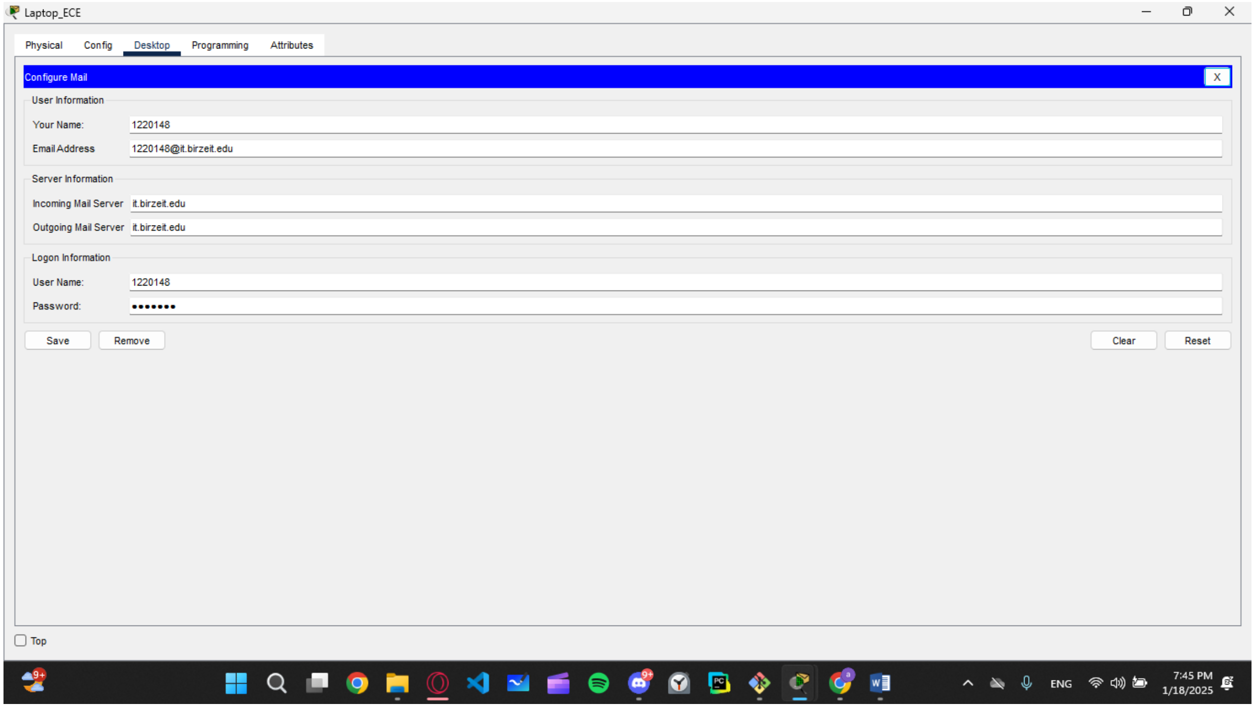


Figure 36: Laptop_ECE email

The email was added to the laptop on Area2, ECE part, with the details as follows:

User Information:
• Your Name: 1220148
• Email Address: 1220148@it.birzeit.edu

Server Information:
• Incoming Mail Server: it.birzeit.edu
• Outgoing Mail Server: it.birzeit.edu

Logon Information:
• Username: 1220148
• Password: 1220148

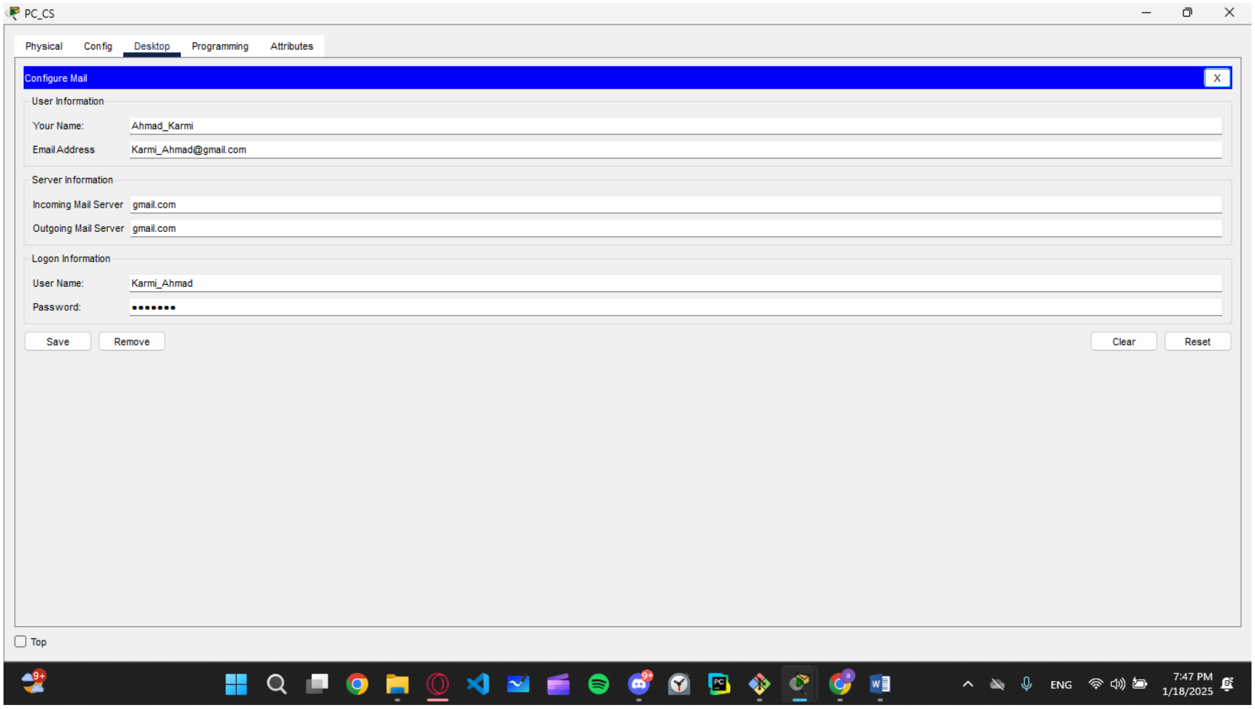


Figure 37: PC_CS email

The email was added to the PC on Area2, CS part, with the details as follows:

User Information:
• Your Name: Ahmad Karmi
• Email Address: Karmi_Ahmad@gmail.com

Server Information:
• Incoming Mail Server: gmail.com
• Outgoing Mail Server: gmail.com

Logon Information:
• Username: Karmi_Ahmad
• Password: 1220003

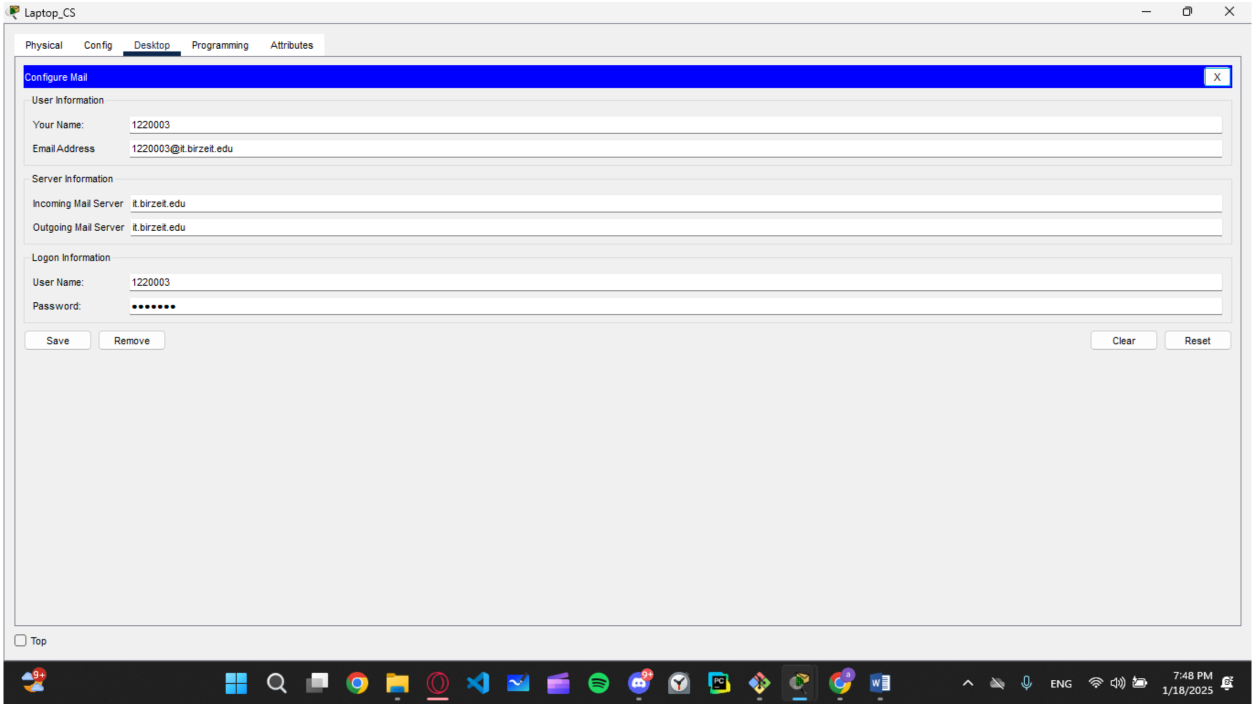


Figure 38: Laptop_CS email

The email was added to the laptop on Area2, CS part, with the details as follows:

User Information:
• Your Name: 1220003
• Email Address: 1220003@it.birzeit.edu

Server Information:
• Incoming Mail Server: it.birzeit.edu
• Outgoing Mail Server: it.birzeit.edu

Logon Information:
• Username: 1220003
• Password: 1220003

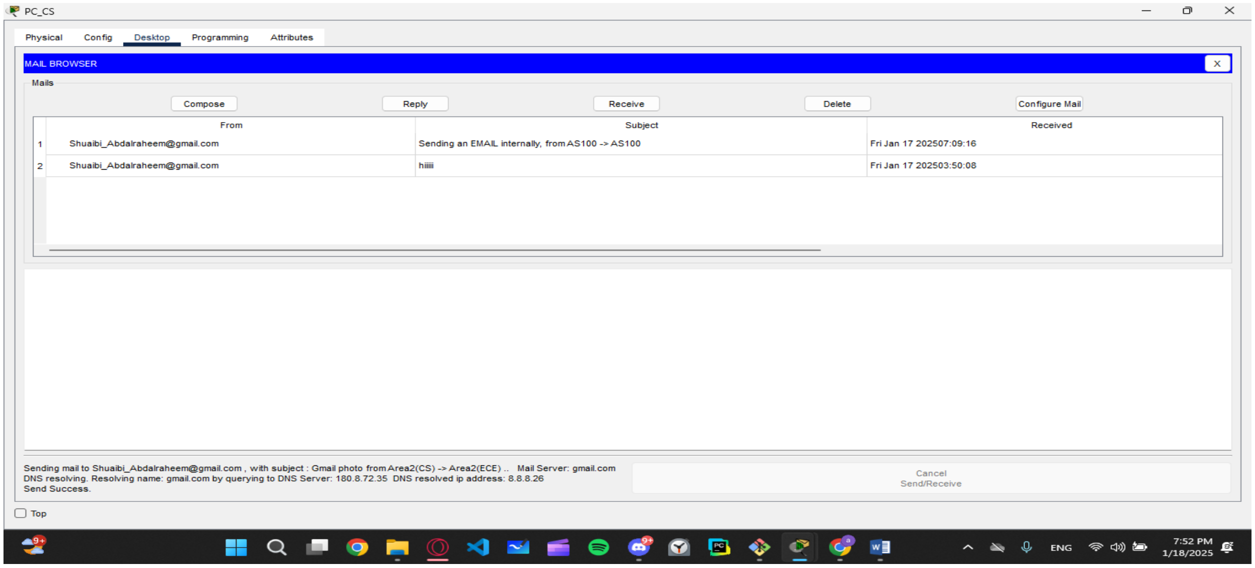


Figure 39: sending gmail

The email was successfully sent from PC_CS (Gmail account: Karmi_Ahmad@gmail.com) in Area2 (CS) to PC_ECE (Gmail account: Shuaibi_Abdalraheem@gmail.com) in Area2 (ECE).

Message: Gmail from Area2(CS) -> Area2(ECE).

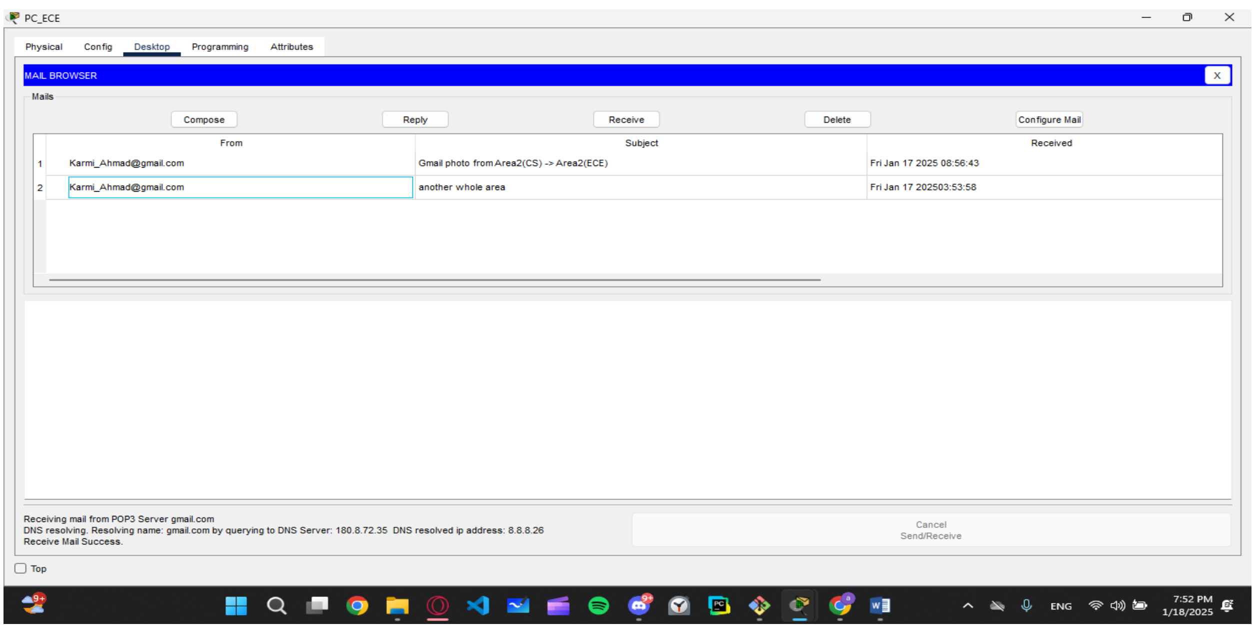


Figure 40: receiving gmail

The email was successfully received on PC_ECE (Gmail account: Shuaibi_Abdalraheem@gmail.com) in Area2 (ECE) from PC_CS (Gmail account: Karmi_Ahmad@gmail.com) in Area2 (CS), the message is displayed with the right time (see **figure39** system time).

Message: Gmail from Area2(CS) -> Area2(ECE).

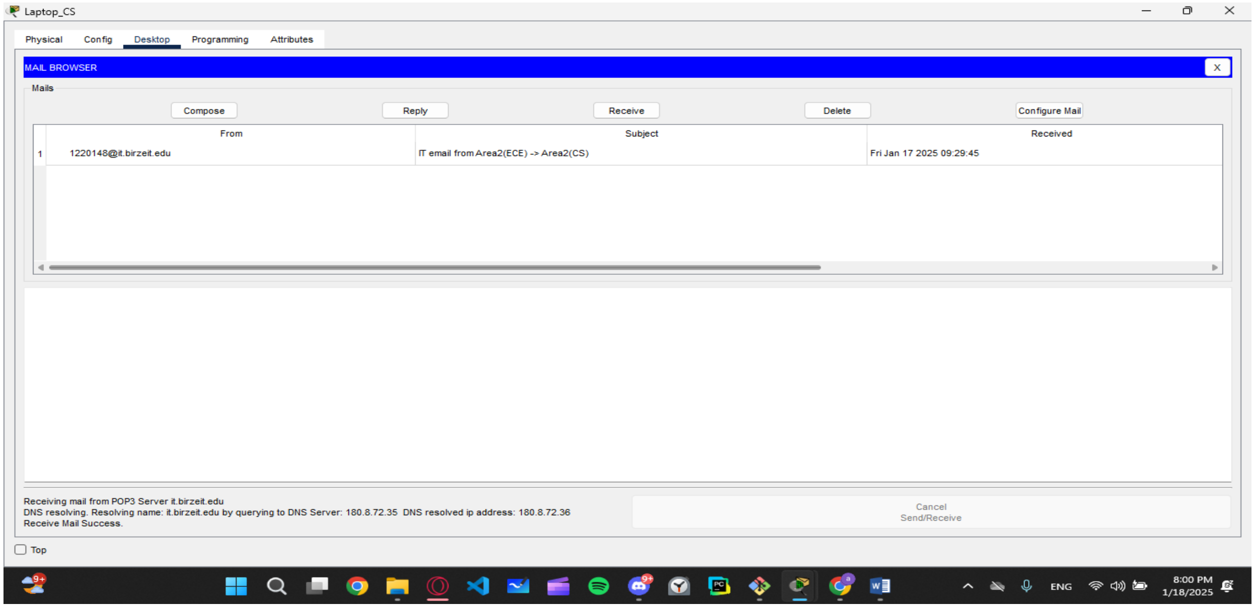


Figure 41: sending IT

The email was successfully sent from Laptop_ECE (IT account: 1220148@it.birzeit.edu) in Area2 (ECE) to Laptop_CS (IT account: 1220003@it.birzeit.edu) in Area2 (CS).

Message: IT email from Area2(ECE) -> Area2(CS).

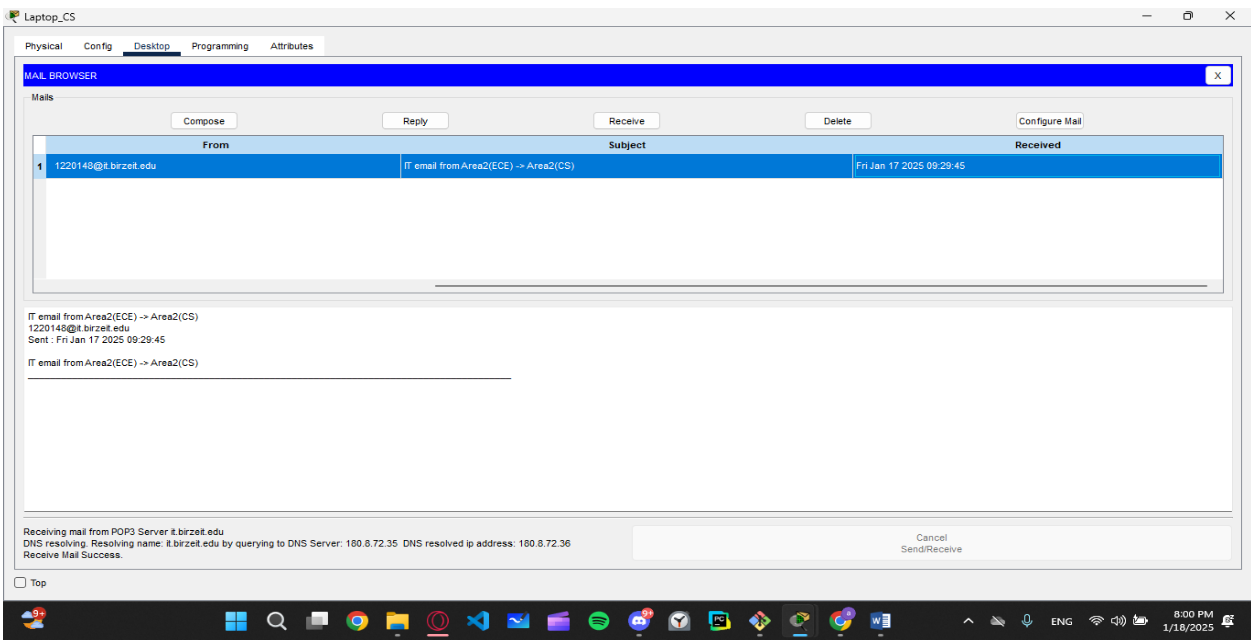


Figure 42: reciving IT

The email was successfully received on Laptop_CS (IT account: 1220003@it.birzeit.edu) in Area2 (CS) from Laptop_ECE (IT account: 1220148@it.birzeit.edu) in Area2 (ECE).
Message: IT email from Area2(ECE) -> Area2(CS).

2.3 Home-ISP Network (AS-200)

2.3.1 Sub-netting

Table 4:Home (AS200) subnet

Network	# Served IPs	IP	Subnet mask
Home Network	254	192.168.08.0/24	255.255.255.0
ISP Network	6	209.165.08.224/29	255.255.255.248

2.3.2 Results

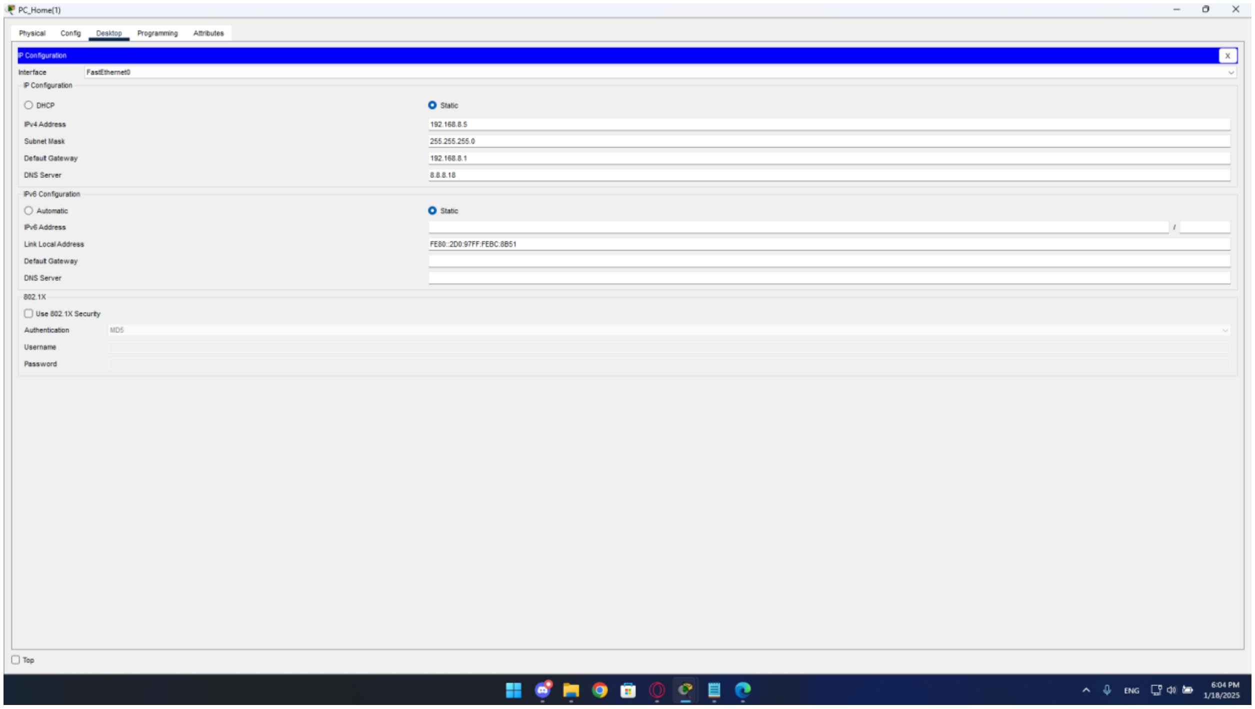


Figure 43:PC_Home IP

I configured the IPv4 address for PC_Home as 192.168.8.5 In this address, 192.168.8 represents the network portion, while 5 is the host identifier. The host ID can be set to any value between 0 and 255, provided it does not conflict with 0 (the network address), 255 (the broadcast address), or the addresses assigned to other devices within the same subnet.

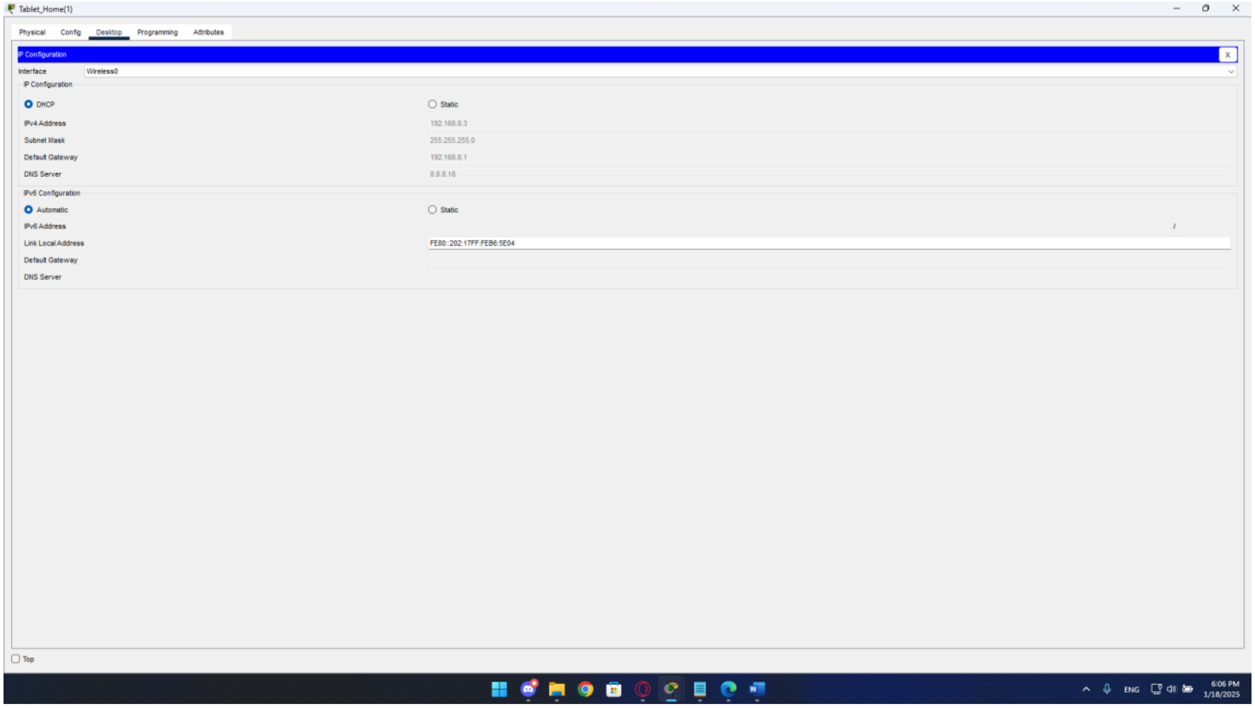


Figure 44:Tablet_Home IP

The IP address for Tablet_Home is assigned dynamically by DHCP. The router R_Home acts as both the router and the DHCP server for the network.

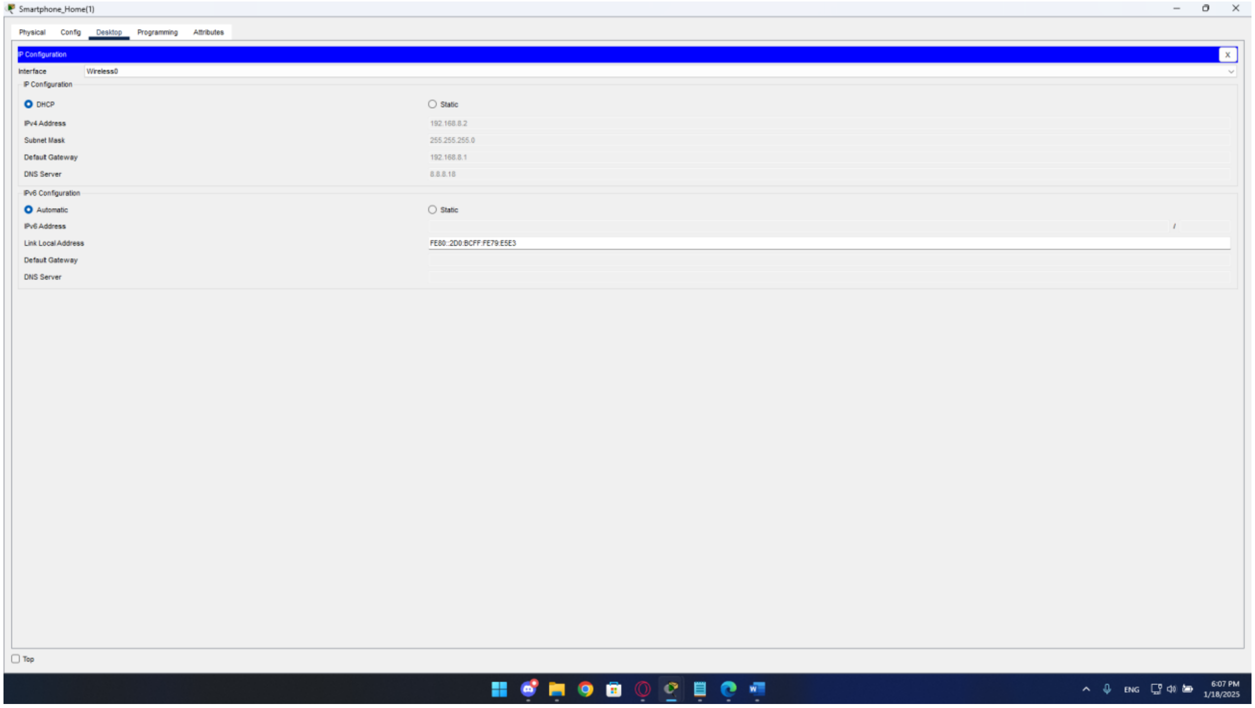


Figure 45:Smartphone_Home IP

The IP address for smartphone_Home is assigned dynamically by DHCP. The router R_Home acts as both the router and the DHCP server for the network.

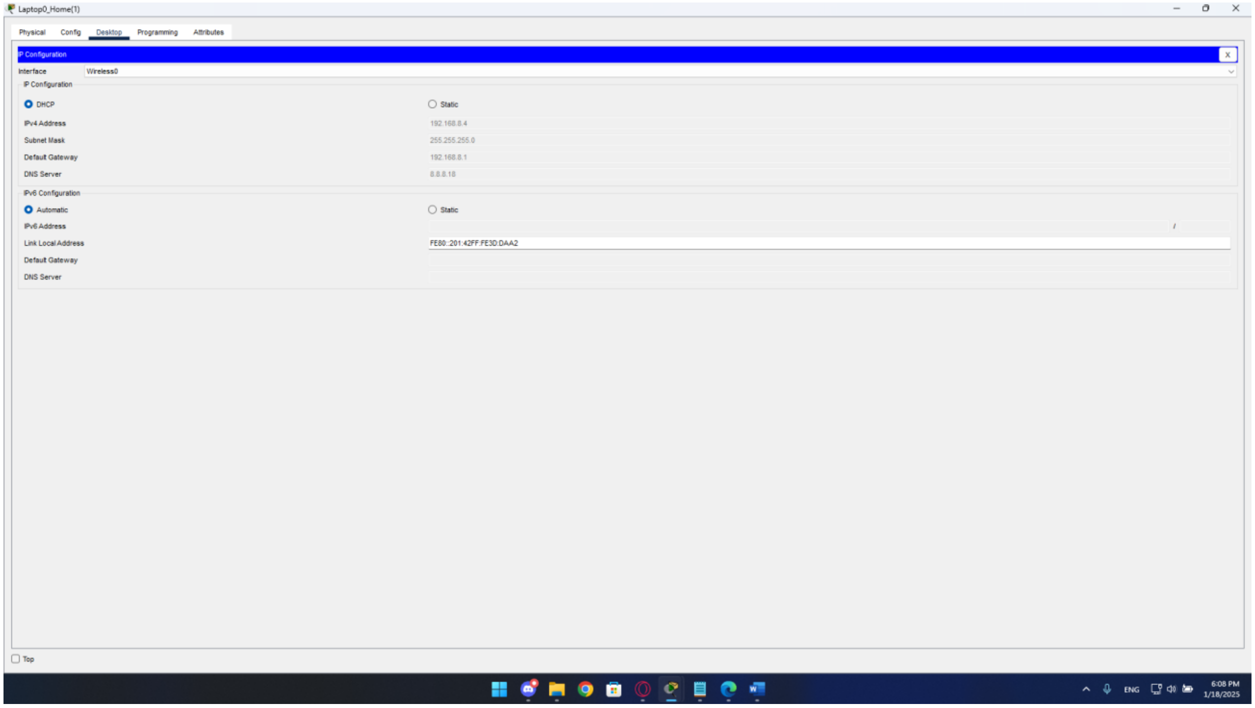


Figure 46:Laptop0_Home IP

The IP address for Laptop0_Home is assigned dynamically by DHCP. The router R_Home acts as both the router and the DHCP server for the network.

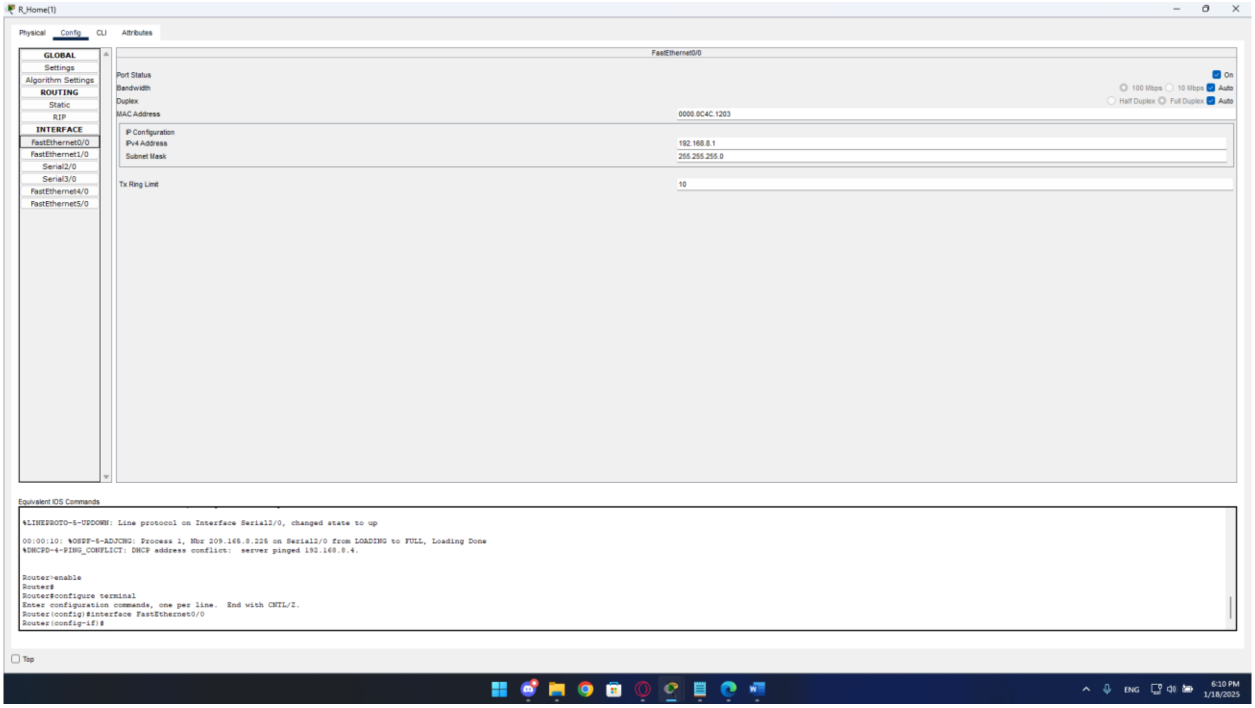


Figure 47:R_Home Fa0/0

I configured the IPv4 address for R_Home as 192.168.8.1 In this address, 192.168.8 represents the network portion, while 1 is the host identifier. The host ID can be set to any value between 0 and 255, provided it does not conflict with 0 (the network address), 255 (the broadcast address), or the addresses assigned to other devices within the same subnet.

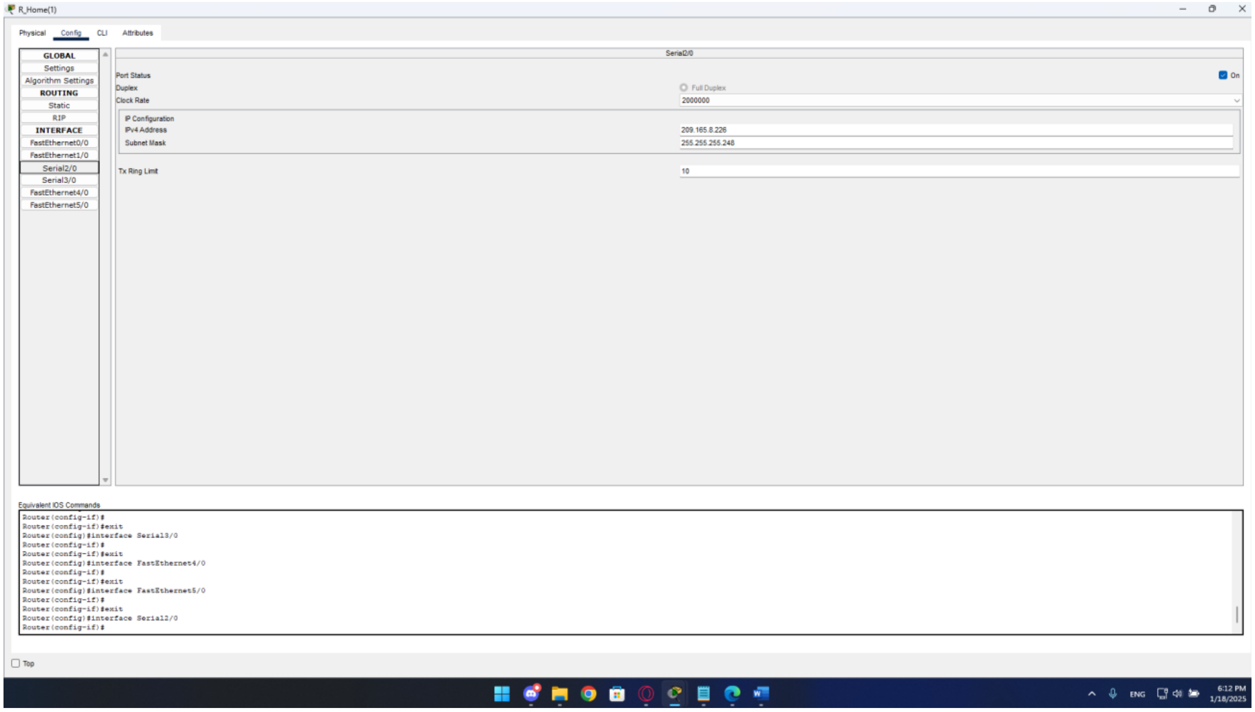


Figure 48:R_HOME Se2/0

I configured the IPv4 address for R_Home as 209.165.8.226 In this address, 209.165.8 represents the network portion, while 226 is the host identifier. The host ID can be set to any value between 224 and 231, provided it does not conflict with 0 (the network address), 231 (the broadcast address), or the addresses assigned to other devices within the same subnet.

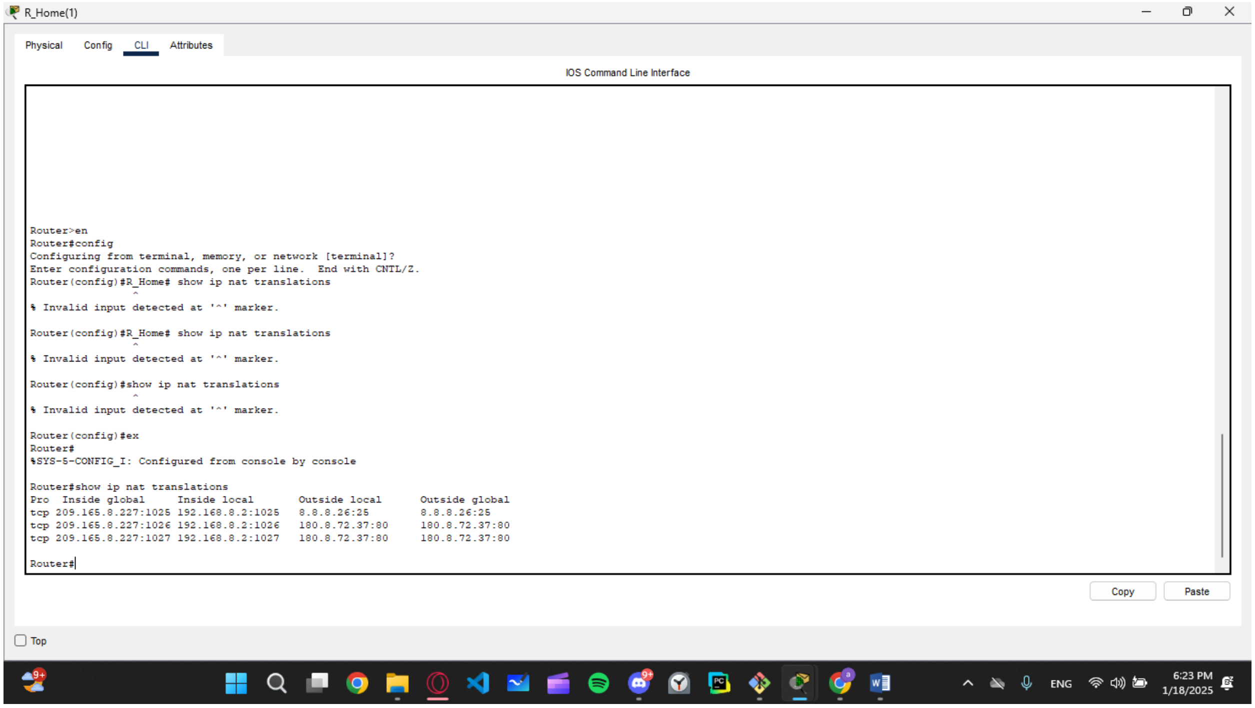


Figure 49:NAT table of R_Home router

The NAT table shows active translations on the R_Home router, mapping private IPs in the local network to a public IP for internet communication. For example, the device with private IP 192.168.8.2 (port 1025) is translated to the public IP 209.165.8.227, communicating with an external server at 8.8.8.26 (port 25). Each entry lists the protocol, private (inside local) and public (inside global) IPs, and the destination's public (outside global) IP. This table tracks NAT sessions, enabling local devices to access external networks.

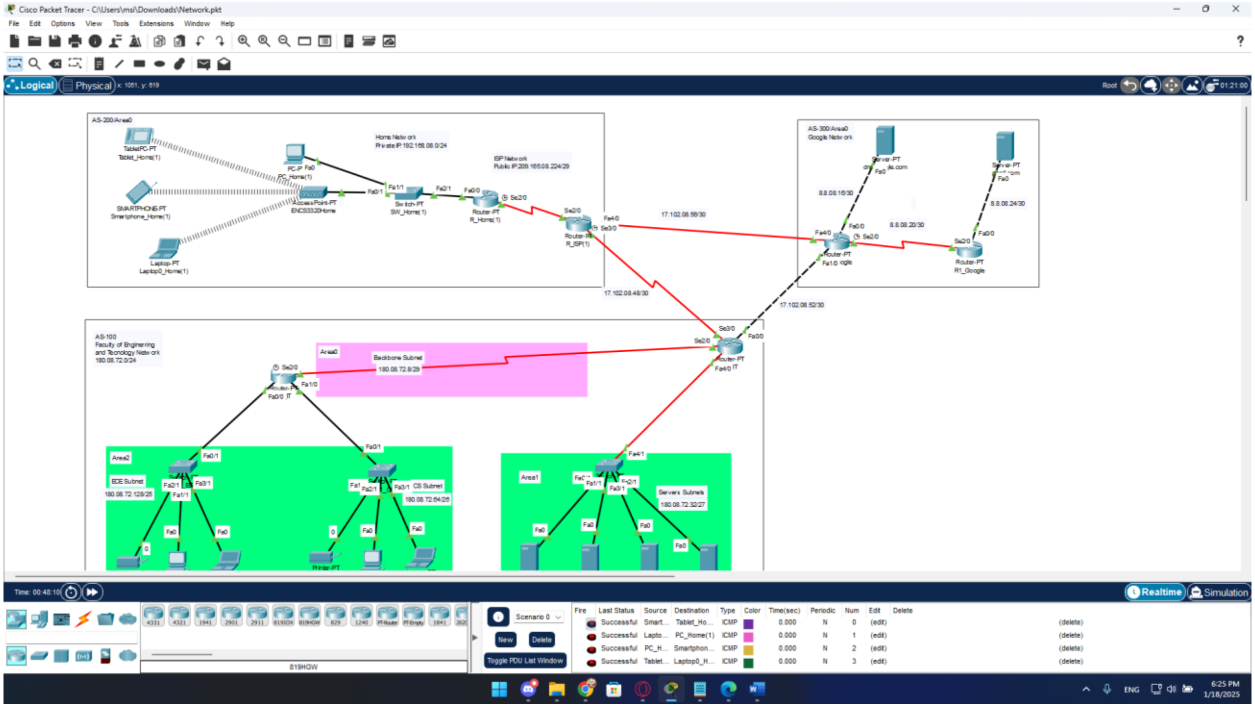


Figure 50:Ping results

A ping was sent between two devices in the home network, and it was successful, showing the devices can communicate properly.

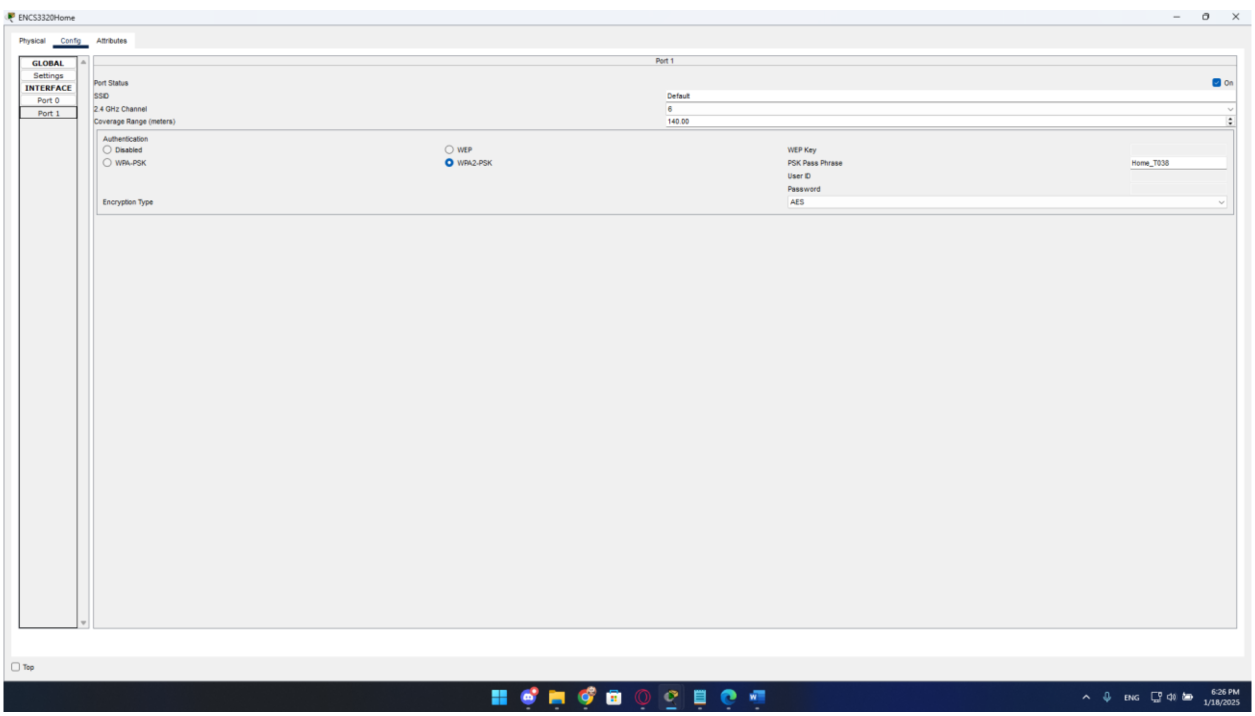


Figure 51:Wireless network configuration for ENCS3320Home

This photo displays the wireless network configuration for ENCS3320Home, which is secured with a password and cannot be accessed without it , and the password is Home_T038 our team number.

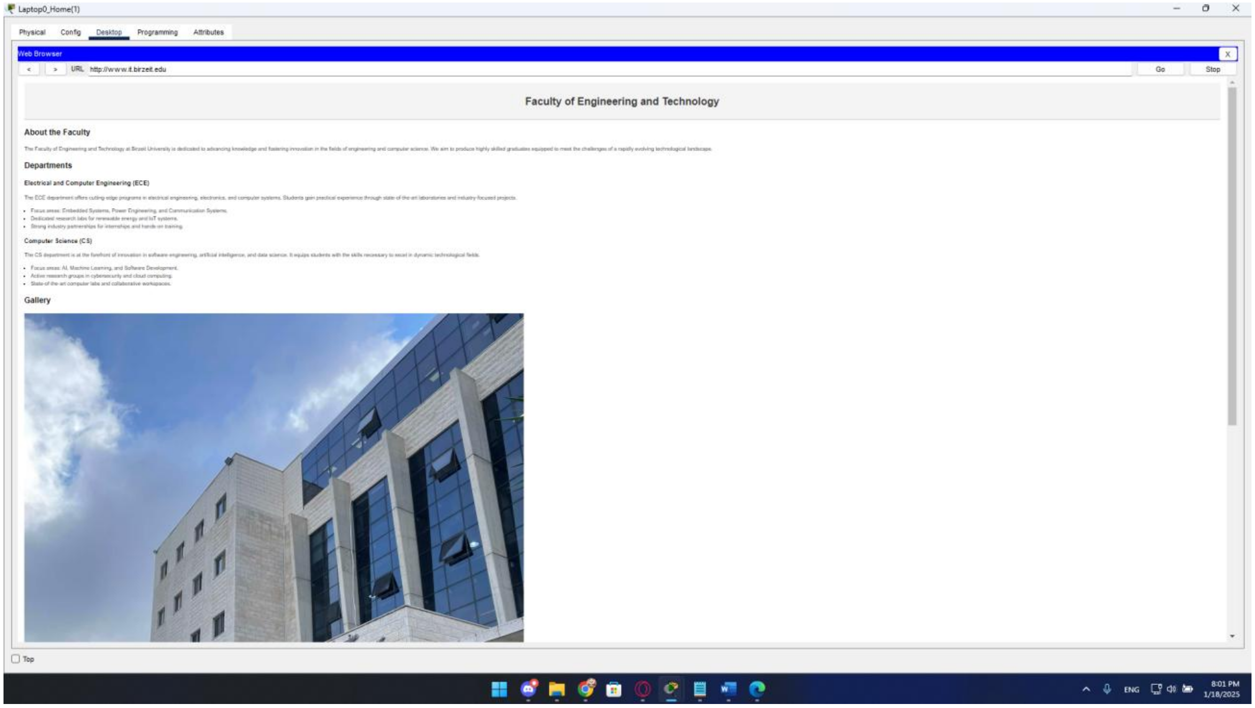


Figure 52:access to www.it.birzeit.edu from a home network end device.

This photo show that Laptop0_Home which is a home end device that Successfully accessed to the www.it.birzeit.edu website

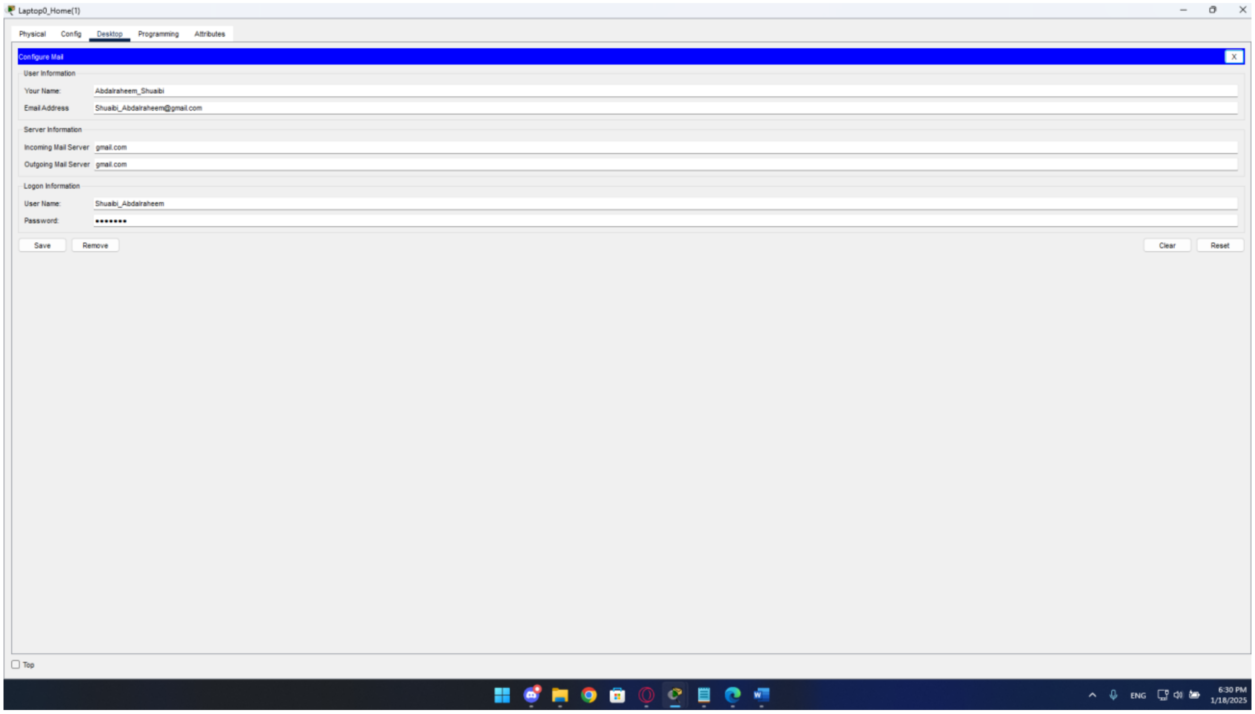


Figure 53:Laptop0_Home Email

This photo displays the email configuration in the end device Laptop0_Home , we set the incoming and the outgoing server to gmail.com.

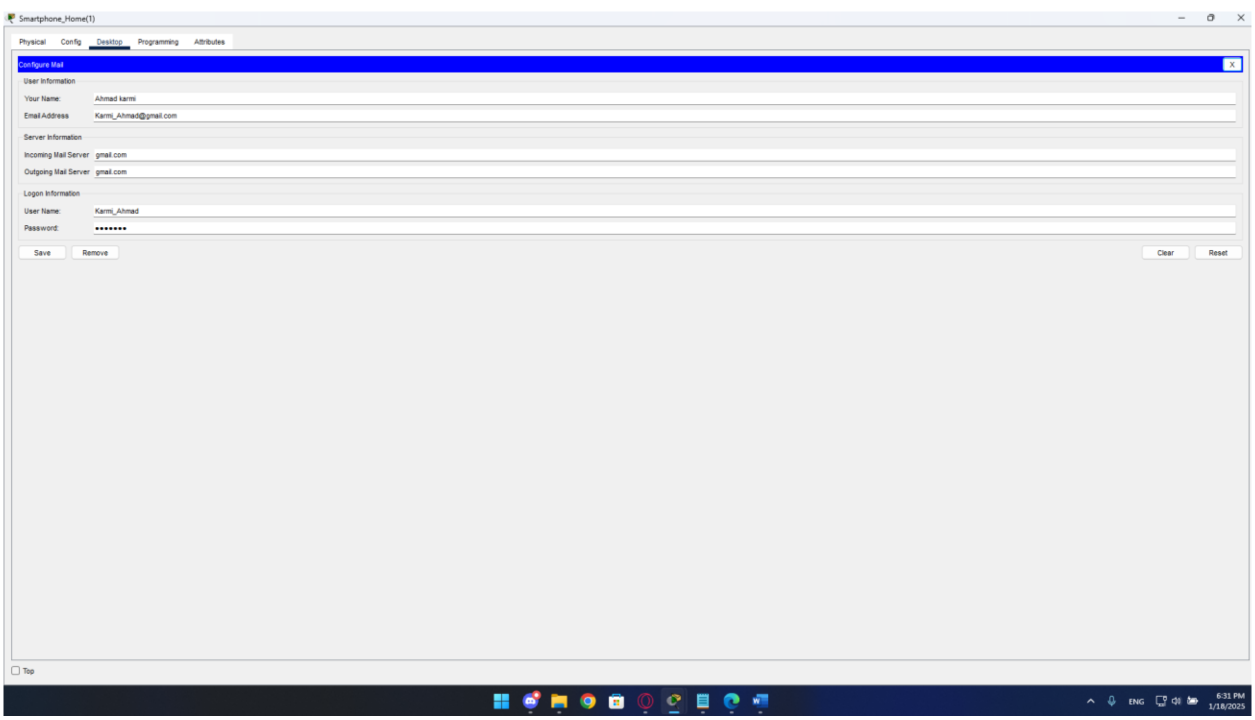


Figure 54:Email for Smartphone_Home

This photo displays the email configuration in the end device smartphone_Home ,we set the incoming and the outgoing server to gmail.com.

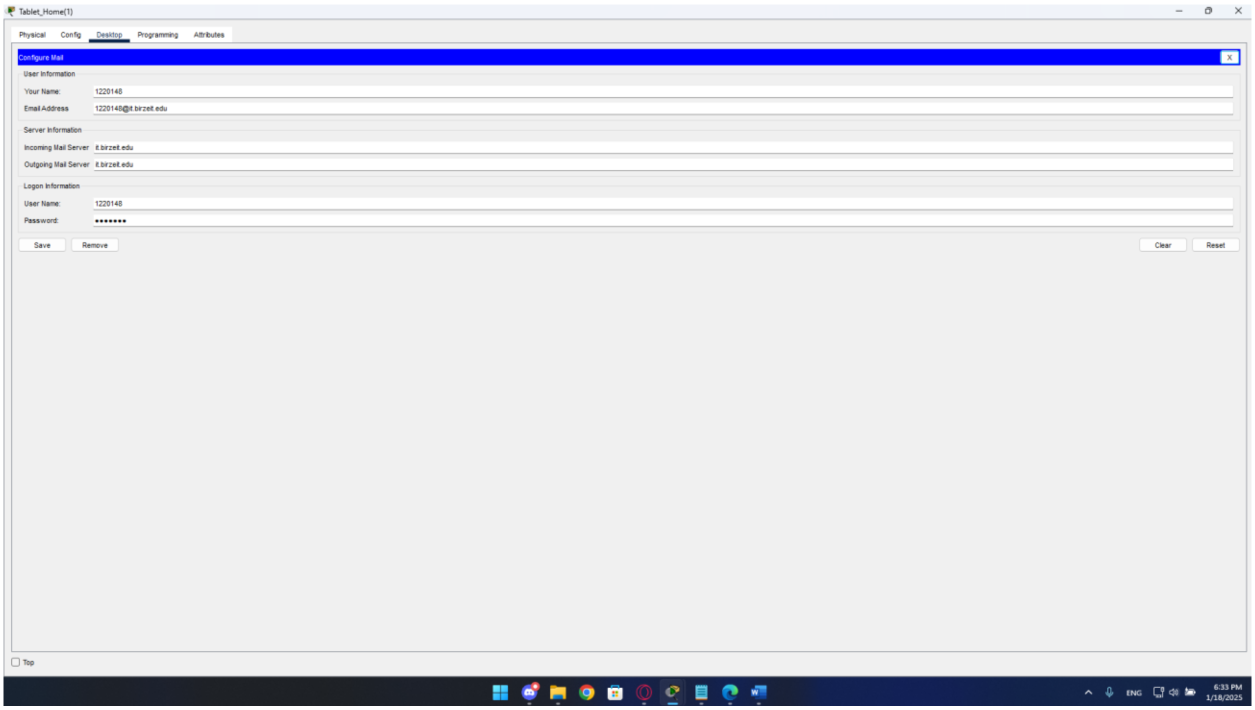


Figure 55:Email for Tablet_Home

This photo displays the email configuration in the end device Tablet_Home ,we set the incoming and the outgoing server to it.birzeit.edu.

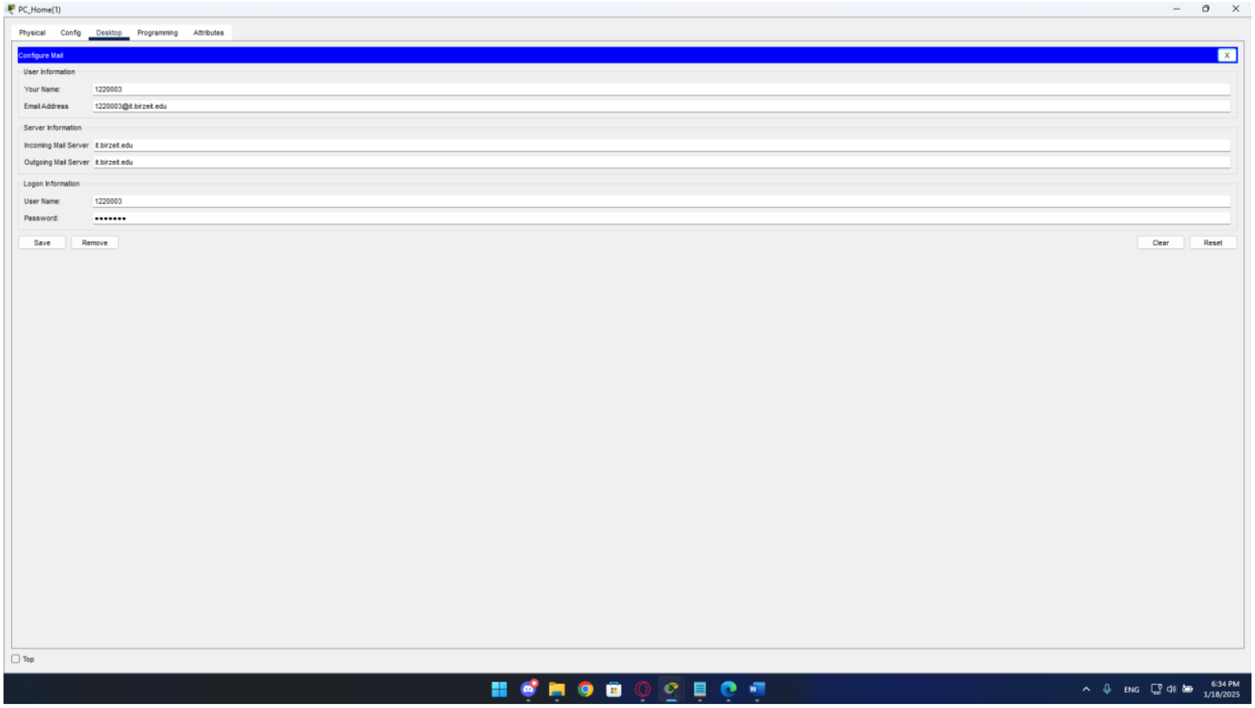


Figure 56:Email for PC_Home

This photo displays the email configuration in the end device PC_Home ,we set the incoming and the outgoing server to it.birzeit.edu.

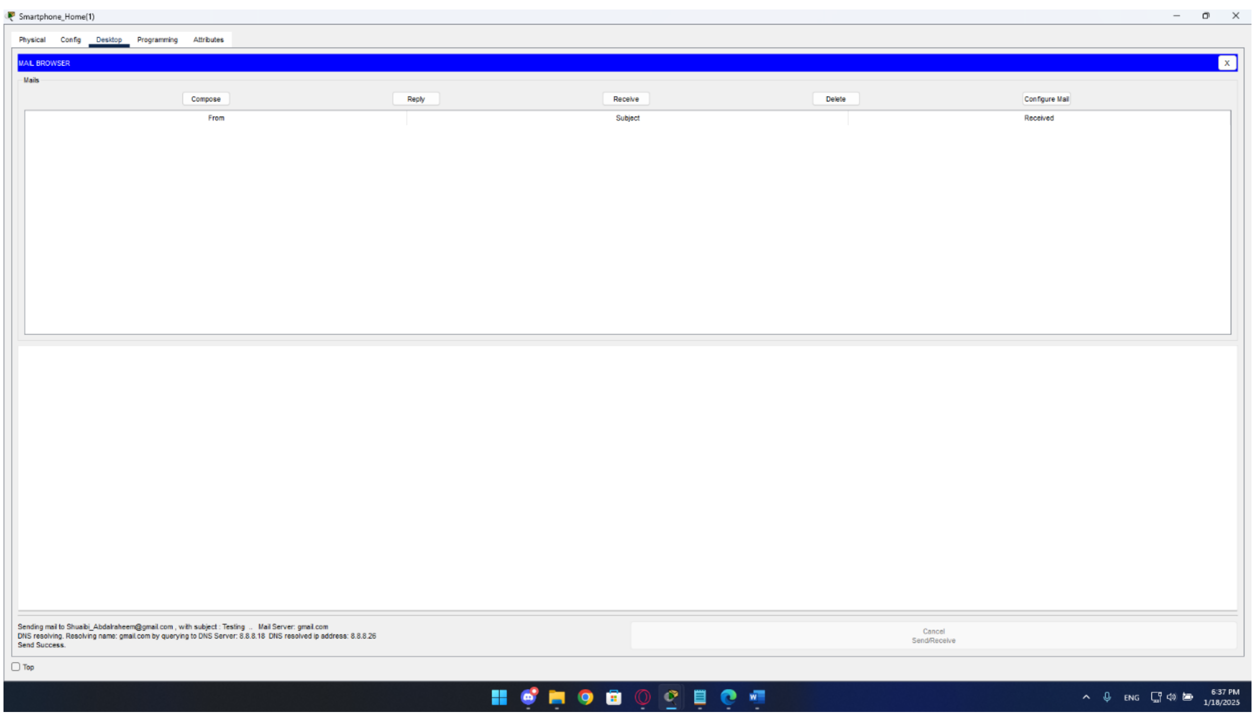


Figure 57:sending massege using gmail

An email sent using a gmail account form smartphone_Home end device to the Laptop0_Home end device.

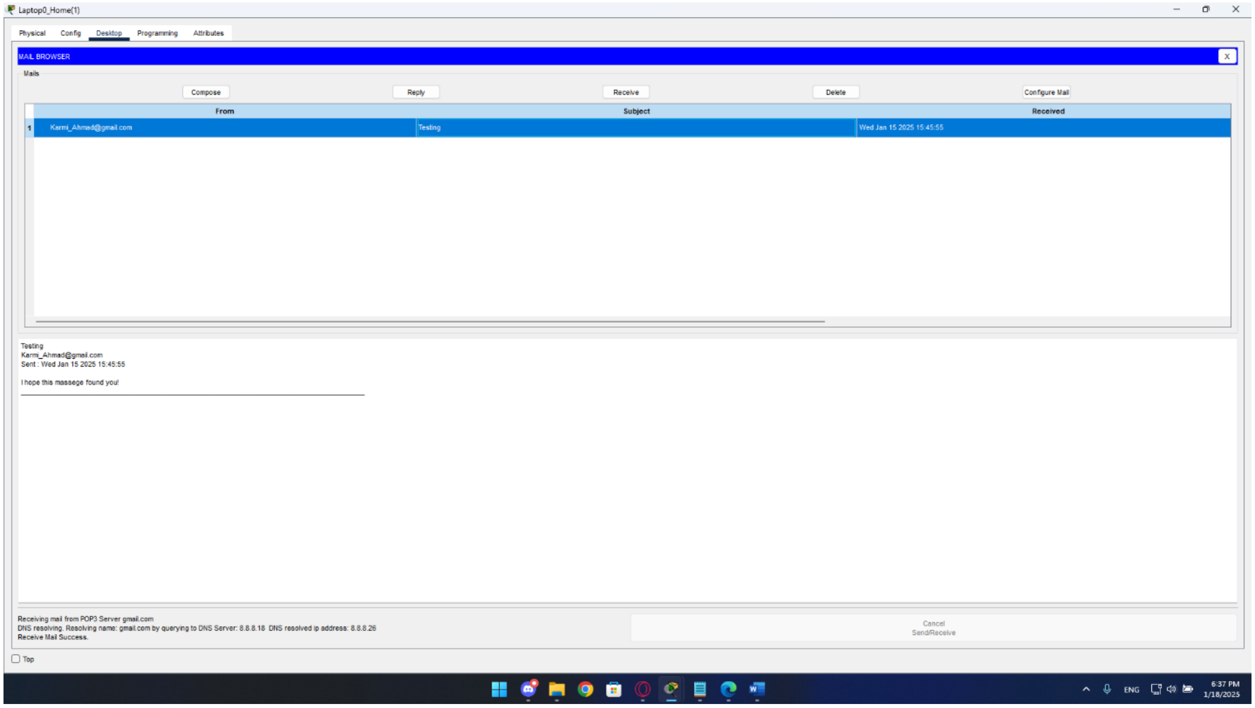


Figure 58:receiving massege using gmail

An email received in Laptop0_Home end device using a gmail account form smartphone_Home.

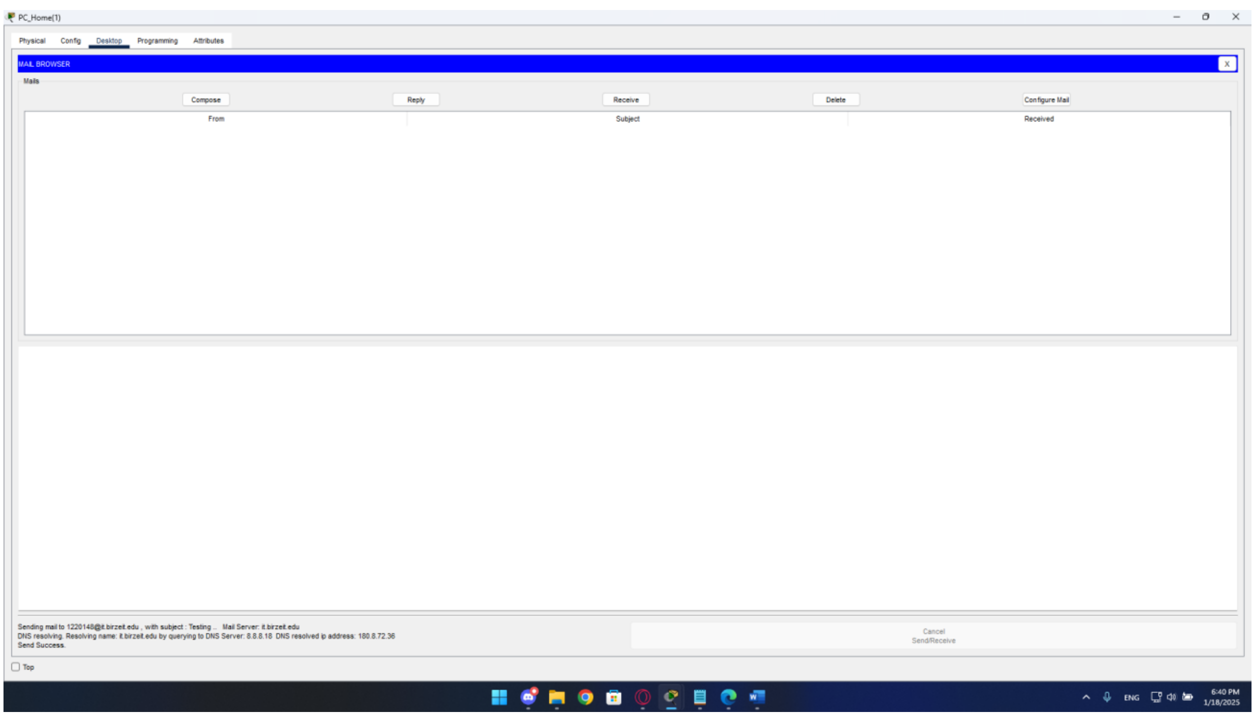


Figure 59:Sending massege using it.birzeit.edu

An email sent using a it.birzeit.edu account form PC_Home end device to the Tablet_Home end device.

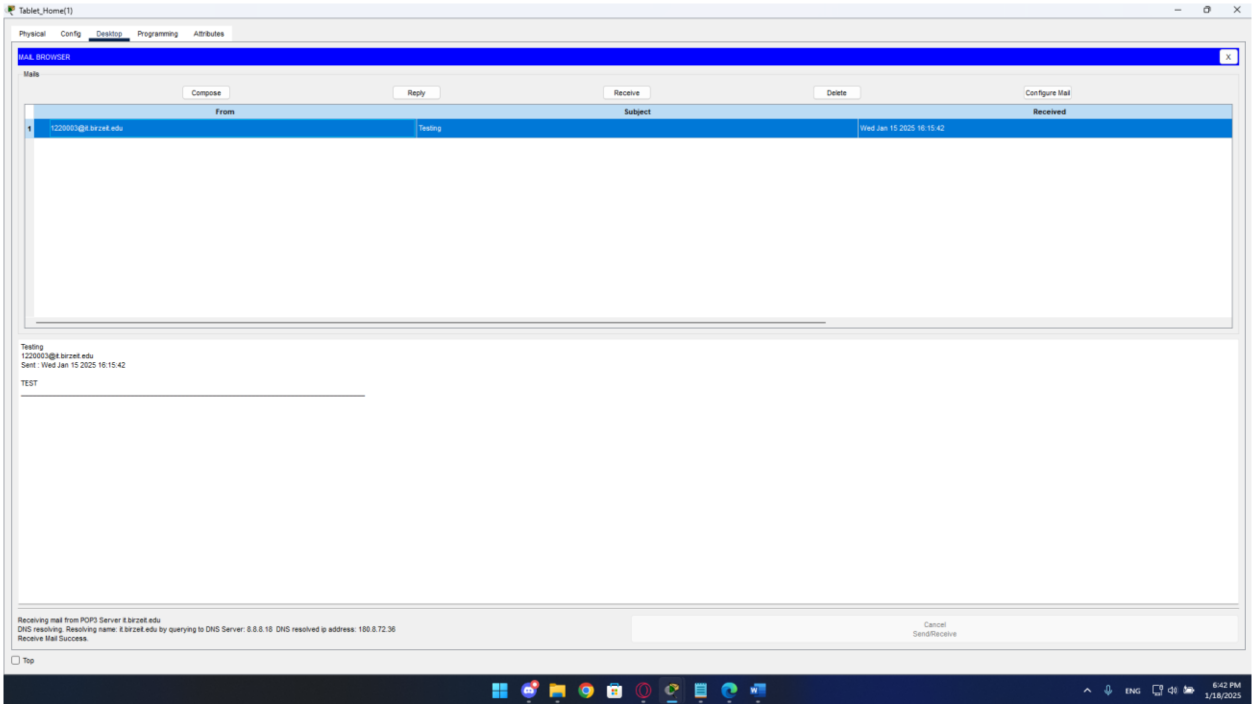


Figure 60:receiving massege using it.birzeit.edu

An email received in Tablet_Home end device using a it.birzeit.edu account form PC_Home.

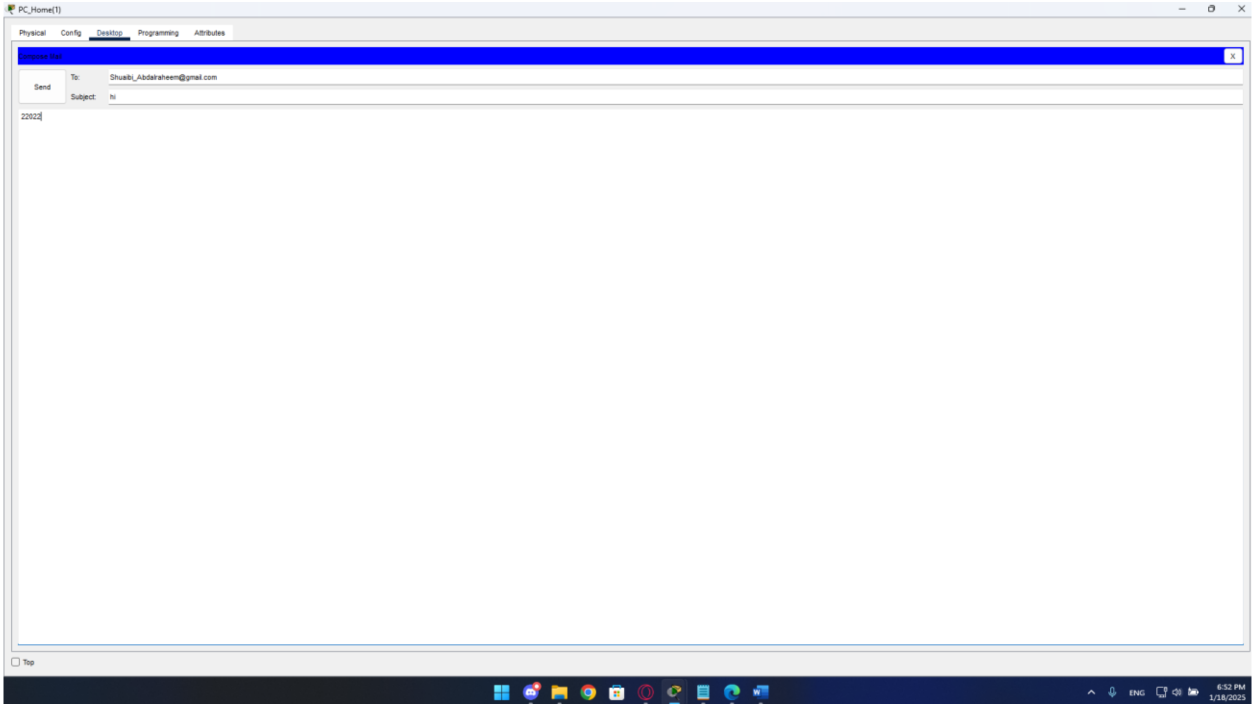


Figure 61:sending massege form it.birzeit.edu account to gmail

An email sent using a it.birzeit.edu account form PC_Home end device to the Laptop0_Home end device that uses a Gmail account.

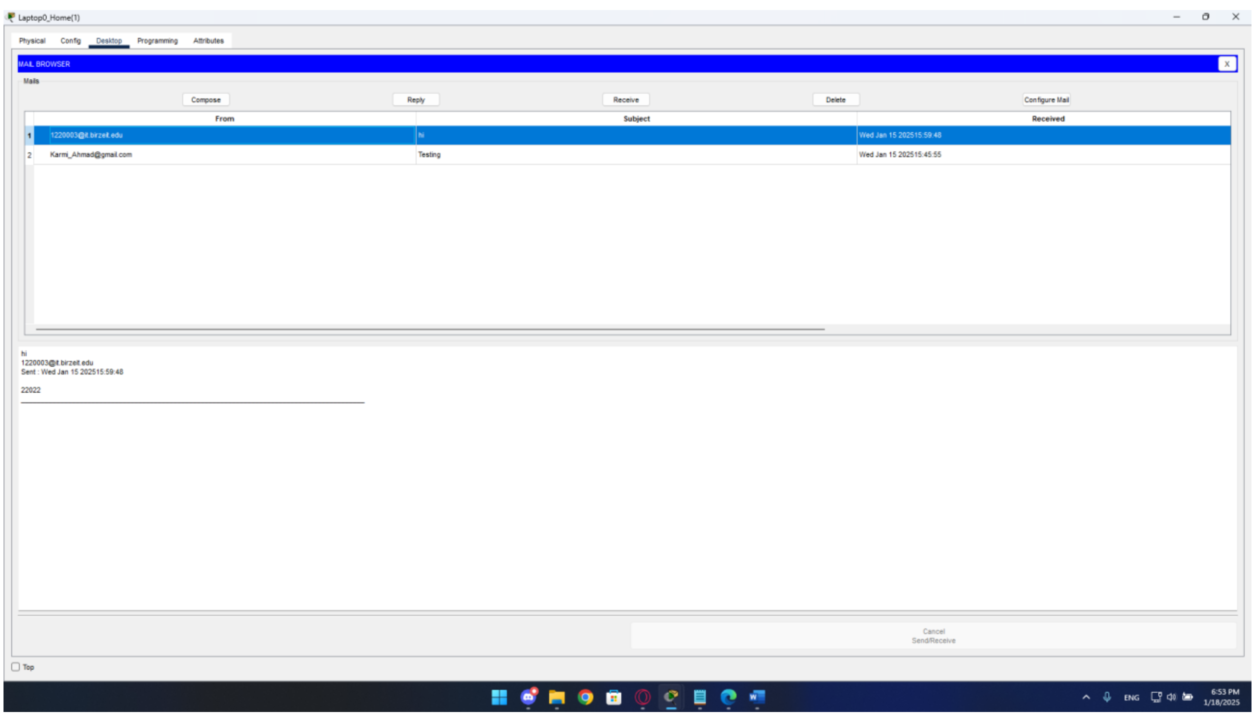


Figure 62: receiving massege form it.birzeit.edu account to gmail

An email received in Labtob0_Home end device using a gmail account form PC_Home that uses a it.birzeit.edu account.

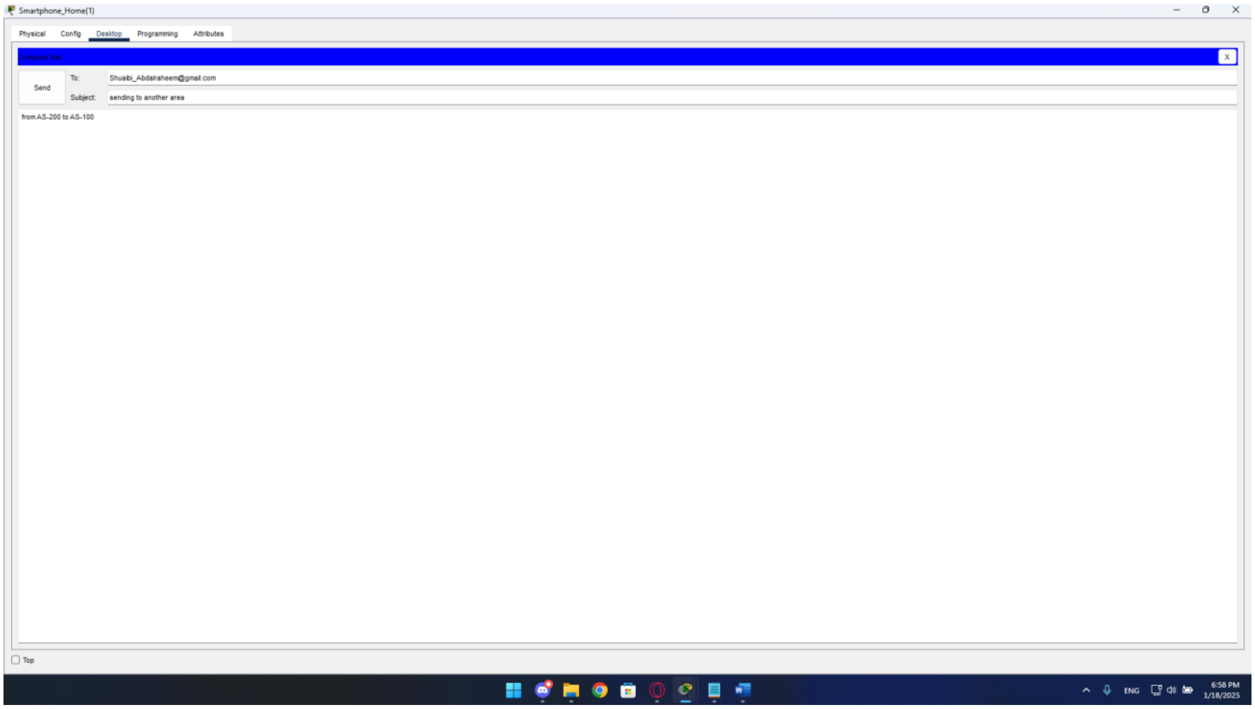


Figure 63:sending massege using gmail account from AS200 to AS100

Sending an email using gmail account from home area to the Faculty of Engineering and Technology area by using a smartphone_Home end device to the PC_ECE end device.

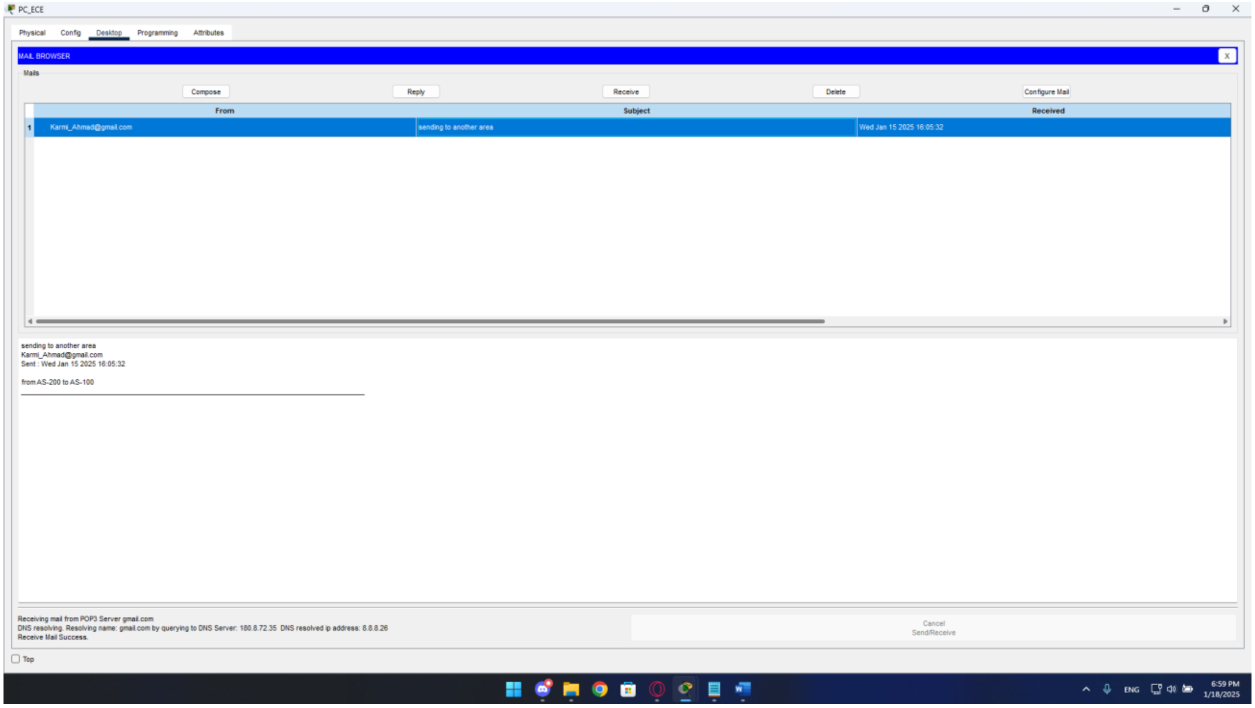


Figure 64: receiving massege using gmail account in AS100 from AS200

Receiving an email using gmail account in Faculty of Engineering and Technology area from home area using a smartphone_Home end device to the PC_ECE end device.

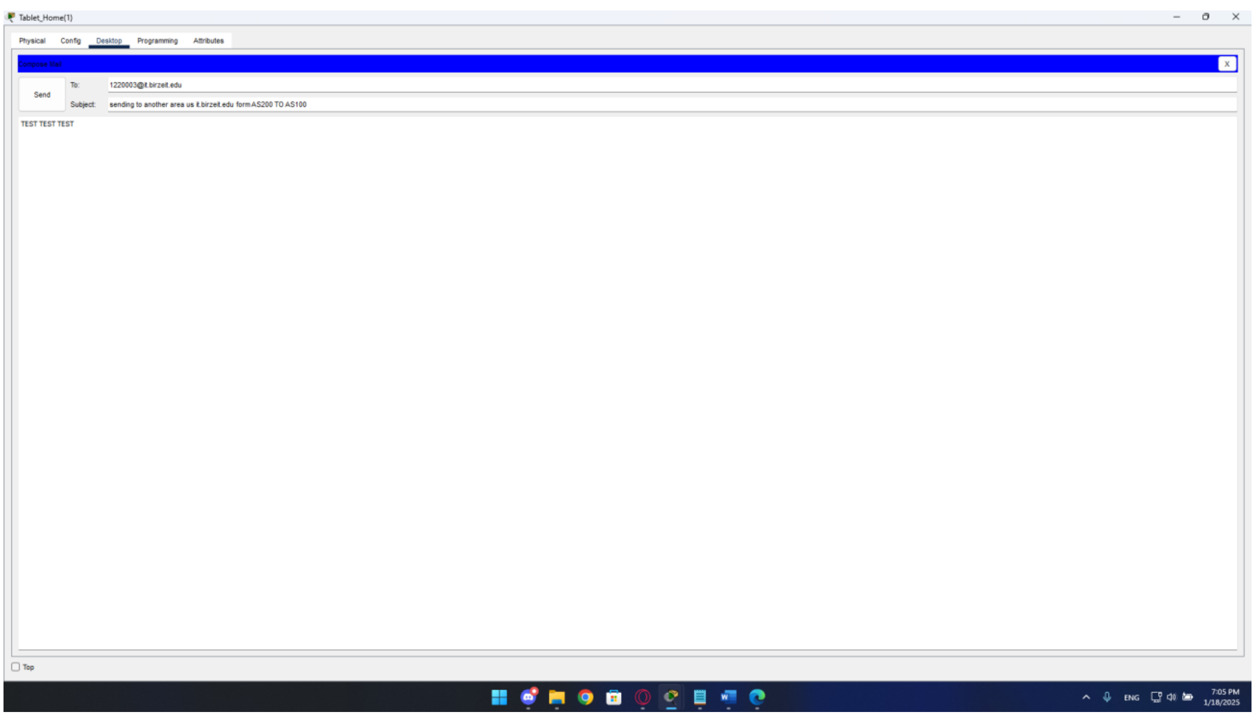


Figure 65:sending massege using it.birzeit.edu account from AS200 to AS100

Sending an email using it.birzeit.edu account from home area to the Faculty of Engineering and Technology area by using a Tablet_Home end device to the Labtop_CS end device.

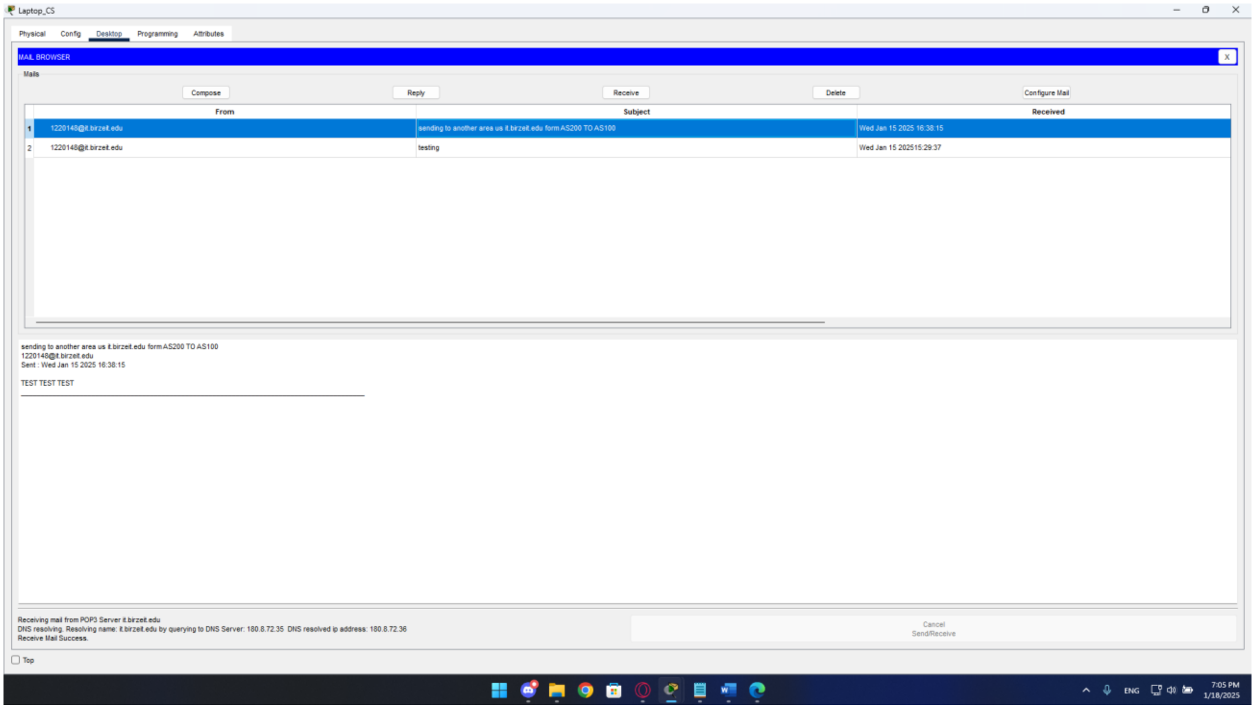


Figure 66:receiving massege using it.birzeit.edu account in AS100 from AS200

Receiving an email using it.birzeit.edu account in Faculty of Engineering and Technology area from home area using a Tablet_Home end device to theLabtop_CS end device.

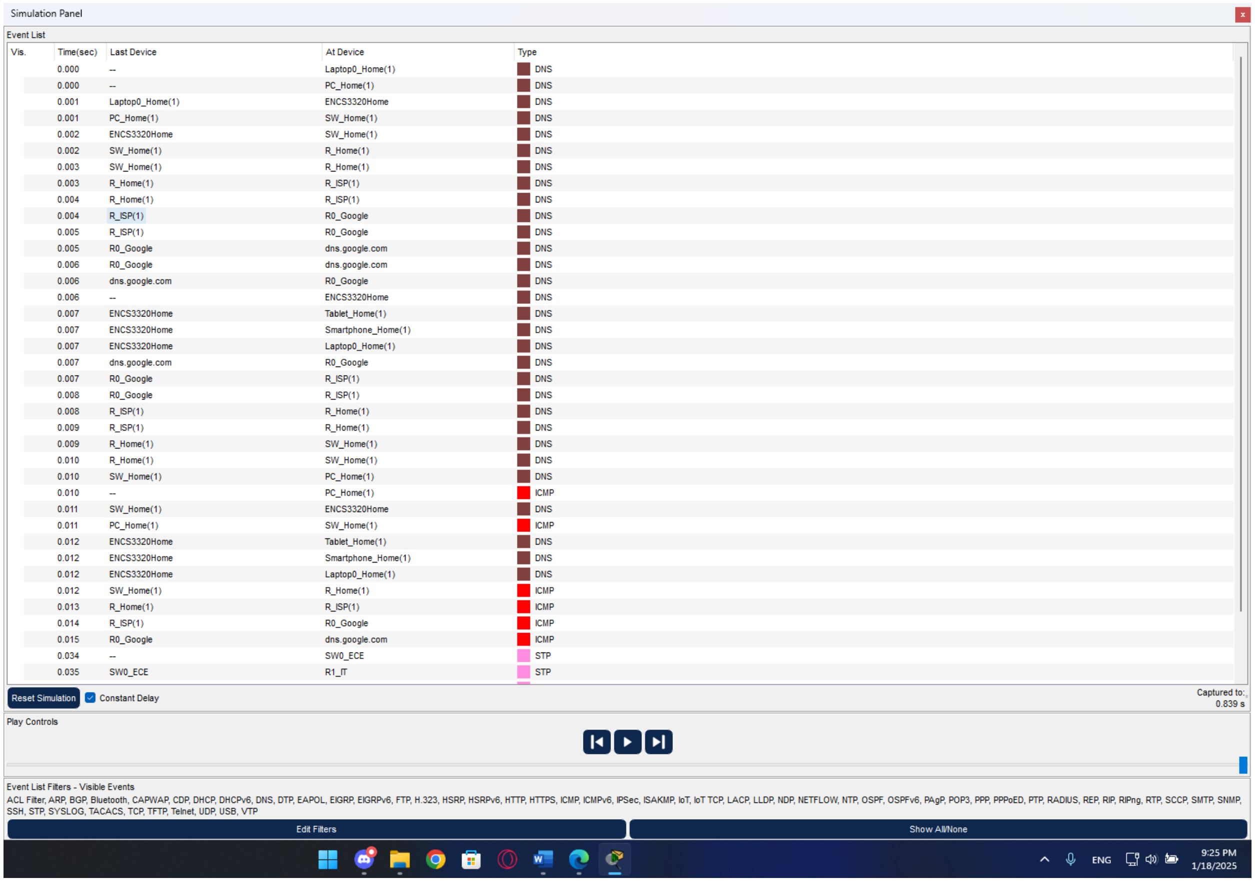


Figure 67:Simulation Mode

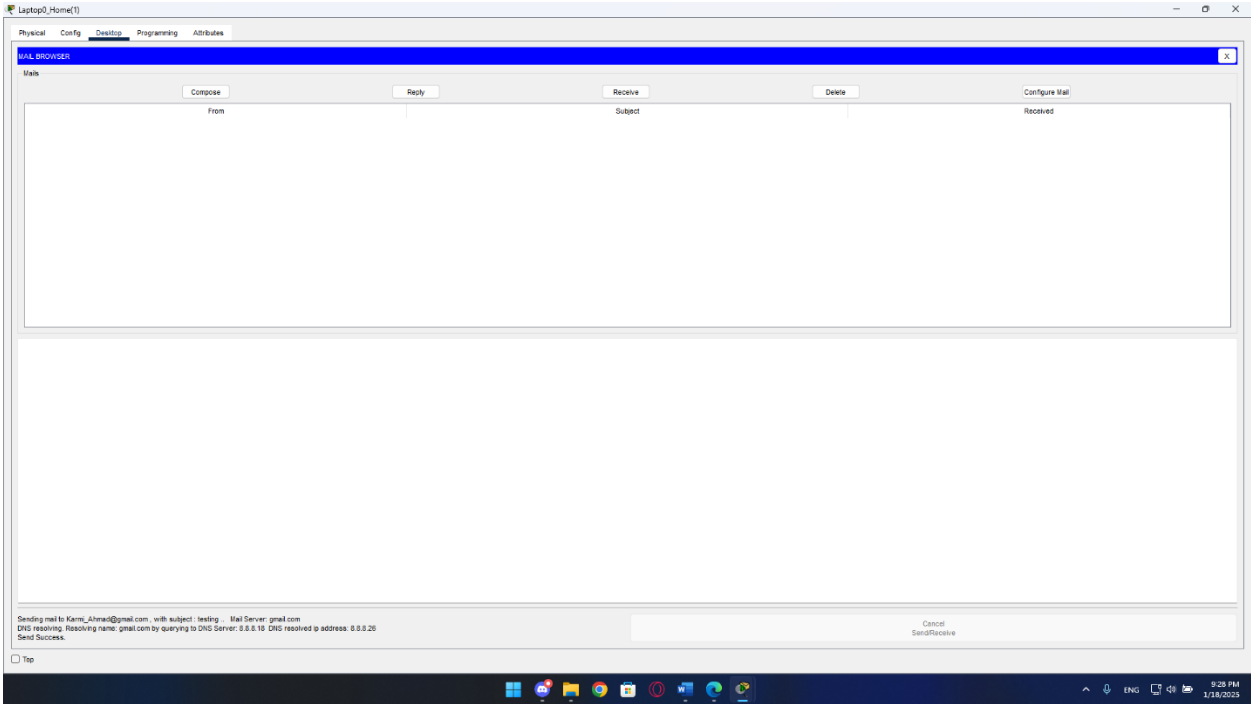


Figure 68:sending massege using gmail to another client

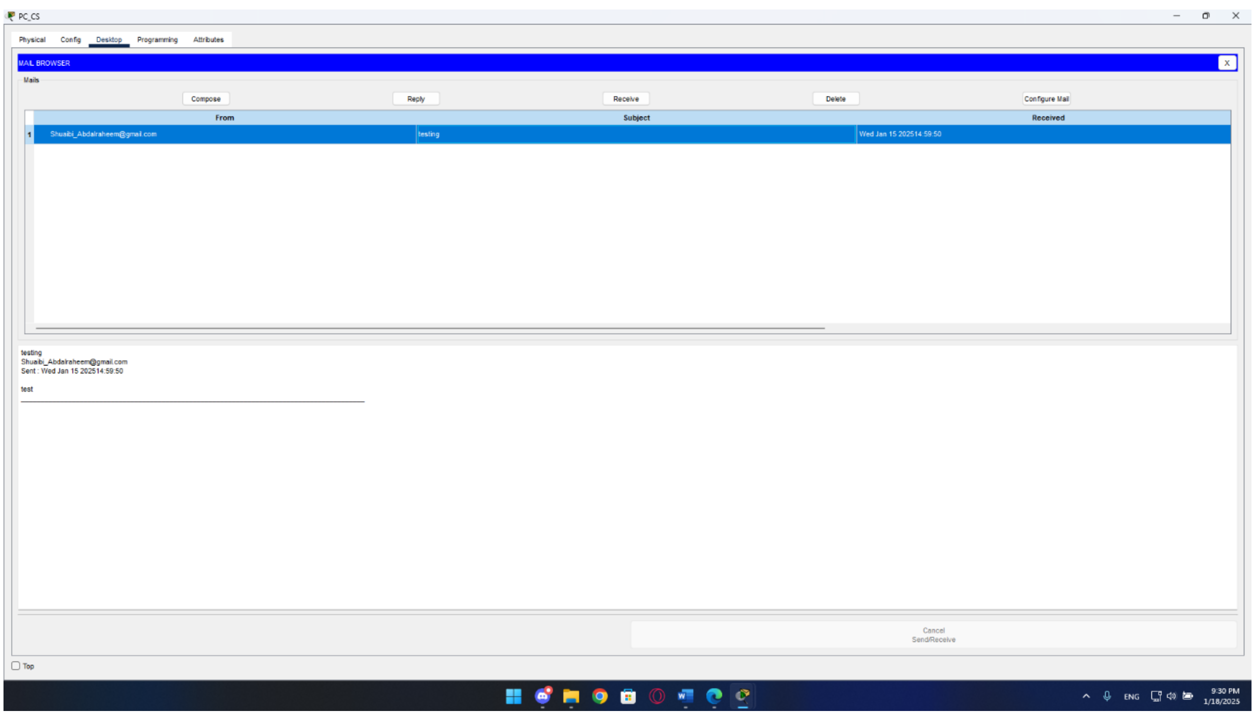


Figure 69:massege Received

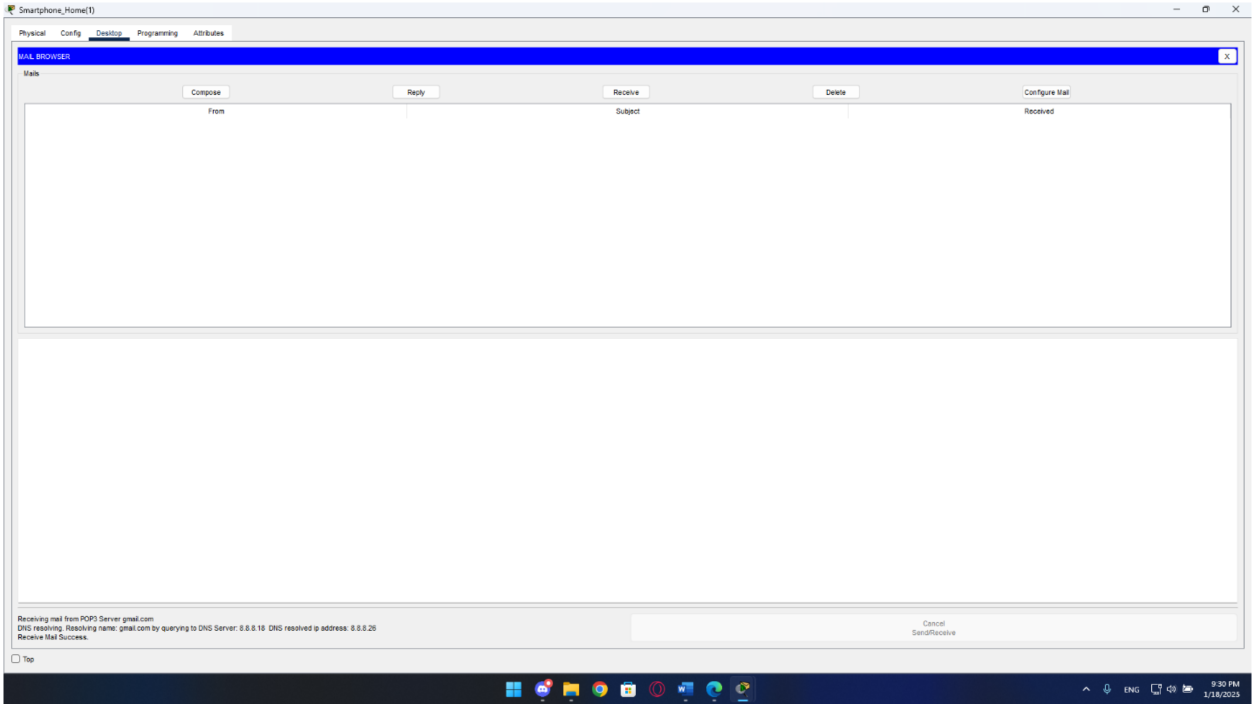


Figure 70:the seconed device for the same client

The email was successfully sent, but only the body of the message was retrieved on one device. This occurred due to a possible misconfiguration in the email client settings or a connectivity issue on the other device, such as incorrect server information, DNS resolution problems, or incomplete synchronization with the mail server. Further investigation is needed to address the issue and ensure proper functionality on both devices.

3 Limitations and issues

In this project, we have faced many obstacles, specifically with the construction and installation of all AS.

1.In the beginning, the topic was a little complicated in terms of OSPF. For him, we sat for a while until we learned how to know it between 2 routers. Add to that the way each router was built, which made the task difficult for us.

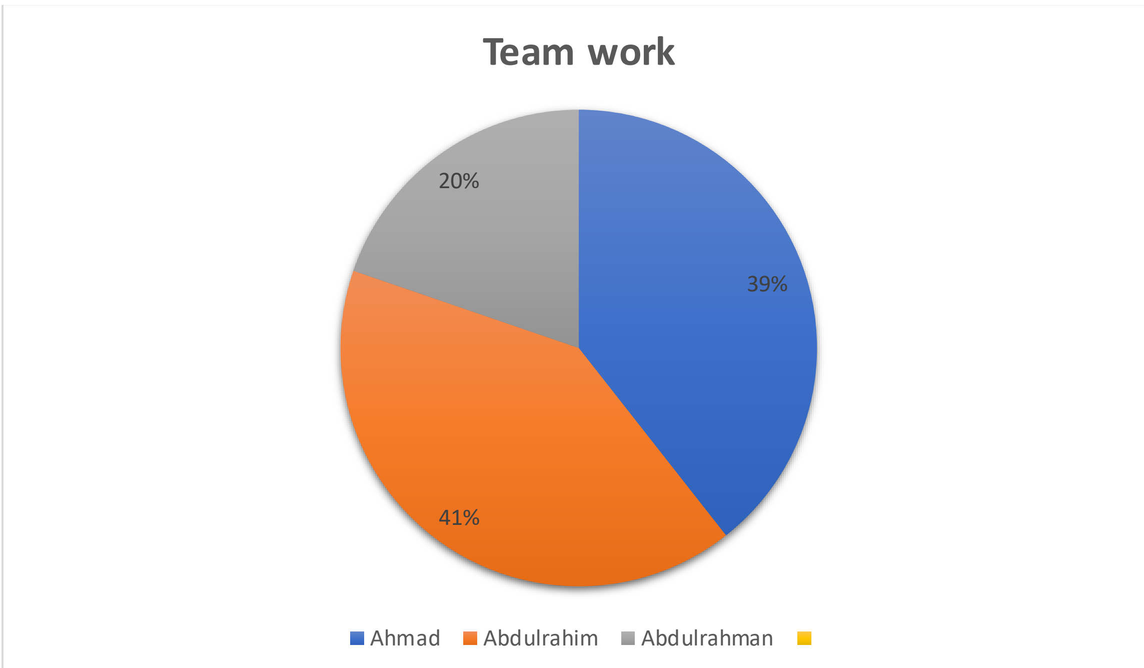
2.Also, the process of sub-netting was not easy, especially in the AS 100, which needed to subnet more than one area so that each component could take an IP address, and also leaving a margin of IP for devices that wanted to enter was not easy.

3.Also, the internal design of the servers as a command mode was hindering us from making each one of them a specific service station for all devices

Finally, We were not successful in working on this project with each other face to face, which made the process of understanding and working among us difficult

4 Teamwork

4.1 graph



4.2 Table of works

Table 5: Team work

name	Works of each member in Cisco	Works of each member in report
Abdulrahman Atyani	Build the overall shape and interior design work of the AS-300	Theory and procedure ,cover page Abstract , limitations and issues Teamwork
Ahmad karmi	interior design work of the AS-200	Results and Discussions
Abdulrahim Shuaibi	interior design work of the AS-100	Results and Discussions

5 References

[1]:https://en.wikipedia.org/wiki/Main_Page.

[2]:https://www.akamai.com/.

[3].https://www.cloudflare.com/.