Universidad De Las Américas Puebla

Ingeniería en Robótica y Telecomunicaciones
Departamento de computación, electrónica y mecatrónica.

En el curso:
LABORATORIO DE REDES DE COMPUTADORAS
O23-LRT4052-1
Impartido por:
Dr. Eduardo Javier Jiménez López

Práctica 1:

Equipo 3

Proyecto que presentan:
André Federico López Hernández - 167564
Jesús Alberto Betancourt Nevares - 166352
Jonathan Eliasib Rosas Tlaczani - 168399

Abstract

The main things we need to take in count for this practice are in the first place, that knowing about basic PC components and its internal peripherals are important as well as knowing of binary, decimal and hexadecimal numbering system.

We are going to know how to use the tools to obtain and compare information about network settings and to use the PING (Packet Internet Gopher) and TRACERT commands.

Theorical Analysis

1. Conversion between Hexadecimal, Binary, and Decimal Systems:

Hexadecimal, binary, and decimal are numeral systems used to represent numbers in different bases. The choice of base depends on the context and the ease of human or machine interpretation.

- Hexadecimal (Base-16): This system uses 16 symbols (0-9, A-F) to represent values. It's commonly used in computing to represent memory addresses, color codes, and more. Conversion between hexadecimal and binary is straightforward, as each hexadecimal digit corresponds to four binary digits (bits). Similarly, conversion between hexadecimal and decimal involves grouping digits and their corresponding place values.

- Binary (Base-2): Computers fundamentally operate using binary, with two symbols (0 and 1) to represent values. It's the basis of digital logic and is used in computing to represent data and instructions. Converting between binary and decimal involves multiplying each bit by its corresponding power of 2 and summing the results.

- Decimal (Base-10): This is the familiar numeral system humans use every day. Each digit represents a power of 10. Conversion between decimal and binary or hexadecimal requires iterative division and remainders.

2. Internal and External Components of a PC:

A personal computer (PC) consists of various internal and external components that collectively enable its functionality.

Internal Components:

- Central Processing Unit (CPU): The "brain" of the computer that executes instructions.

- Motherboard: The main circuit board connects all components.

- RAM (Random Access Memory): Volatile memory for active data and programs.

- Storage Devices: Hard drives (HDDs) and solid-state drives (SSDs) for persistent data storage.

- GPU (Graphics Processing Unit): Handles graphical tasks and can assist in parallel processing.

- Power Supply Unit (PSU): Supplies power to the components.

- Cooling System: Fans, heat sinks, and liquid cooling to prevent overheating.

- Expansion Cards: Add-on cards like sound cards, network adapters, etc.

External Components:

- Monitor: Output device for displaying visual information.

- Keyboard and Mouse: Input devices for user interaction.

- External Storage: Devices like USB drives and external hard drives.

- Speakers or Headphones: Output devices for audio.

- Printer/Scanner: Input/output devices for physical document handling.

- Network Devices: Routers, modems for network connectivity.

3. TCP/IP Configuration:

TCP/IP (Transmission Control Protocol/Internet Protocol) is the set of protocols that enable communication over the Internet. Configuration involves settings for devices to communicate effectively.

- IP Addressing: Devices are assigned IP addresses (IPv4 or IPv6) for identification and routing.

- Subnetting: Dividing an IP network into smaller sub-networks for efficient routing.

- Gateway: The router that connects a local network to other networks.

- DNS (Domain Name System): Resolves domain names to IP addresses.

- DHCP (Dynamic Host Configuration Protocol): Automatically assigns IP addresses to devices on a network.

- **Ports: ** Used to differentiate services on a single device.

4. FQDN, Ping, and Tracert:

These terms relate to network communication and troubleshooting.

- FQDN (Fully Qualified Domain Name): A complete domain name that specifies a precise location in the DNS hierarchy, e.g., www.example.com.

- Ping: A utility to test network connectivity by sending ICMP echo requests and receiving replies.

- Tracert (Traceroute): A tool to trace the route packets take from source to destination, showing network hops and response times.

In summary, understanding hexadecimal, binary, and decimal conversions is crucial in computing. PCs consist of various internal and external components that collaborate for functionality. TCP/IP configuration facilitates network communication, and terms like FQDN, Ping, and Tracert aid in network troubleshooting and analysis.

Methodology

- Part I: Conversion between Hexadecimal systems, binary or decimal.

Examine the MAC address of your assigned PC and convert this value to binary and decimal format without the aid of a calculator. Then, using the conventions mentioned in class, perform the conversions between the different systems in Table 1.

- Part II: Internal and External Components of a PC.

Examine the peripheral components of the PC and list at least 5 of them including the name of the manufacturer, description of the peripheral and its characteristics. Also make a list of at least eight internal system components and their characteristics. Then turn on a PC and use the Control Panel to get the CPU characteristics and the amount of memory installed in the system.

- Part III: TCP/IP Configuration.

Using a PC with Internet access, find out and record the IP network address. To do this, use the IPCONFIG command from the command line (LC). Compare this information with that of other PCs in the lab. Find out additional configuration information using the IPCONFIG/ALL command. Find out in detail what additional info is shown. Compare this data with data obtained on at least two other computers. Comment on the results.

	Decimal	Hex	Binario
1		A9	
2		FF	
3		BAF1	
4		E7-63-1C	
5	53		
6	115		
7	19		
8	212.65.119.45		
9			10101010
10			110
11			11111100.00111100
12			10110111.11010111

Table 1. Conversions between numeric systems

- Part IV: FQDN, Ping y Tracert

Using the Command Line (CL) type the following commands (without the < > symbols):

1. PING < IP address of a > host

2. PING < Number of hosts >

3. PING www.google.com

4. PING www.udlap.mx

Note: If the host's name contains spaces, it must be enclosed in quotation marks.

Investigate and report the operating principles of the PING command, interpret, and record the results of each command. For commands three and four, the first line will display the FQDN (Fully Qualified Domain Name) followed by an IP address. Find out what type of server can map a Web address to an IP address.

In case any of the PING commands are not successful but show the FQDN find out the reason for this restriction. Please note that this restriction could be based on security policy. Additionally, use the PING command to sign the connection to the default gateway, to the DNS server, DHCP, and to the address of LOOPBACK 127.0.0.1. Record your results in detail (research and include information about the usefulness of the LOOPBACK direction).

Use the following command:

TRACERT www.google.com

From the results displayed, it is observed that each of the lines represents a connection point between two networks, through which the packet passed. Use the TRACERT command to send a packet to other Web addresses and record and comment on the results. Find out and comment on the main differences between the PING and TRACERT commands.

Experimental Results

- Part I

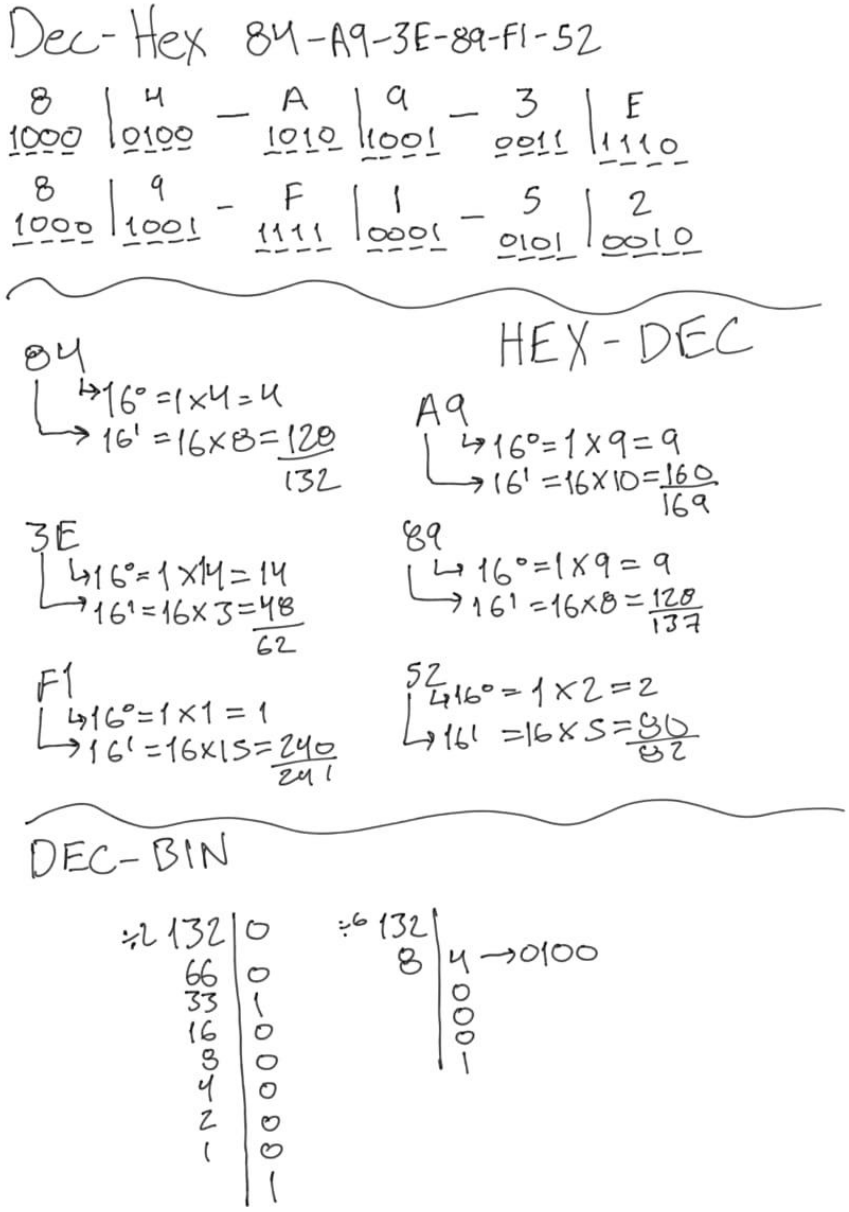

Figure 1. Conversions between Dec-Hex, Hex-Dec, Dec-Bin

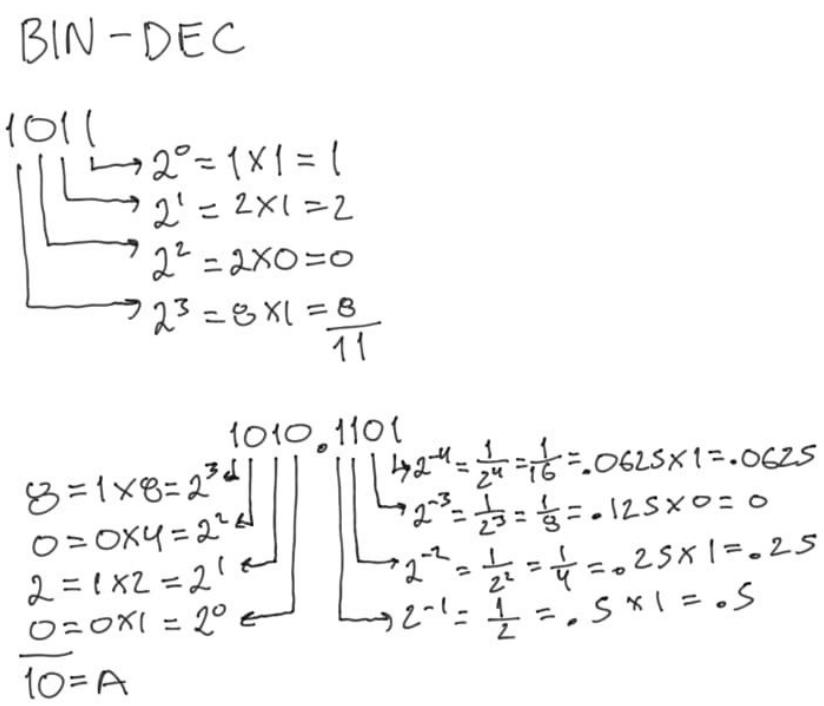

Figure 2. Conversions between Bin-Dec

- Part II

Device name	PCCN115-10
Full device name	PCCN115-10.udla.fundacion.mx
Processor	Intel(R) Core(TM) i7-9700 CPU @ 3.00GHz 3.00 GHz
Installed RAM	16.0 GB (15.8 GB usable)
Device ID	25EE13DD-3224-4789-9DBC-104EBC388A6D
Product ID	00329-00000-00003-AA116
System type	64-bit operating system, x64-based processor

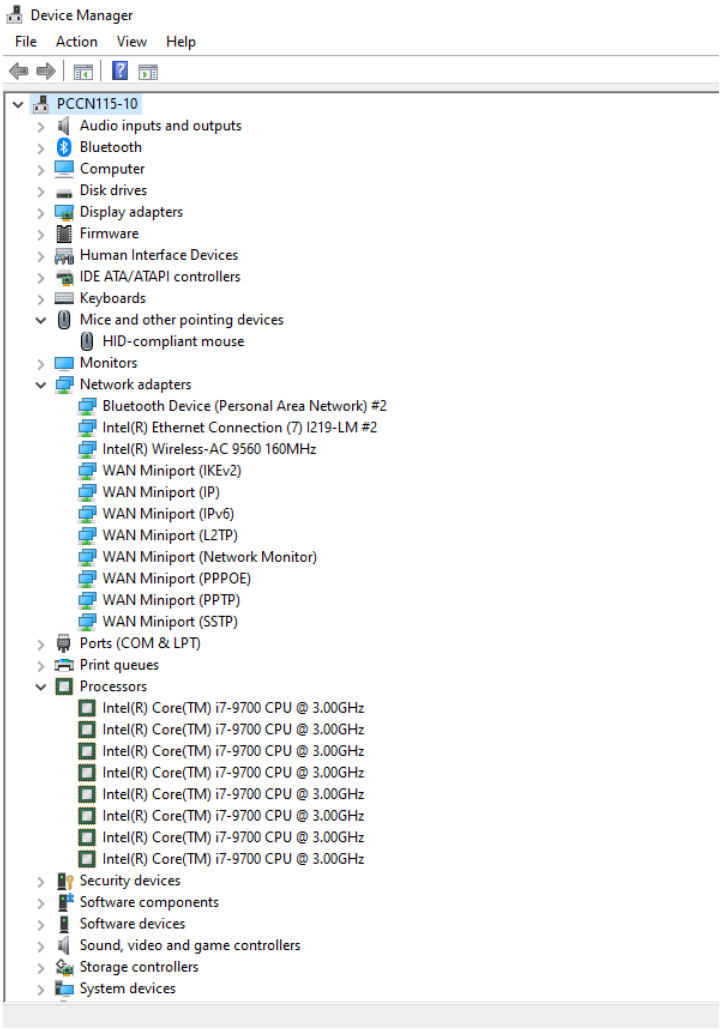

Figure 3. Device manager Internal and External Components of a PC

In figure 3 we can observe a list of at least eight internal system components and their characteristics, this can be seen by opening the computer's device manager interface.

- Part III
  Ex1:

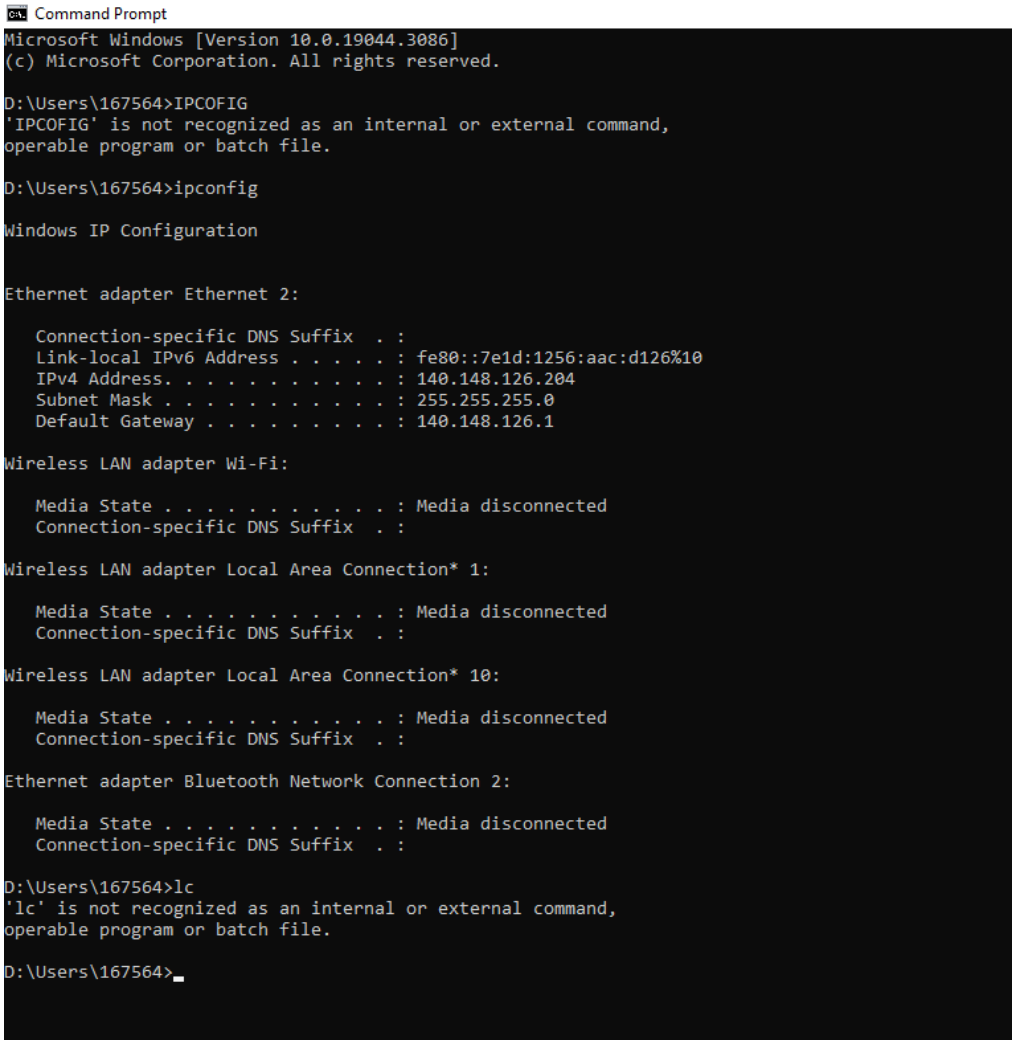

Figure 4. PC CMP IP configuration

In figure 4 we opened the command prompt to check the IP configuration using the ipconfig command from the command line (LC). We then compared the information displayed with other PC's information in the LAB.

Ex2:

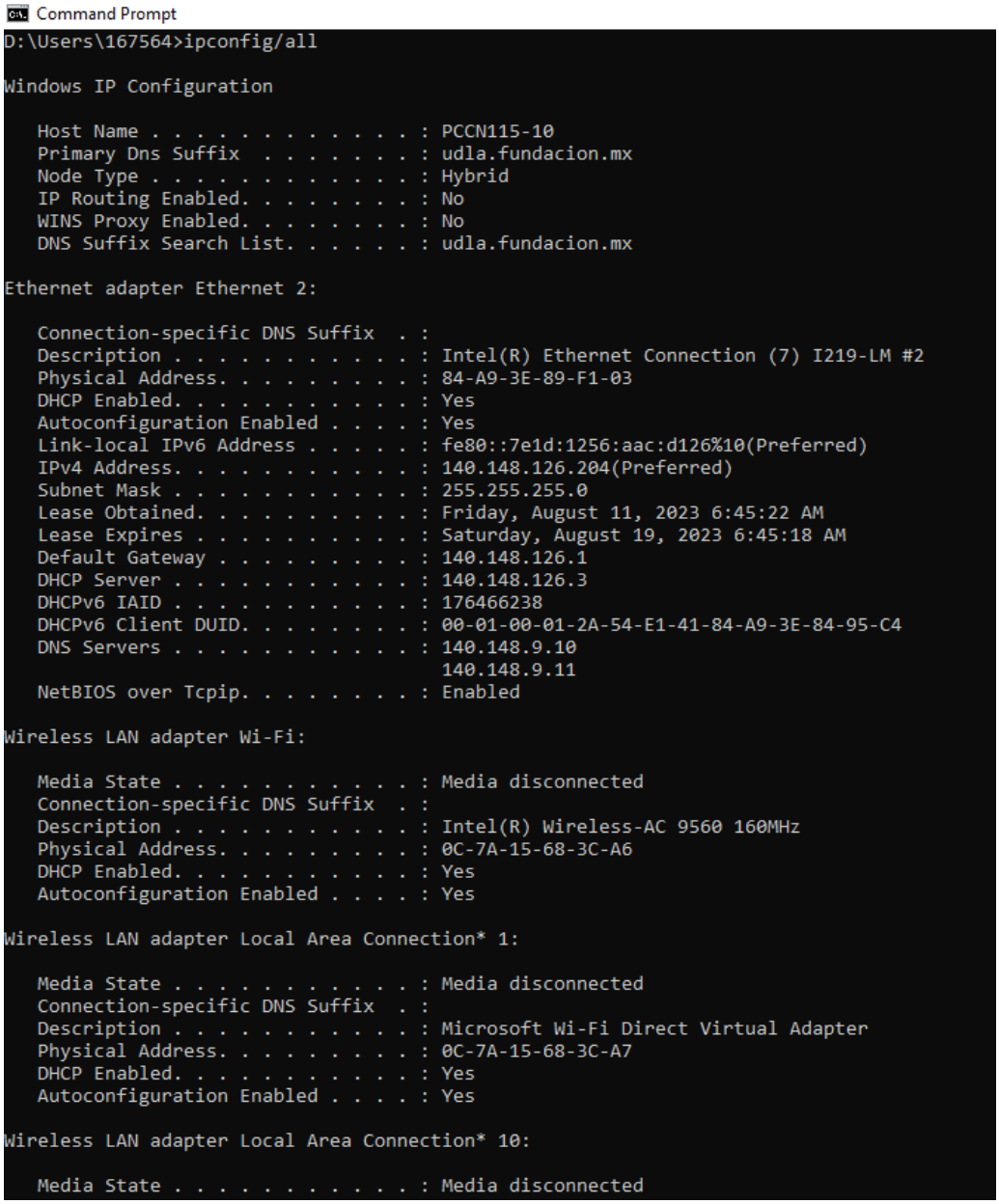

Figure 5. PC CMP IP configuration ALL

In figure 5 we once again opened the computer's command prompt to observe additional information by using a similar command called IPCONFIG/ALL, this command shows more characteristics about the ETHERNET and WIRELESS LAN adapter.

BINARIO	HEX	DECIMAL
10101001	A9	169

11111111	FF	255
1011101011110001	BAF1	47857
11100111-01100011-00011100	E7-63-1C	231-99-28
110101	35	53
1110011	73	115
0001 0011	13	19
11010100. 01000001. 01110111. 00101101	D4.41.77.55	212.65.119.45
10101010	AA	170
110	6	6
11111100.00111100	FC.3C	252. 23437500000000000000
10110111.11010111	B7.D7	183. 83984375000000000000

Table 2. Complete conversions between numeric systems

- Part IV

1. **PING**

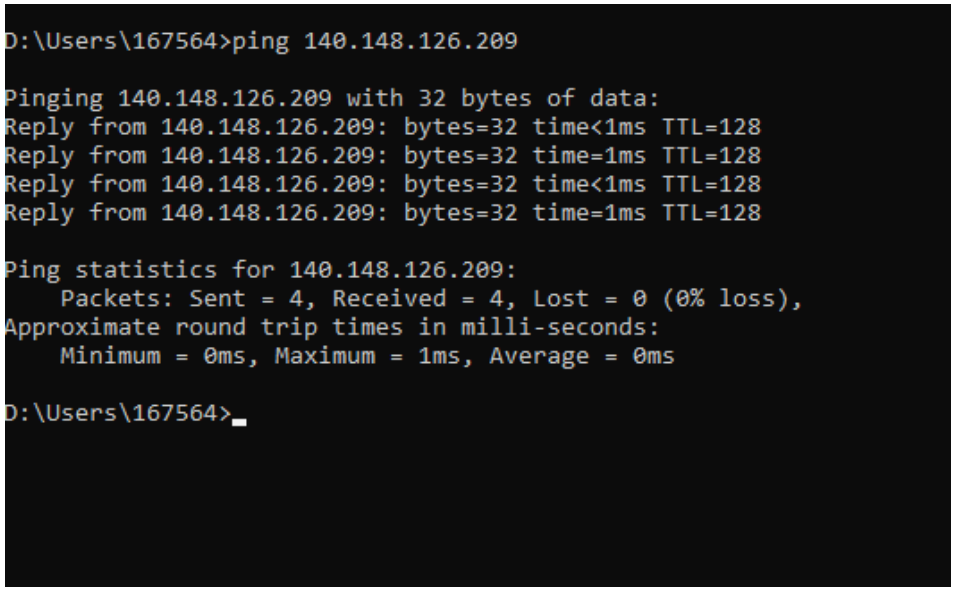

Figure 6. CMP < IP address of a > host

In figure 6 we used the computer's CMP to type the ping command to ping the hosts IP address.

2. **PING**

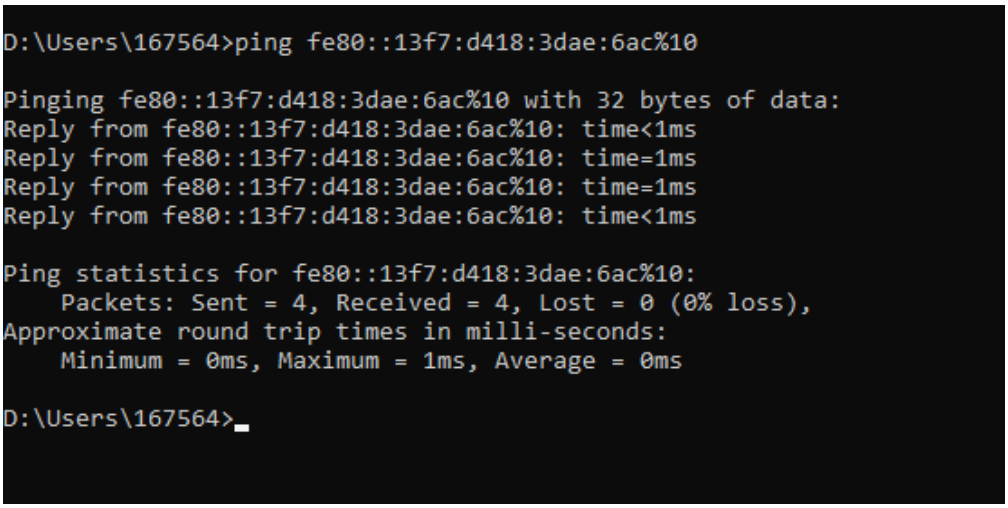

Figure 7. CMP < Number of hosts >

In figure 7 we used the computer's CMP to type the ping command to ping the number of hosts IP address.

3. **PING**

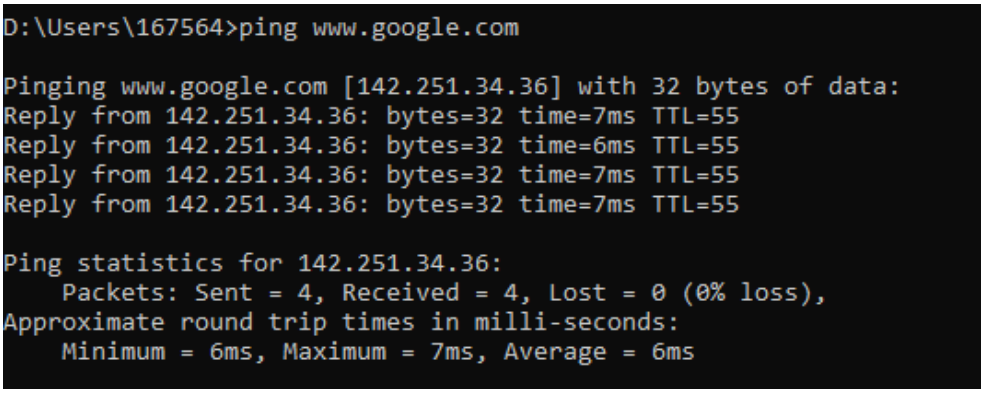

Figure 8. CMP to ping www.google.com

In figure 8 we used the computer's CMP to type the ping command to ping Google to observe the ping statistic, the number of packages sent and the approximate round-trip times in milli-seconds.

4. **PING** www.udlap.mx

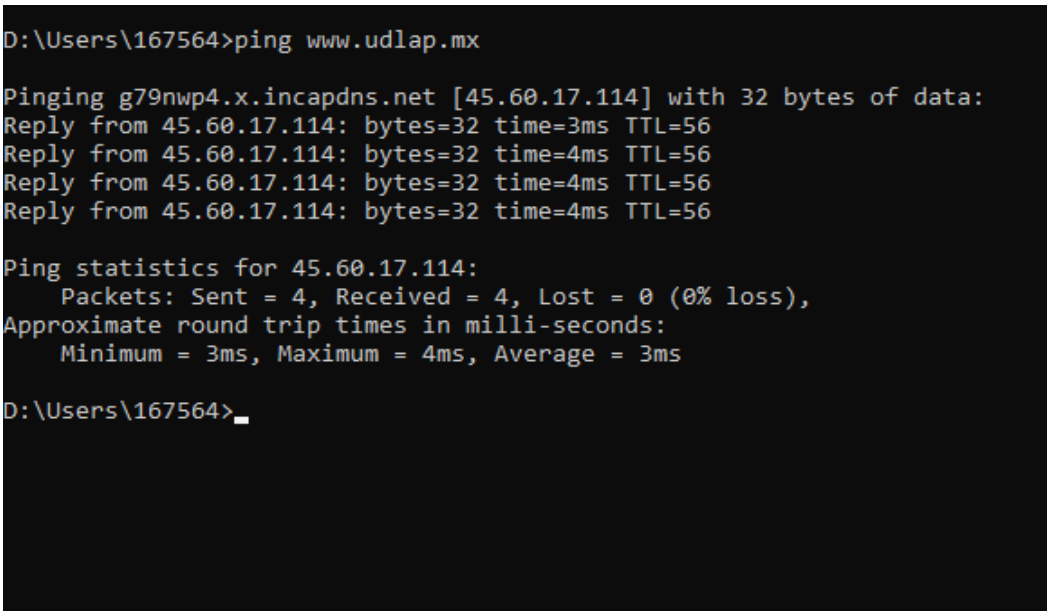

Figure 9. CMP to ping www.udlap.mx

In figure 9 we used the computer's CMP to type the ping command to ping the UDLAP university to observe the ping statistic, the number of packages sent and the approximate round-trip times in milli-seconds.

LOOPBACK

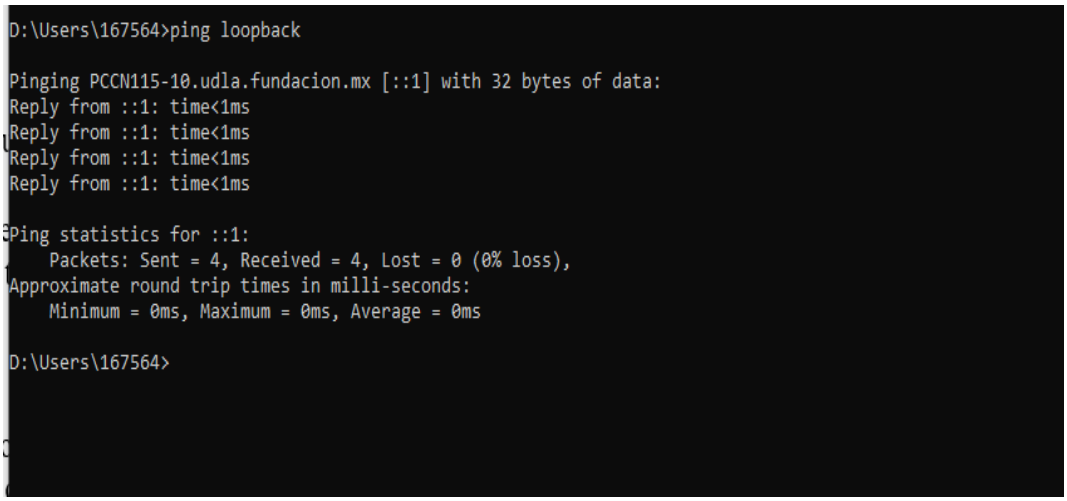

Figure 10. CMP ping LOOKBACK

The loopback direction is a crucial component of computer networking, primarily used for testing, diagnosing, and isolating network-related issues. It's also a valuable tool for developers, security, and network administrators to ensure the proper functioning of network services and applications on a local machine without external network involvement.

TRACERT www.google.com

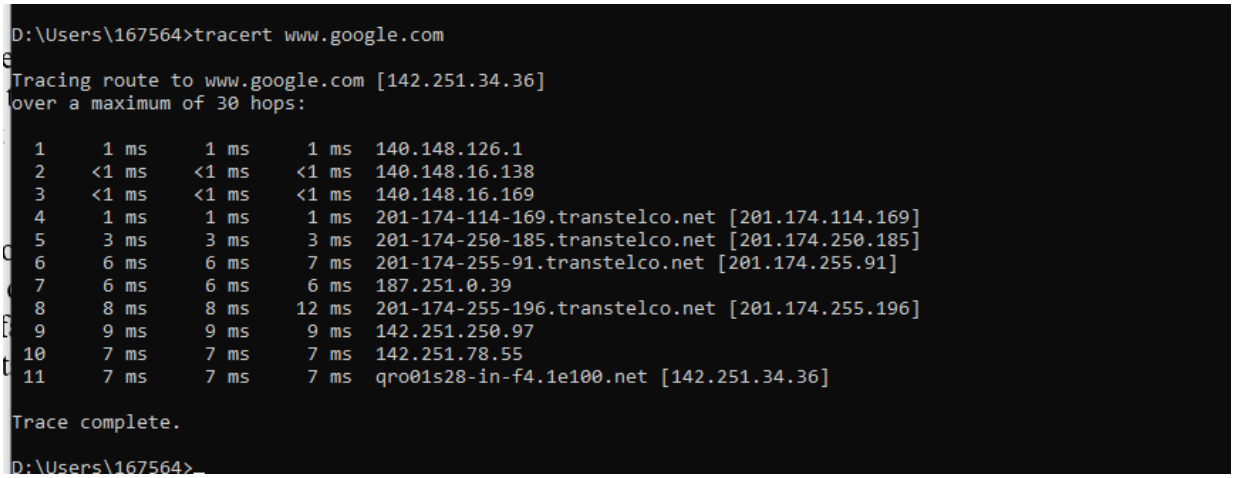

Figure 11. CMP tracert command to www.google.com

Based on the displayed results, it can be noted that each line signifies a junction where two networks are interconnected, and it's the point through which the packet traveled.

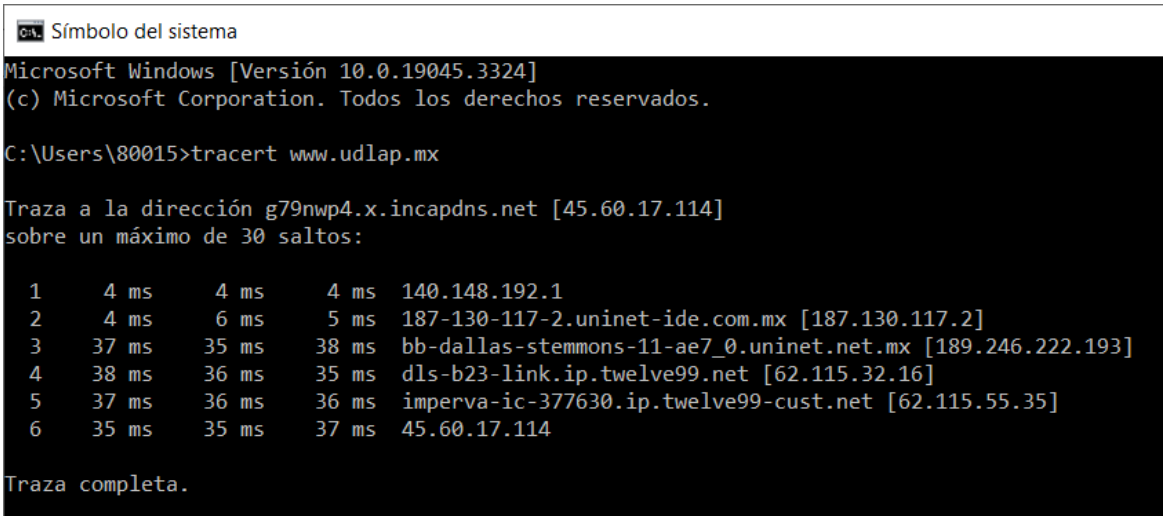

Figure 12. CMP tracert comand to www.udlap.mx

PING and TRACERT are valuable network diagnostic tools, but they serve different purposes. PING is used for basic host reachability and latency testing, while TRACERT is used for tracing the route that packets take through a network to diagnose routing and network-related issues.

Conclusions

We learned how to watch the peripherals and characteristics of our PC, to make conversions between hexadecimal, binary and decimal numbers using our IPV4 address, to ping a computer connected to a default gateway from another computer and of web pages. The sent packets didn't always arrive giving us consequently a message that said received packets=0. Using a traceroute command we also learned how to follow the route of a message.

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