COMPUTER SYSTEMS UNIT8: NETWORK SYSTEMS		CFGS DAM

1. Find out your public IP: Go online and type https://whatismyipaddress.com. Compare the result with a colleague. What conclusions can you draw?

  The conclusion of both have the same IP's is that both are in the same red

2. Using shell commands, display the network settings of your current computer and answer the questions:

- What is your IP address? Is it public or private?

   The Wi-Fi adapter is 192.168.1.74. This is a private IP address, which means it is assigned by the local network rather than the ISP.

- What is your mask?

   The mask is 255.255.255.0

- What is your gateway?

   The gateway is 192.168.1.1.

- What are your DNS servers?

   `10.2.1.254`

2. Explain what it's for:

- The IP address: A unique identifier assigned to every device on a network that enables communication between devices.

- The netmask: A 32-bit number used to divide an IP address into a network address and host address to determine if a device is on the same local network.

- The gateway: The IP address of a router that connects a local network to the internet, allowing devices on the network to access resources outside the local network.

- DNS servers: Computers that translate domain names into IP addresses so that devices can access websites and services on the internet.

3. Enter your IP in CIDR format and in IP format with netmask. What is your network address? Which broadcast? How many hosts can be assigned on that network?
CIDR format: 192.168.56.1/24
Netmask: 192.168.56.1/255.255.255.0

Broadcast address: 192.168.56.255

254 hosts assigned on that network.

4. Which is equivalent of this IPv6 address -1234:2001:acbc:0001:0004:0000:1234:0000

- o   1234:201:acbc:1:4:0:1234::
- o   **1234:2001:acbc:1:4::1234:0**
- o   1234:2001:acbc:1:4::1234::
- o   1234:21:acbc:1:4::1234:0

Which is equivalent of this IPv6 address - 5030:0101:00ac:0001:4001:0000:0000:0000

- o   5030:11:00ac:0001:4001:0000:0000:0000
- o   **5030:101:ac:1:4001::**
- o   5030:11:00ac:1:4001::
- o   5030:0101:AM:1:41::

Which is equivalent of this IPv6 address - 0000:0000:0000:0000:abcd:0000:0000:0000

- o   :0:abcd::
- o   ::abcd:0:0
- o   **::abcd:0:0:0**
  - ::abcd::

5. Set up your Linux VM, with a network card in bridge mode. Configure the card graphically in DHCP. Do you have Internet access? What is the configuration that the card receives? Show it and <u>explain it</u>.

IP address: 192.168.1.74

Subnet mask: /24 (or 255.255.255.0)

Broadcast address: 192.168.1.255

The Wi-Fi card's MAC address is "link/ether". It gets a dynamic IP address with DHCP. It can communicate with devices on the same network (subnet mask /24). It should have internet access if the network is OK.

6. Configure your Linux VM with a network card in NAT mode. Configure the card graphically in DHCP. Do you have Internet access? What is the configuration that the card receives? Show it and <u>explain it</u>.

IP address: 192.168.56.1

Subnet mask: /24 (or 255.255.255.0)

Broadcast address: 192.168.56.255

The eth0 interface is in the "UP" state, indicating that it is enabled and functioning properly. The "BROADCAST" and "LOWER_UP" flags indicate that the network interface is capable of sending and receiving broadcast messages and is connected to a network.

The "mtu" value of 1500 represents the Maximum Transmission Unit, which specifies the maximum size of data packets that can be transmitted over the network.

The "qdisc" value of "fq_codel" represents the queuing discipline used for managing network traffic.

The "valid_lft" and "preferred_lft" values represent the valid and preferred lifetimes of the IP address obtained via DHCP. In this case, the IP address is valid for 28511 seconds (about 7.9 hours) and preferred for the same duration.

The "link/ether" value specifies the MAC address (Media Access Control) of the network interface, which is unique to the device.

7. Search the Internet for information about Cat5e, Cat6, Cat6a, Cat7, Cat7a and Cat8 categories indicating their bandwidth and maximum distance. Write a table with the results.

	Bandwidth	maximum distance
Cat5e	100 Mbps	100 meters
Cat6	10 Gbps	55 meters
Cat6a	10 Gbps	100 meters
Cat7	10 Gbps	100 meters
Cat7	10 Gbps	100 meters
Cat8	40 Gbps	30 meters

8. Search the Internet for Ethernet versions for coaxial, twisted pair, and fiber optic cables. Specifies their bandwidth.

Ethernet is a LAN technology that transfers Ethernet format frames over various cable types at different speeds. Here's a summary of Ethernet versions and their corresponding bandwidths:

Coaxial:

10Base-5 (thick Ethernet): 10 Mbps

10Base-2 (thin Ethernet): 10 Mbps

Twisted pair:

10Base-T: 10 Mbps

100Base-TX (Fast Ethernet): 100 Mbps

1000Base-T (Gigabit Ethernet): 1 Gbps

10GBase-T (10 Gigabit Ethernet): 10 Gbps

Cat5/Cat5e/Cat6/Cat6a/Cat7 (UTP or STP): Varies by cable category and length

Fiber optic:

10Base-FL: 10 Mbps

100Base-FX (Fast Ethernet): 100 Mbps

1000Base-X (Gigabit Ethernet): 1 Gbps

10GBase-X (10 Gigabit Ethernet): 10 Gbps

40GBase-X (40 Gigabit Ethernet): 40 Gbps

100GBase-X (100 Gigabit Ethernet): 100 Gbps

9. Search the Internet for the meaning of the following standards: 100BaseT, 100BaseFX and 10GBASE-T.

Standard Description

100BaseT A Fast Ethernet standard that supports data transfer speeds of 100 Mbps using twisted pair cables.

100BaseFX A Fast Ethernet standard that utilizes fiber optic cables for data transmission at 100 Mbps.

10GBASE-T A 10 Gigabit Ethernet standard that enables data transfer speeds of 10 Gbps using twisted pair cables.

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10. Search the Internet for information about the Wi-Fi standards studied, as well as 802.11ad, 802.11af, and 802.11ax. Create a table describing its working band (frequency), range, and maximum theoretical bandwidth.

Wi-Fi Standard	Working Band (Frequency)	Range	Maximum Theoretical Bandwidth
802.11a	5 GHz	35 meters	54 Mbps
802.11b	2.4 GHz	38 meters	11 Mbps
802.11g	2.4 GHz	38 meters	54 Mbps
802.11n	2.4 GHz/5 GHz	70 meters	600 Mbps
802.11ac	5 GHz	35 meters	6.77 Gbps
802.11ad	60 GHz	10 meters	7 Gbps
802.11af		1 kilometer	35 Mbps
802.11ax	2.4 GHz/5 GHz		9.6 Gbps

11. Install Wireshark on your virtual machine https://itsfoss.com/install-wireshark-ubuntu/. Scan network traffic and upload a screenshot of at least one packet you "sniffed" indicating what you find on it.

12. On Windows and Ubuntu, access the Windows Task Manager and System Monitor, respectively, by navigating through their various options and familiarizing yourself with them. (In this activity you do not have to deliver anything)