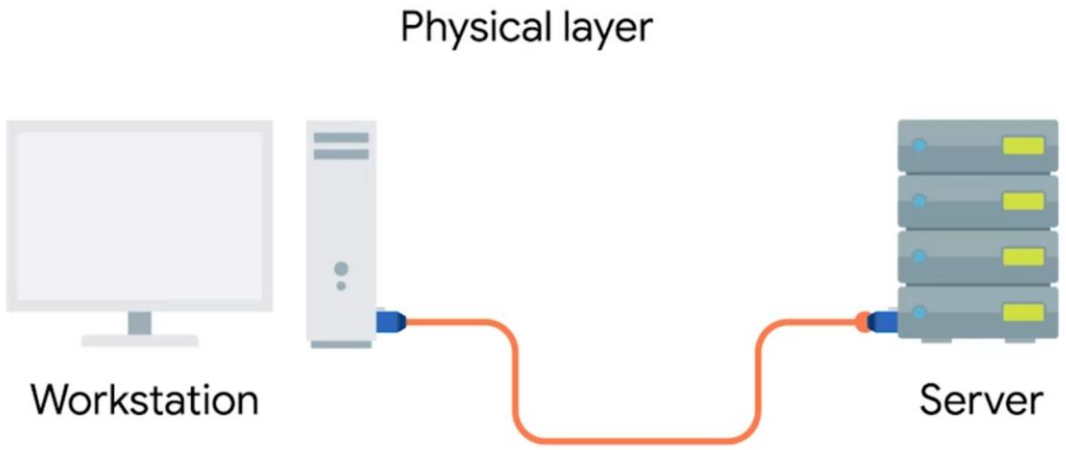
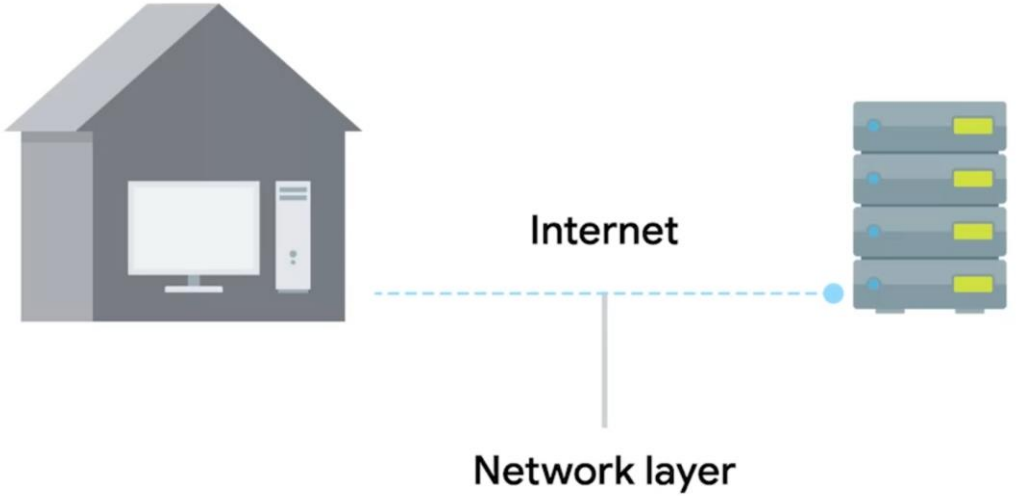
Application Layer	HTTP/SMTP
Transport	TCP/UDP
Network	IP
Data Link	Wi-Fi / Ethernet
Physical	10 Base T, 802.11

5	Application	HTTP, SMTP, etc..	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	10 Base T, 802.11	Bits	n/a

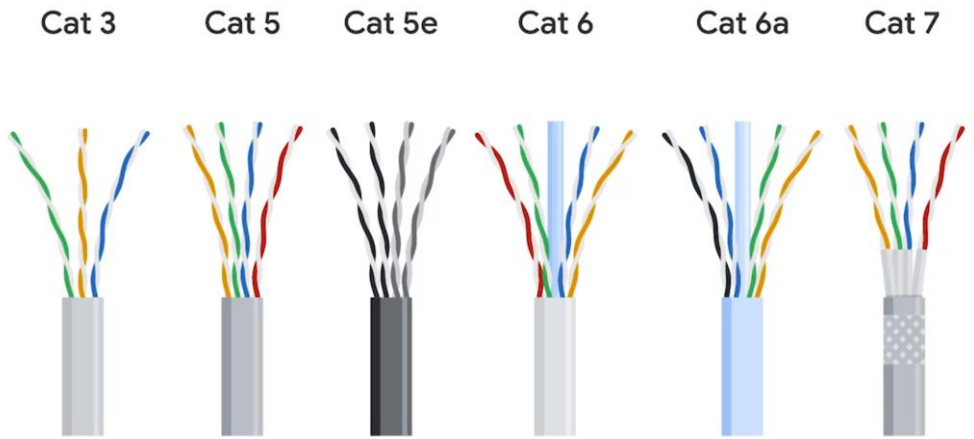

Physical layer
Workstation
Server


Internet
Network layer

Cables

Connect different devices to each other, allowing data to be transmitted over them

The most common forms of copper twisted-pair cables used in networking are **Cat5**, **Cat5e**, and **Cat6** cables.

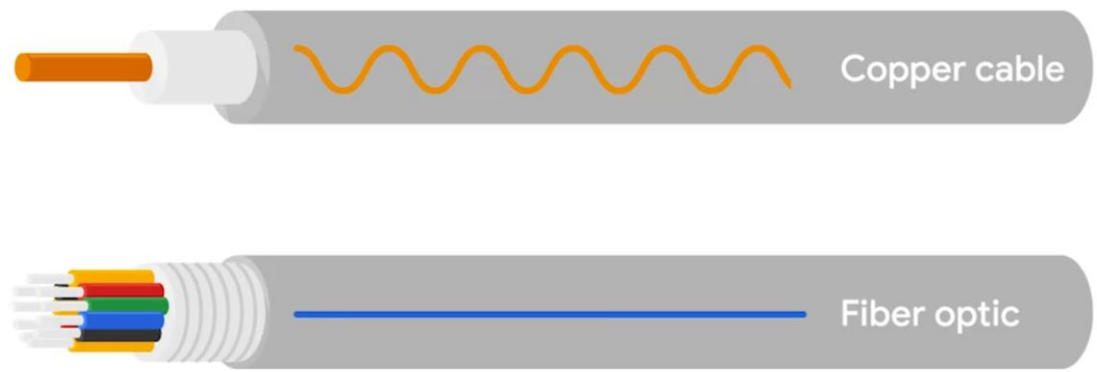


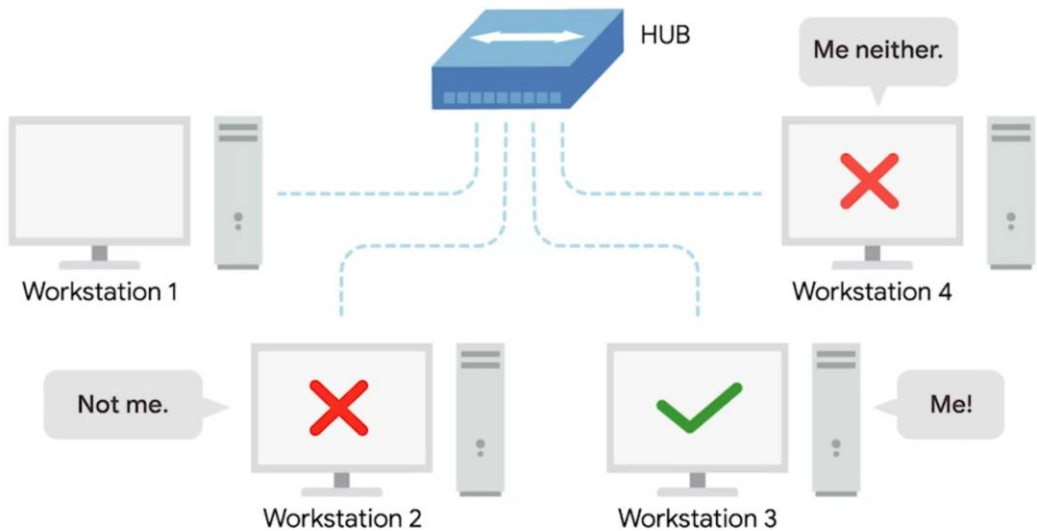
Cables

Connect different devices to each other, allowing data to be transmitted over them

Fiber cables

Contain individual optical fibers, which are tiny tubes made out of glass about the width of a human hair



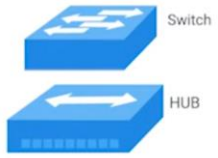


Collision domain

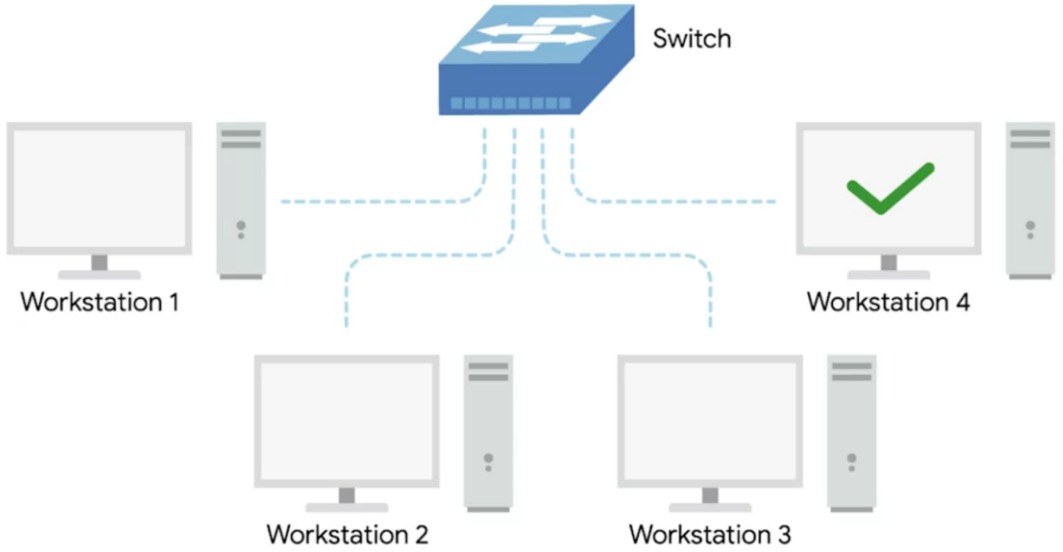
A network segment where only one device can communicate at a time

Hub

A physical layer device that allows for connections from many computers at once

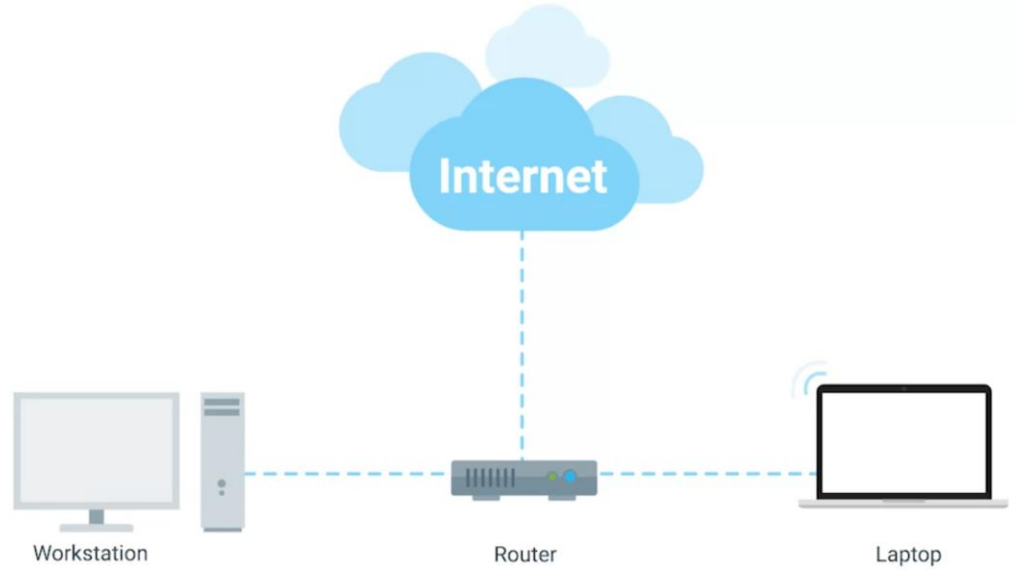


#	*Layer Name*	*Protocol*	*Protocol Data Unit*	*Addressing*
5	Application	HTTP, SMTP, etc..	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	10 Base T, 802.11	Bits	n/a



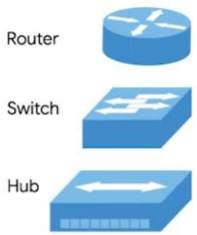
Hubs and switches

The primary devices used to connect computers on a single network, usually referred to as a **LAN**, or **local area network**



Router

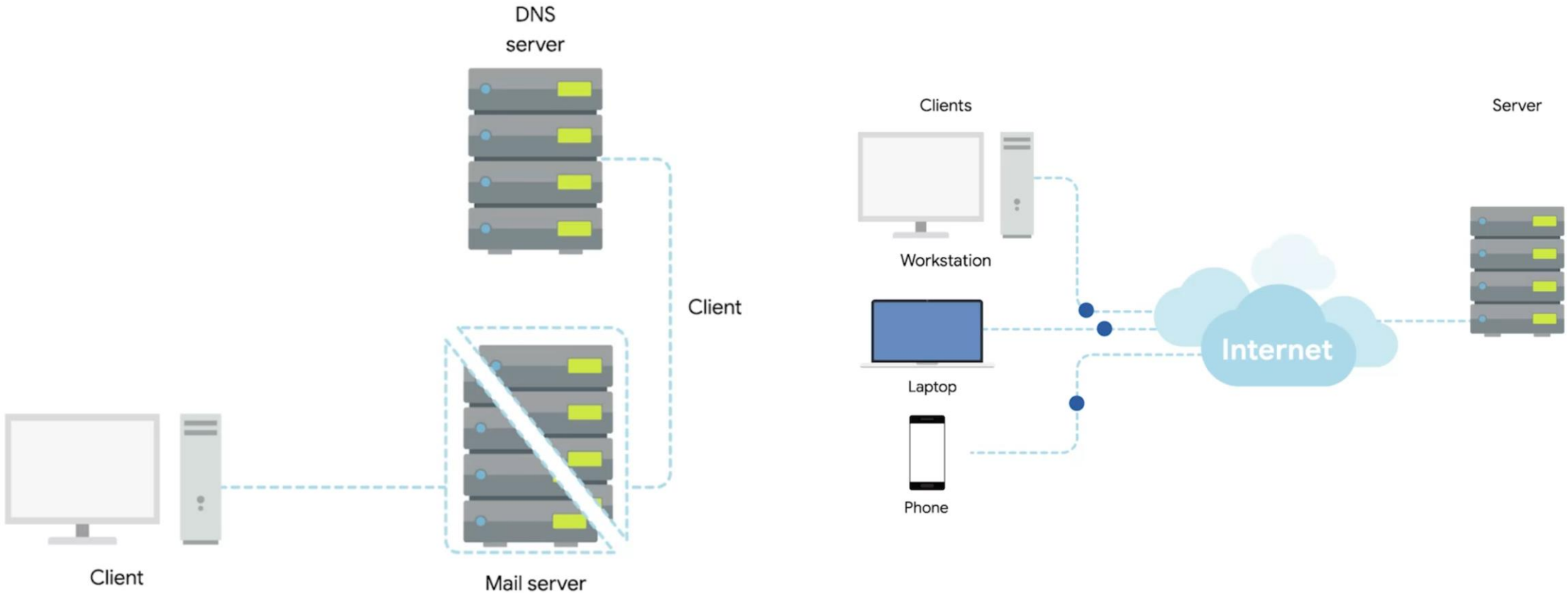
A device that knows how to forward data between independent networks



#	*Layer name*	*Protocol*	*Protocol data unit*	*Addressing*
5	Application	HTTP, SMTP, etc.	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data link	Ethernet, Wifi	Frames	MAC address
1	Physical	10 Base T, 802.11	Bits	n/a

Border Gateway Protocol (BGP)

Routers share data with each other via this protocol, which lets them learn about the most optimal paths to forward traffic

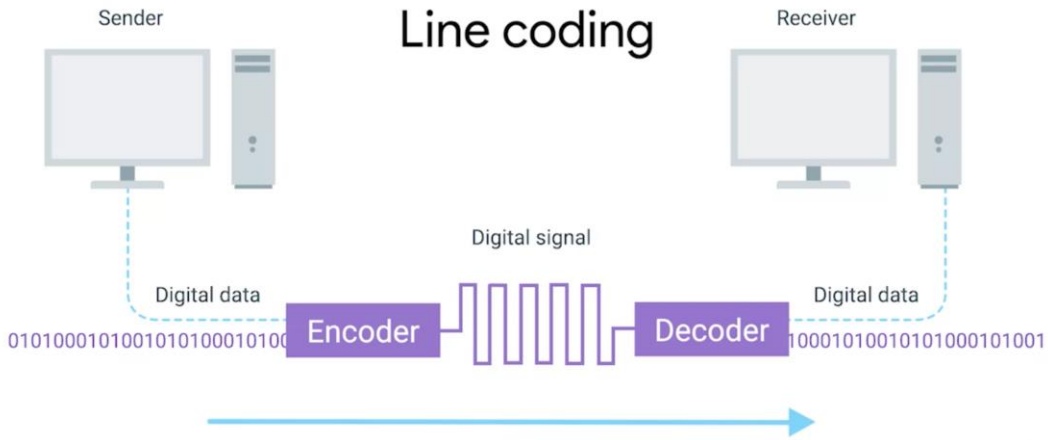

DNS
server
Client
Client
Mail server
Clients
Server
Workstation
Internet
Laptop
Phone

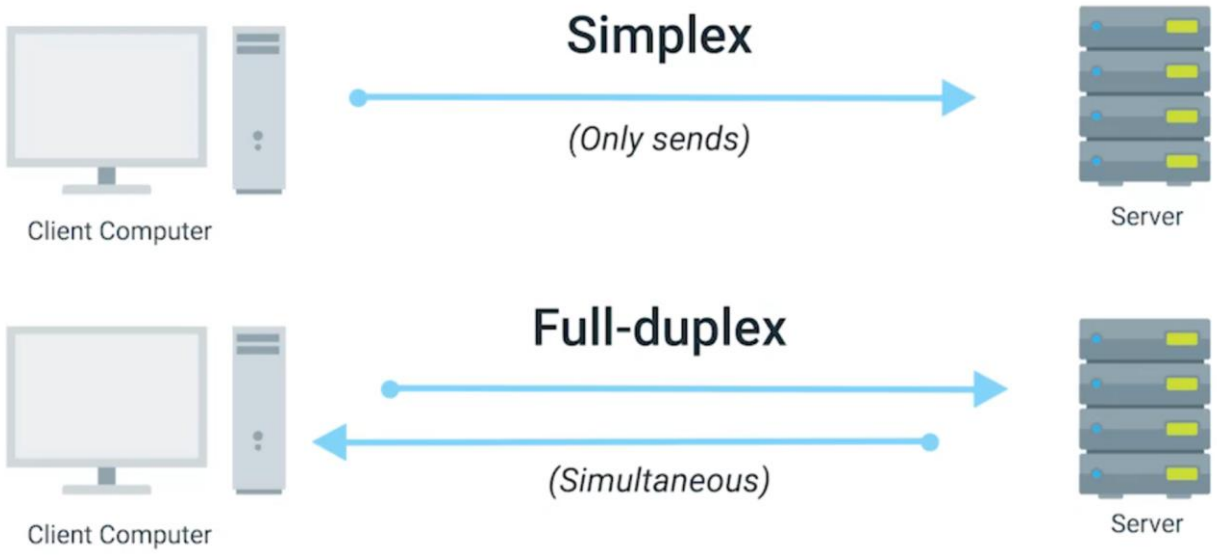
Bit

The smallest representation of data that a computer can understand; it's a one or a zero

Modulation

A way of varying the voltage of this charge moving across the cable





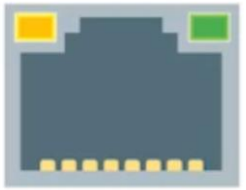
Duplex communication

The concept that information can flow in both directions across the cable

Simplex communication

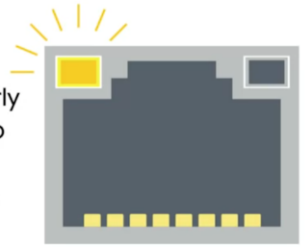
This process is unidirectional

RJ45 port

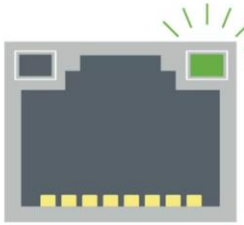


RJ45 plug

Link LED
Cable properly connected to two devices that are both powered on



RJ45 port



Activity LED
Would flash when data actively transmited across the cable

RJ45 port

Patch panel

CSMA/CD

Used to determine when the communications channels are clear, and when a device is free to transmit data

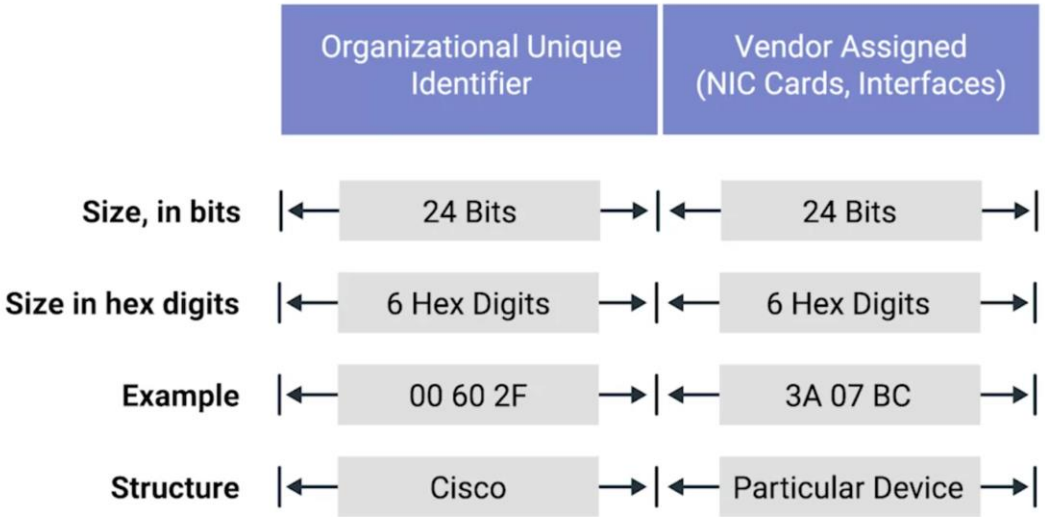
Ethernet as a protocol solved this problem by using a technique known as carrier sense multiple access with collision detection.

MAC address

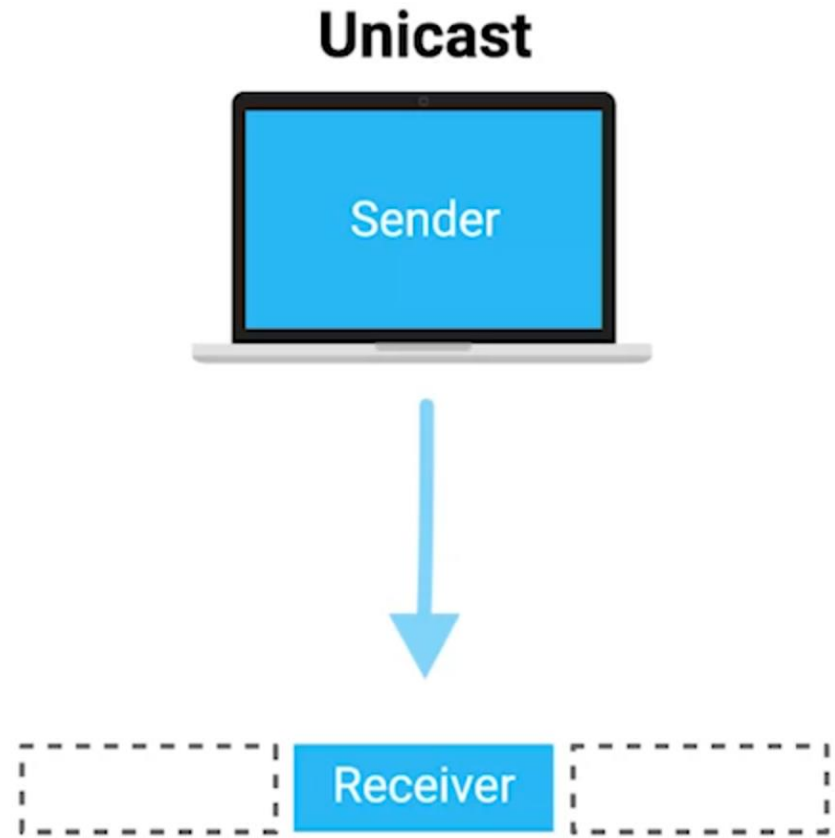
A globally unique identifier attached to an individual network interface

It's a 48-bit number normally represented by six groupings of two hexadecimal numbers.

Ethernet uses **MAC** addresses to ensure that the data it sends has both an address for the machine that sent the transmission, as well as the one the transmission was intended for.

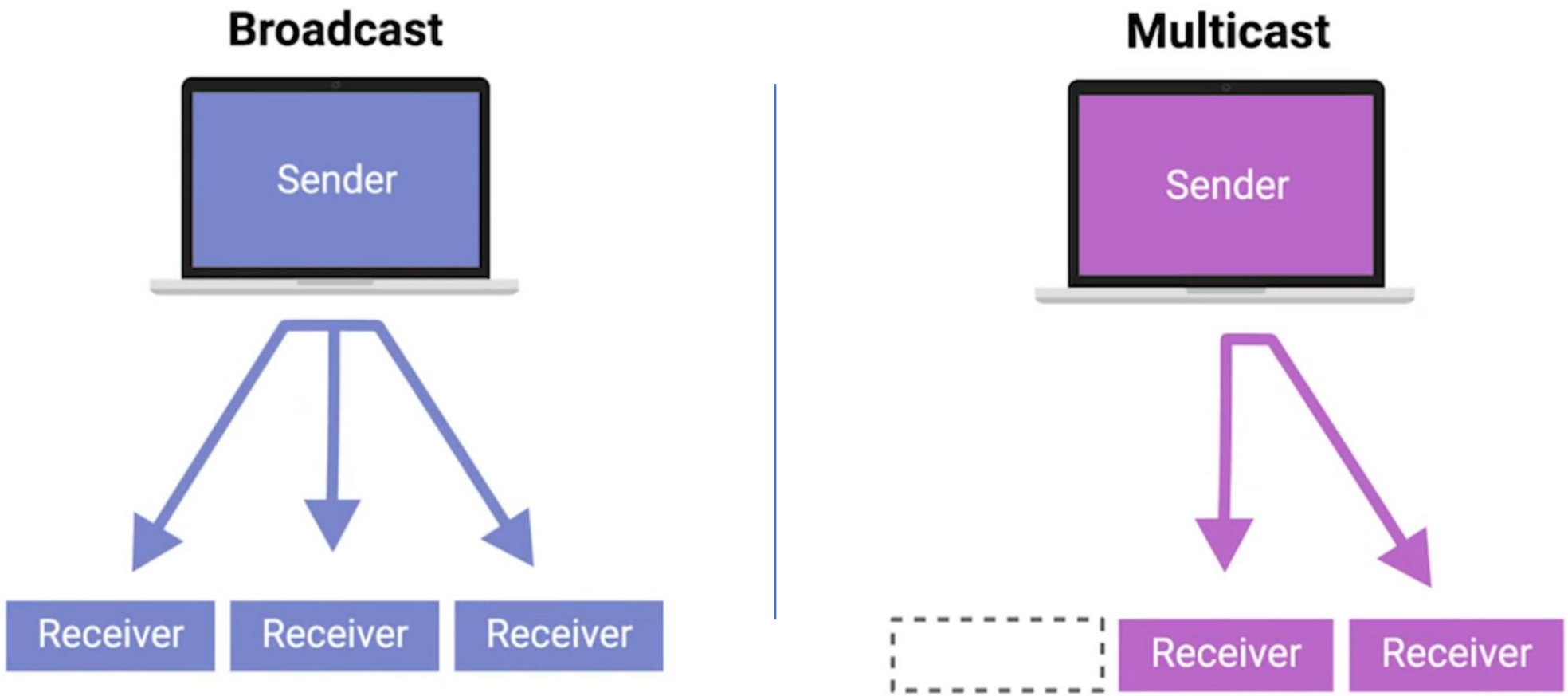


A **unicast** transmission is always meant for just one receiving address.



If the least significant bit in the first octet of a destination address is set to **zero**, it means that ethernet frame is intended for **only the destination address.**

If the least significant bit in the first octet of a destination address is set to **one**, it means you're dealing with a **multicast frame**.


Broadcast
Sender
Receiver
Receiver
Receiver
Multicast
Sender
Receiver
Receiver

Data packet

An all-encompassing term that represents any single set of binary data being sent across a network link

Ethernet frame

A highly structured collection of information presented in a specific order

EtherType field

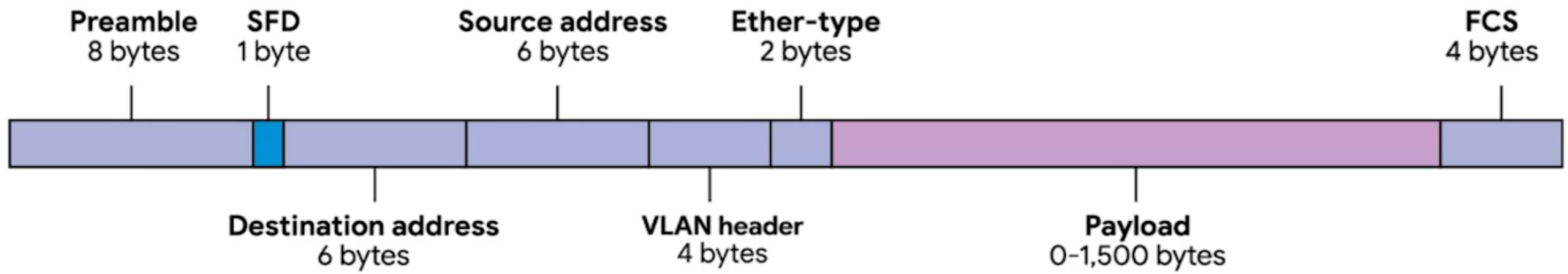
16 bits long and used to describe the protocol of the contents of the frame

Frame Check Sequence

A 4-byte (or 32-bit) number that represents a checksum value for the entire frame

VLAN header

Indicates that the frame itself is what's called a VLAN frame



Destination MAC address

The hardware address of the intended recipient

Preamble

8 bytes (or 64 bits) long, and can itself be split into two sections

Start frame delimiter (SFD)

Signals to a receiving device that the preamble is over and that the actual frame contents will now follow