Badji Mokhtar University Annaba
Electronics Department

Introduction to networking

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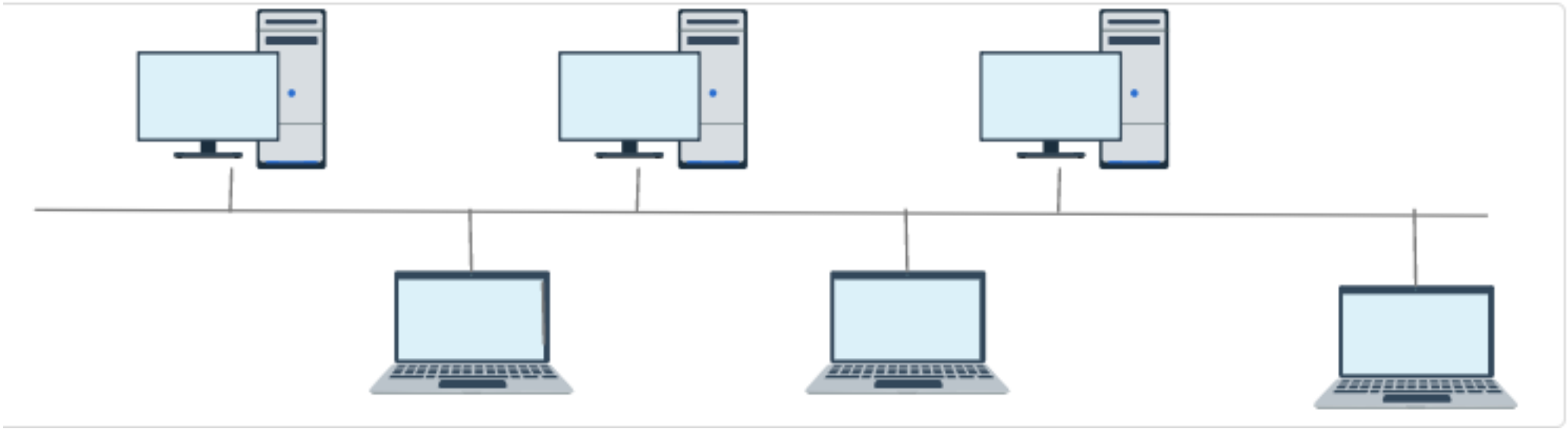
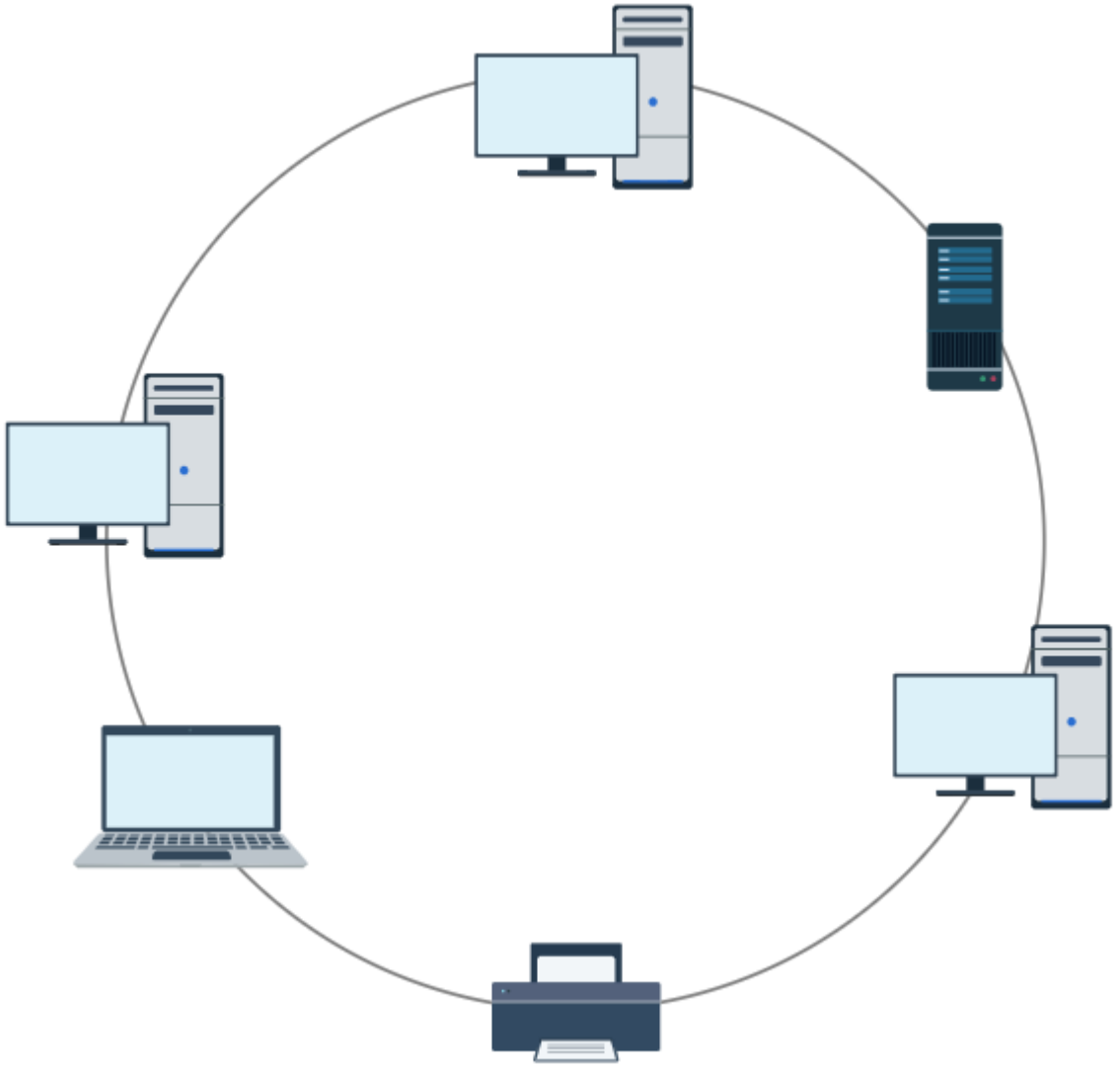
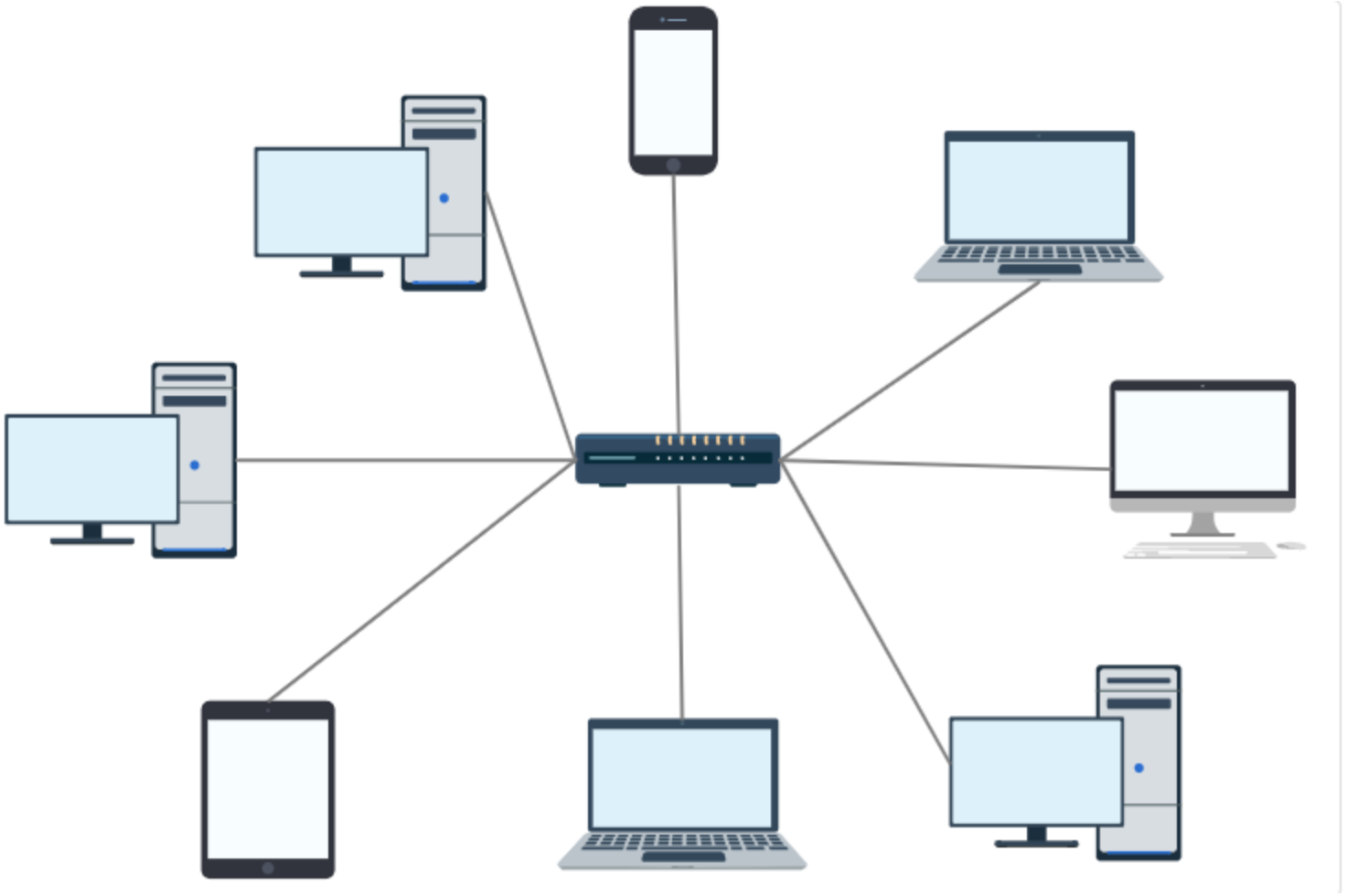
Topology



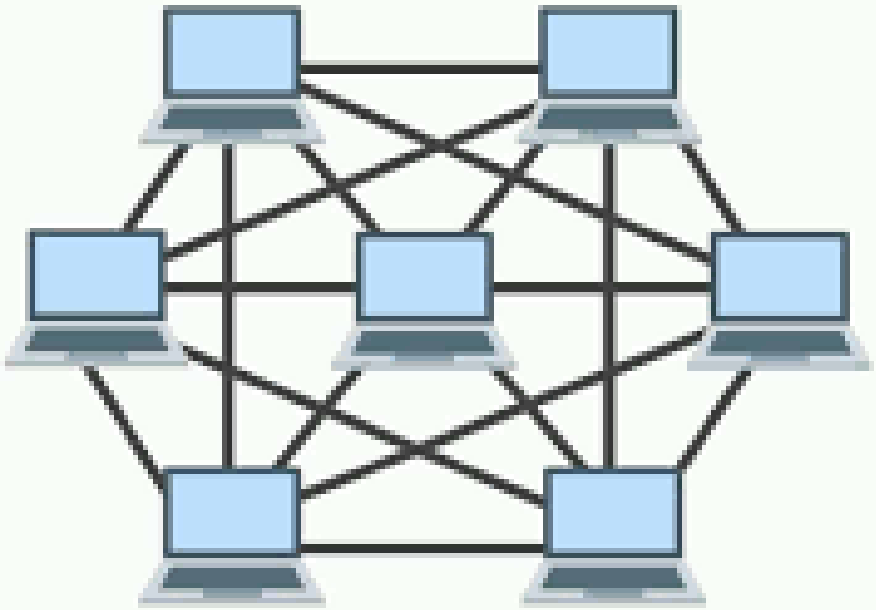
Topology



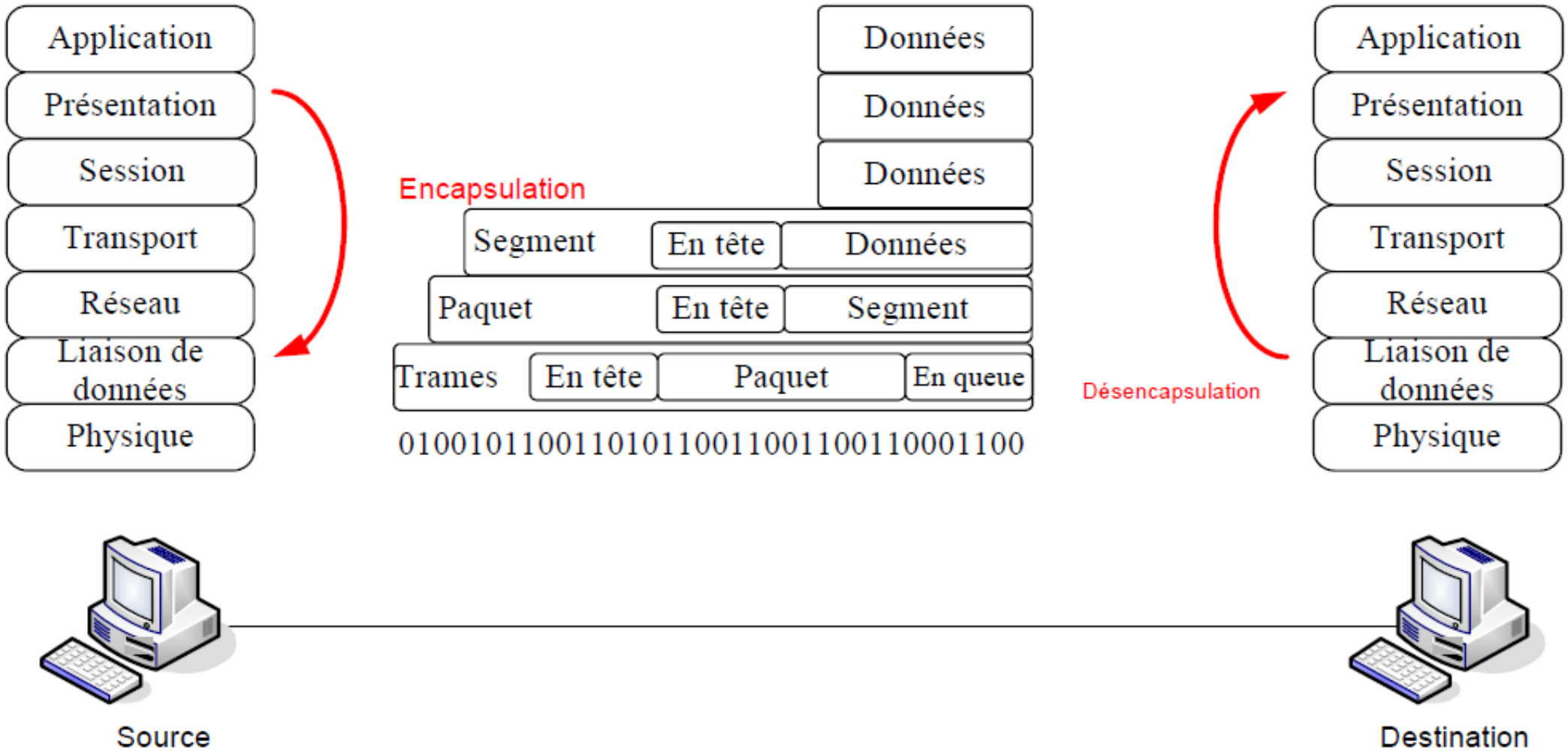
Topology



Topology



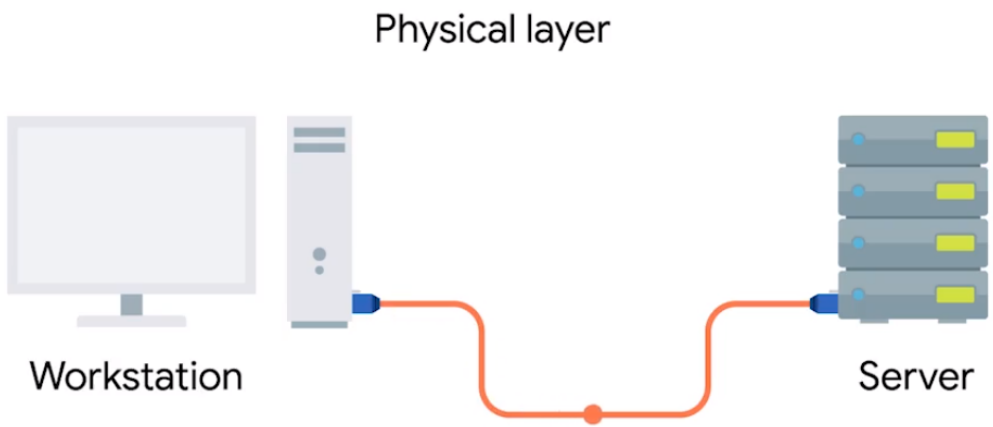
Full Mesh Topology


Application
Présentation
Session
Transport
Réseau
Liaison de données
Physique
Encapsulation
Données
Données
Données
Segment
En tête
Données
Paquet
En tête
Segment
Trames
En tête
Paquet
En queue
0100101100110101100110011001100011100
Désencapsulation
Application
Présentation
Session
Transport
Réseau
Liaison de données
Physique
Source
Destination

#	*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

Physical layer

Represents the physical devices that interconnect computers


Physical layer
Workstation
Server

Data link layer

Responsible for defining a common way of interpreting these signals so network devices can communicate

The **Ethernet** standards also define a protocol responsible for getting data to nodes on the same network or link.

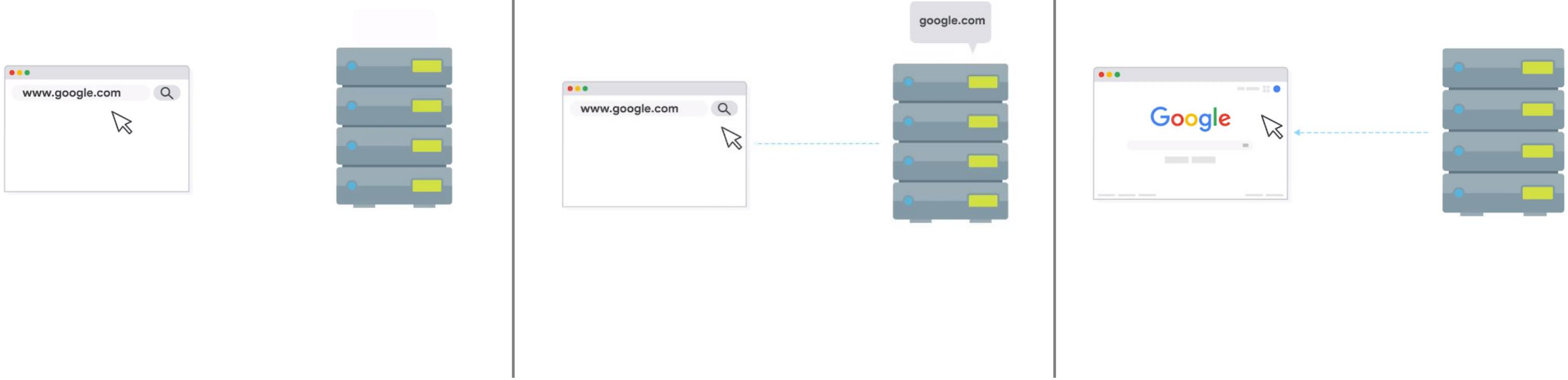
Network layer

Allows different networks to communicate with each other through devices known as routers

Internetwork

A collection of networks connected together through routers, the most famous of these being the **Internet**

IP is the heart of the Internet and most smaller networks around the world.


www.google.com
www.google.com
google.com
Google

Transport layer

Sorts out which client and server programs are supposed to get that data

Physical

Data Link

Network

Transport

Application

1. Which of the following is an example of a network layer (layer 3) protocol?

- ○ Ethernet
- ○ UDP
- ○ TCP
- ○ IP

2. What's the difference between a client and a server?

- ○ Clients operate on the data link layer, and servers operate on the network layer.
- ○ Clients and servers are different names for the same thing.
- ○ A client requests data, and a server responds to that request.
- ○ A server requests data, and a client responds to that request.

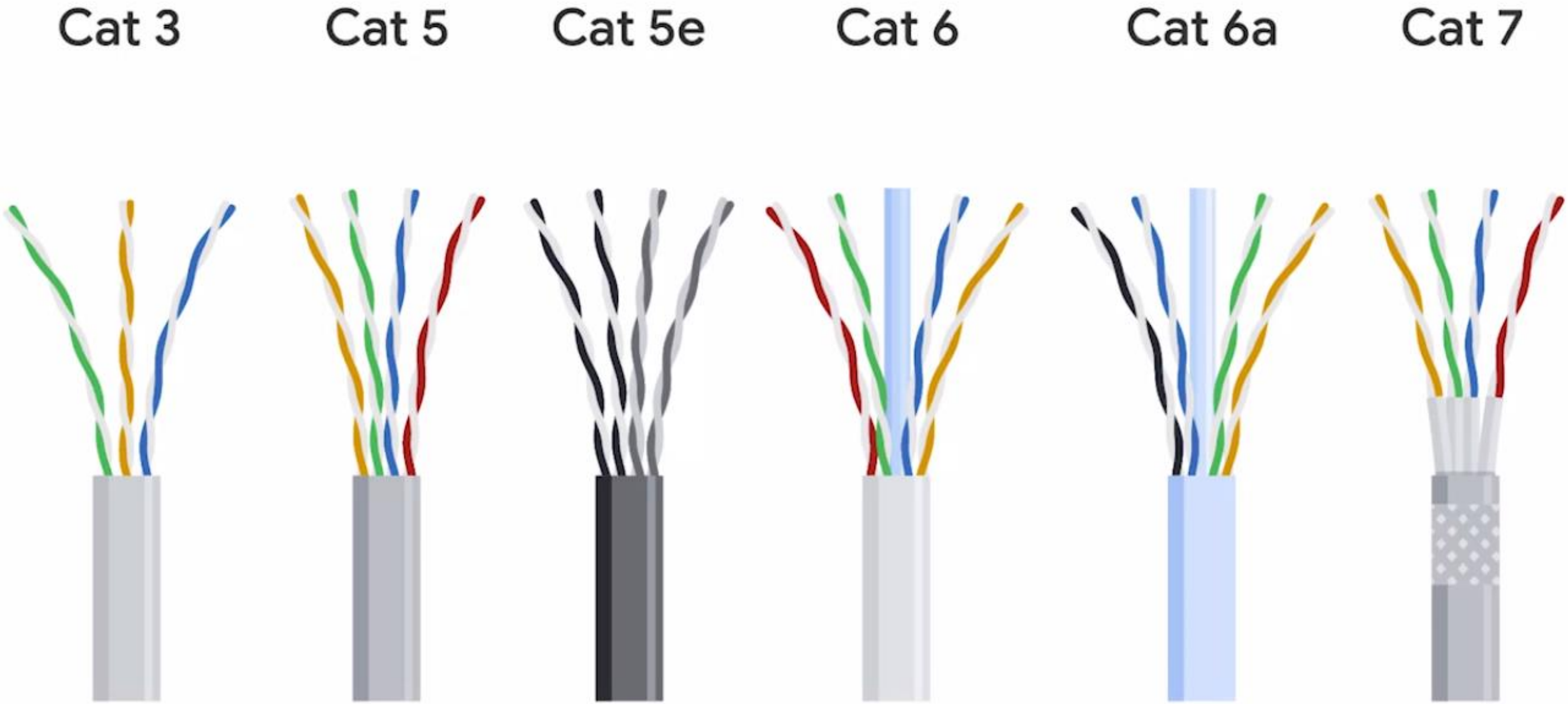
3. Which of the following are examples of layers of our five-layer network model? Check all that apply.

- ☐ The transport layer
- ☐ The presentation layer
- ☐ The application layer
- ☐ The physical layer

Cables

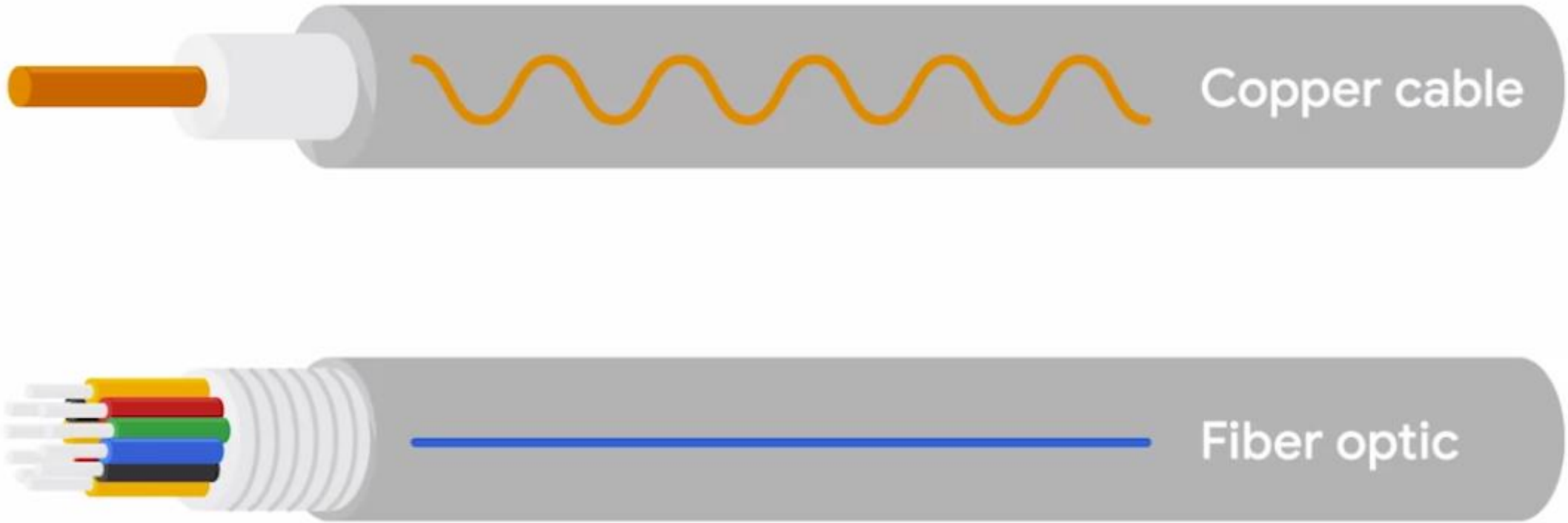
Connect different devices to each other, allowing data to be transmitted over them

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


Cat 3
Cat 5
Cat 5e
Cat 6
Cat 6a
Cat 7

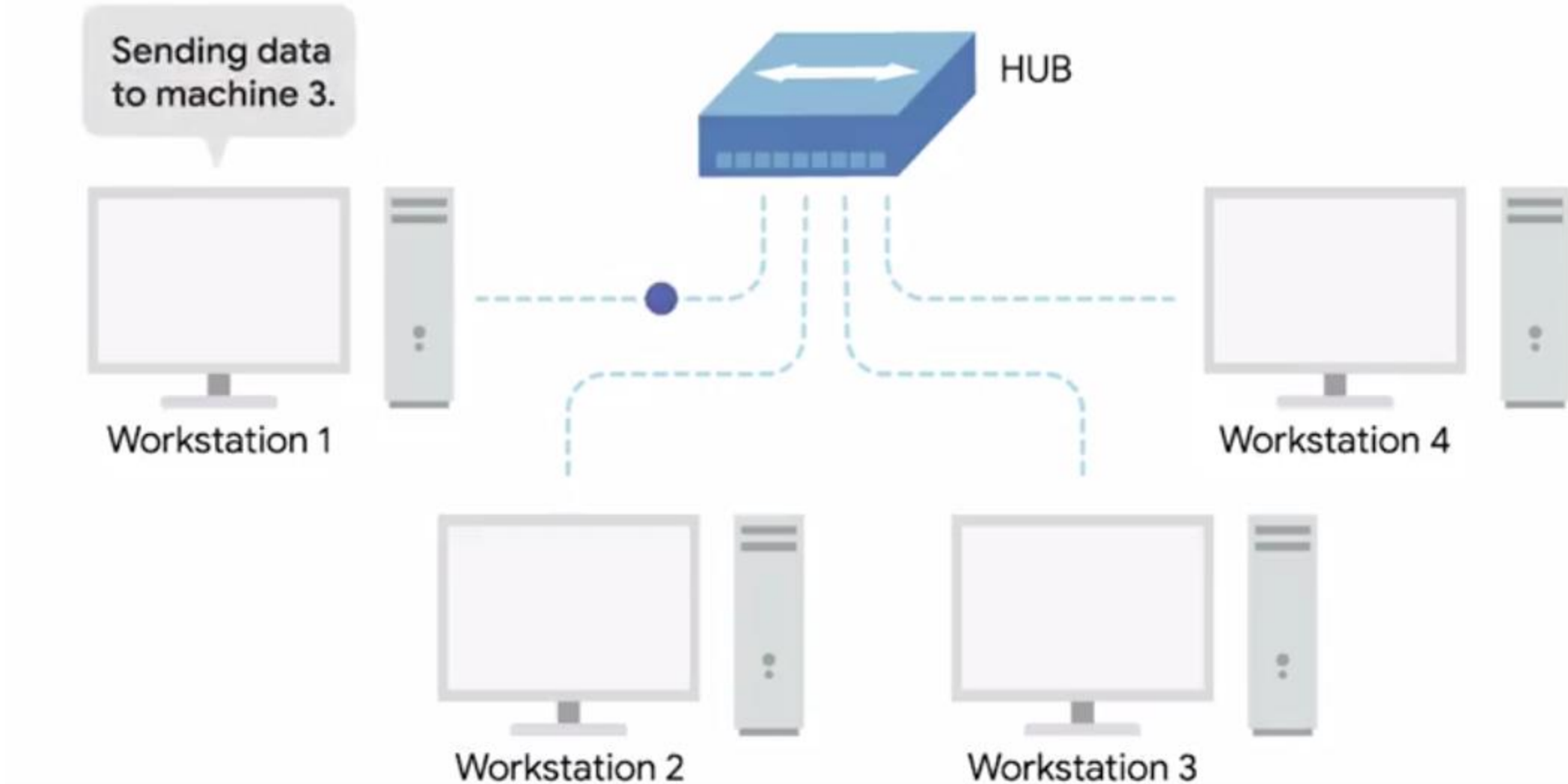
Fiber cables

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


Copper cable
Fiber optic

Hub

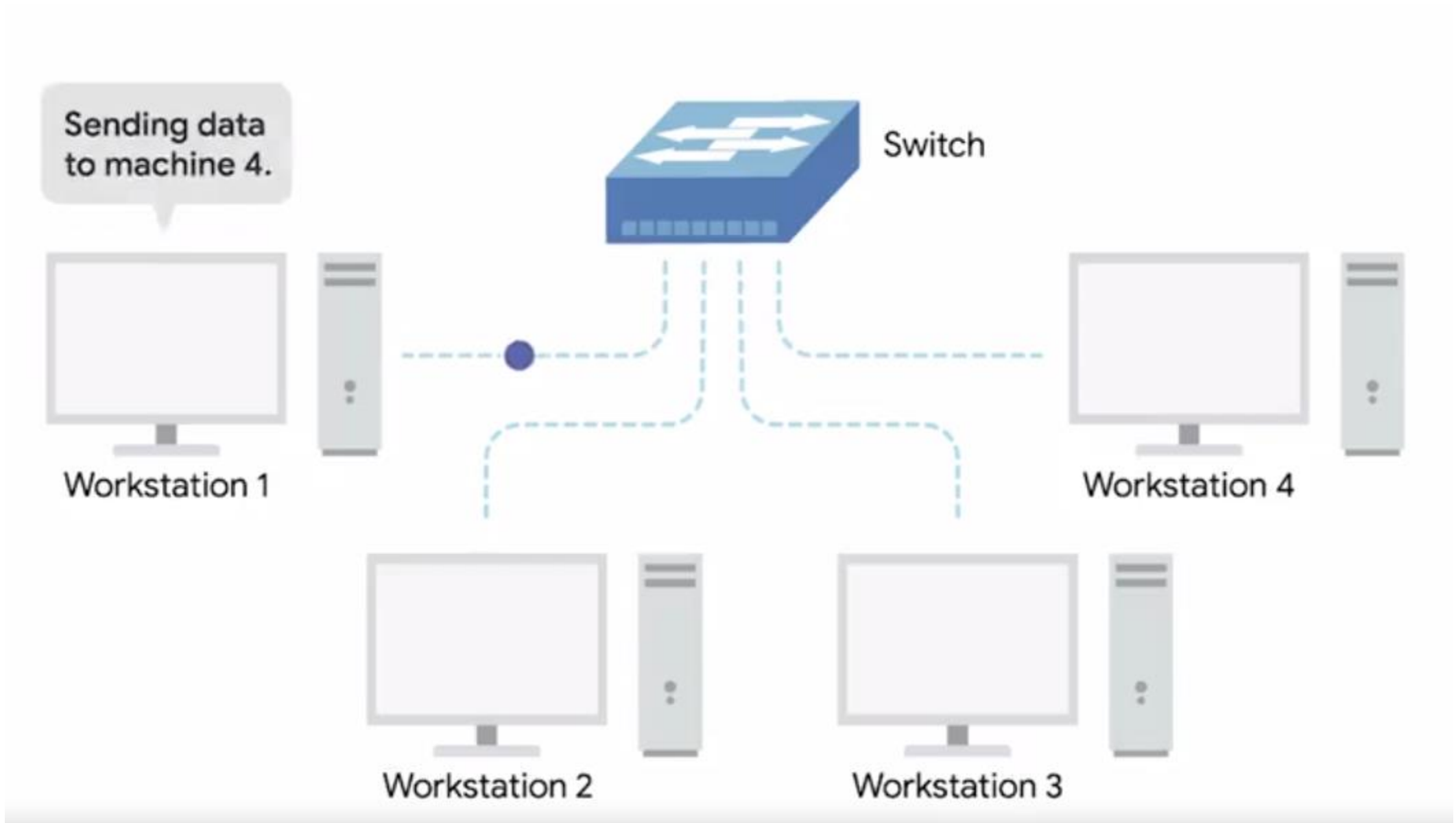
A physical layer device that allows for connections from many computers at once


Sending data to machine 3.
HUB
Workstation 1
Workstation 4
Workstation 2
Workstation 3

Collision domain

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

If multiple systems try sending data at the same time, the electrical pulses sent across the cable can interfere with each other.


Sending data to machine 4.
Switch
Workstation 1
Workstation 4
Workstation 2
Workstation 3

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

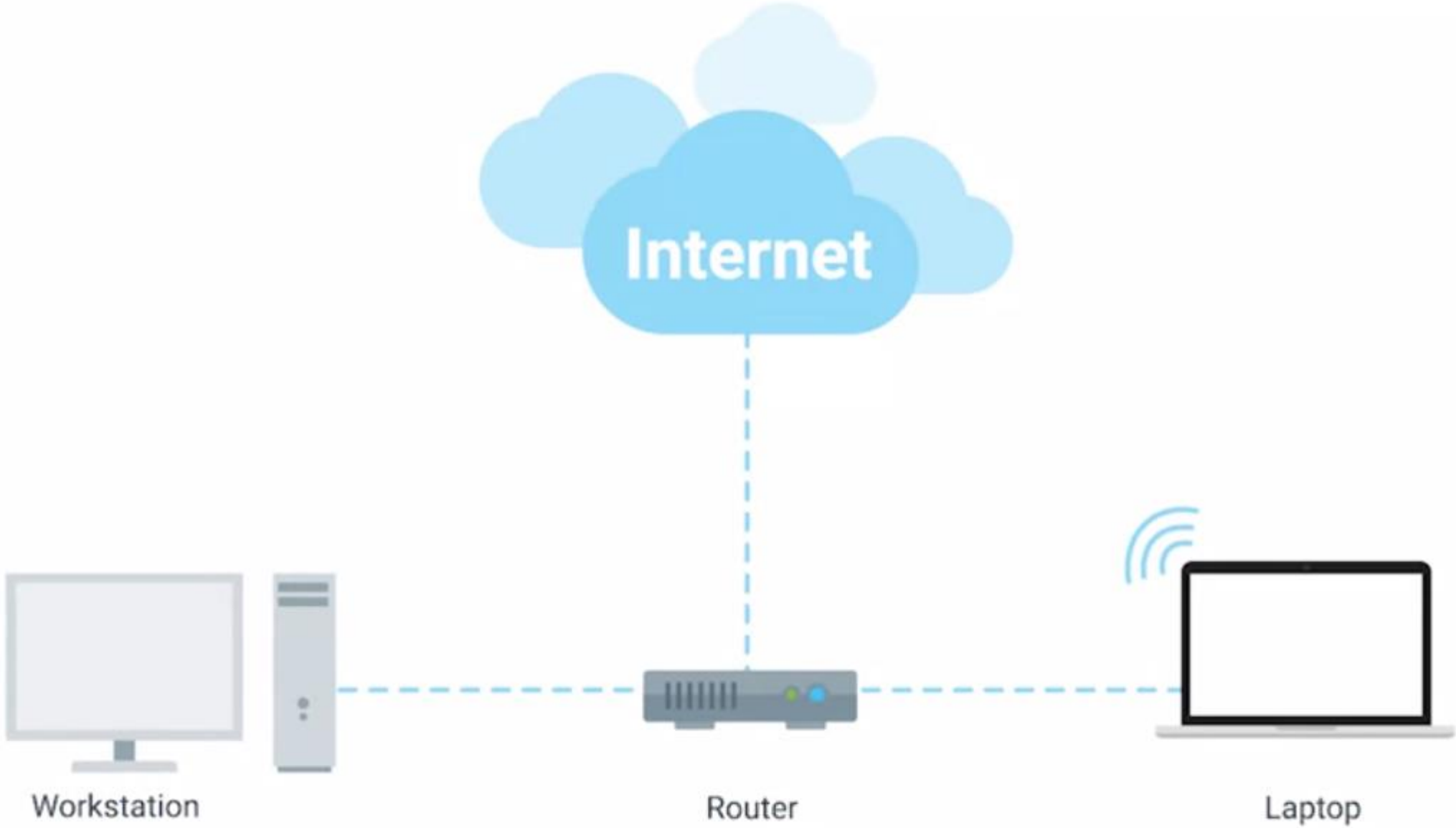
A device that knows how to forward data between independent networks

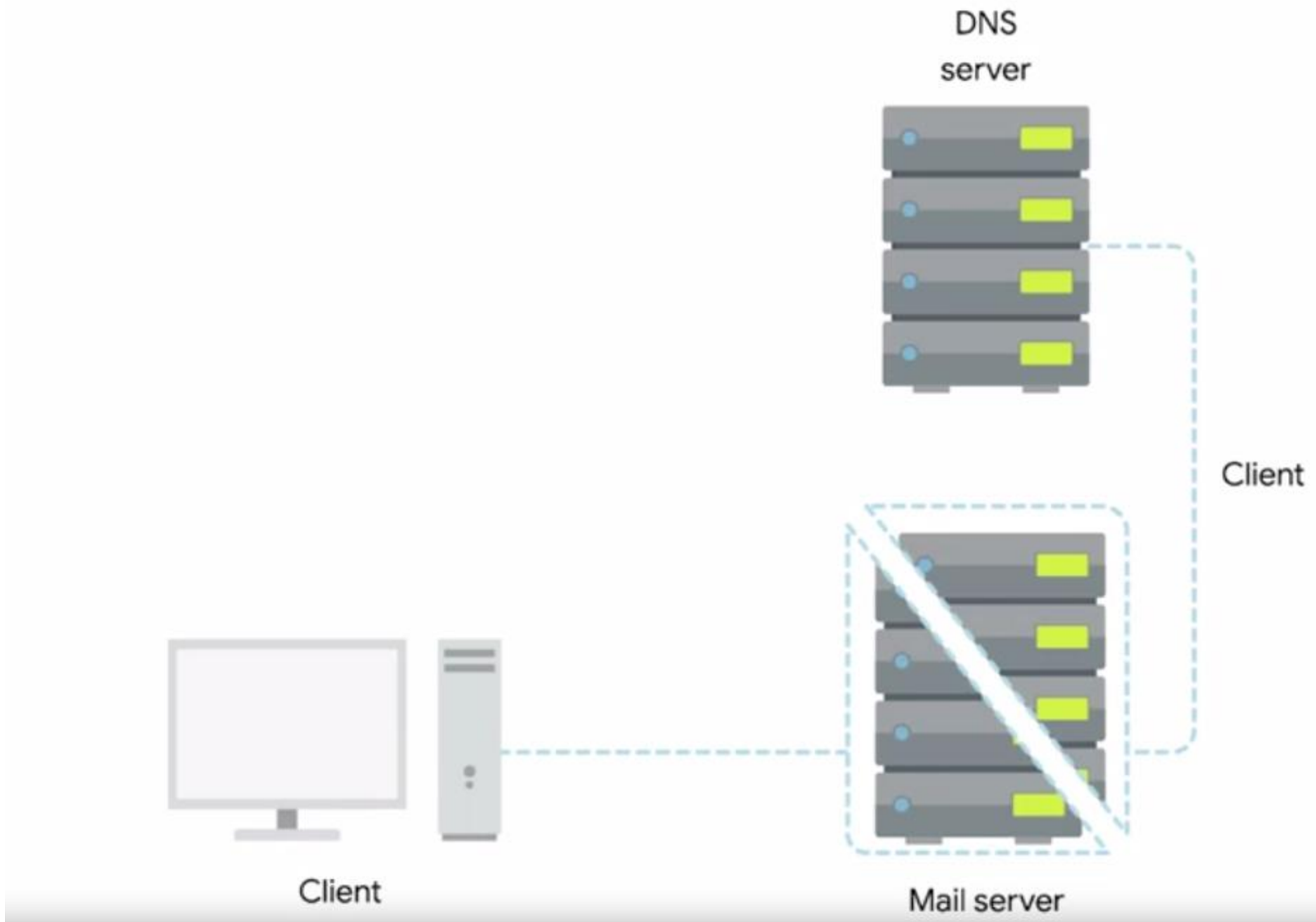
#	Layer name	Protocol	Protocol data unit	Addressing
5	Application	HTTP, SMTP, etc.	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data link	Ethernet, Wifi	Frames	MAC address
1	Physical	10 Base T, 802.11	Bits	n/a

Router 

Switch 

Hub 


Internet
Workstation
Router
Laptop


DNS
server
Client
Client
Mail server

Servers and Clients

Servers

Switches

Catalyst 9200

Catalyst 3650

Routers

ISR 1000

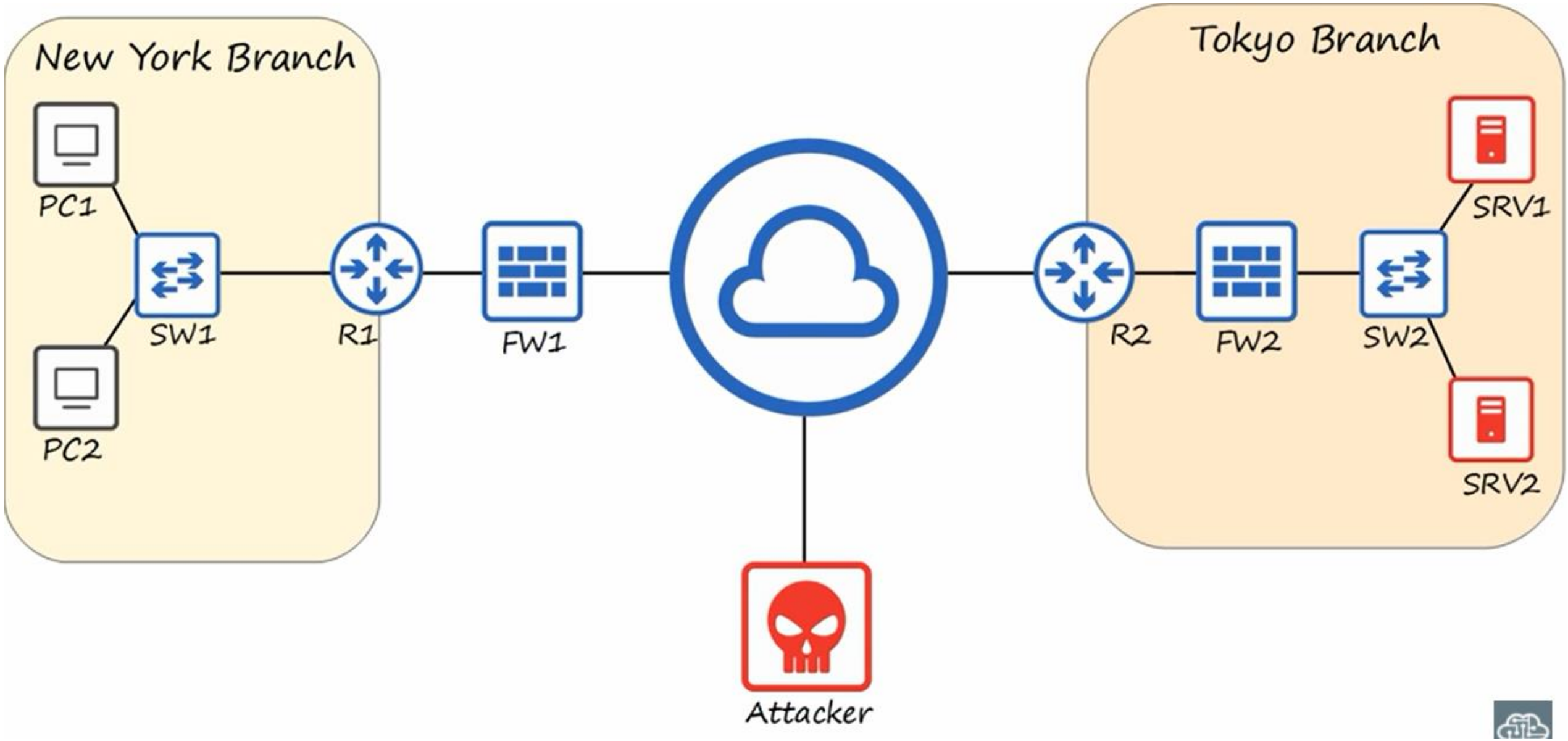
ISR 900

ISR 4000

Firewalls

ASA5500-X

Firepower 2100


New York Branch
PC1
PC2
SW1
R1
FW1
Attacker
R2
FW2
SW2
SRV1
SRV2
Tokyo Branch

1. Which of the following statements accurately describe the differences between a hub and a switch? Check all that apply.

- [ ] A hub is a physical layer device, and a switch is a data link layer device.
- [ ] Hubs are more sophisticated versions of switches.
- [ ] A switch remembers which devices are connected on each interface, while a hub does not.
- [ ] A hub causes larger collision domains.

2. What does LAN stand for?

- ◯ Little area network
- ◯ Locally available network
- ◯ Large area network
- ◯ Local area network

3. What's a router?

- ◯ A device that knows how to forward data between independent networks
- ◯ A network device used specially for fiber cables
- ◯ A physical layer device that prevents crosstalk
- ◯ A more advanced version of a switch

Your company wants to purchase some network hardware to which they can plug the 30 PCs in your department. Which type of network device is appropriate?

a) A router
b) A firewall
c) A switch
d) A server

You received a video file from your friend's Apple iPhone using AirDrop. What was his iPhone functioning as in that transaction?

a) A server

b) A client

c) A local area network

What is your computer or smartphone functionning as while you watch a video from Youtube

a) A server

b) An end host

c) A client

Your company wants to purchase some network hardware to connect its separate networks together. What kind of network device is appropriate?

a) A firewall
b) A host
c) A LAN
d) A router

Your company wants to upgrade its old network firewall that has been in use for several years to one that provides more advanced functions. What kind of firewall should they purchase?

a) A host-based firewall
b) A next-level firewall
c) A next-generation firewall
d) A top-layer firewall