

N E T W O R K



# Important

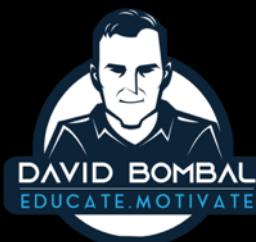
- I am only introducing concepts in this part of the course.
- I will discuss items in more detail later in the course - don't worry if you don't understand everything right now.



# What is a Network?

- A computer network is a digital telecommunications network for sharing resources between nodes, which are computing devices that use a common telecommunications technology.
- Data transmission between nodes is supported over data links consisting of physical cable media, such as twisted pair or fibre-optic cables, or by wireless methods, such as Wi-Fi, microwave transmission, or free-space optical communication.

\* Source: Wikipedia



# Resource example: Printer



# Resource example: File Sharing



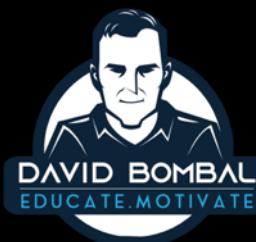
# Sneakernet



# Sneakernet

- Sneakernet is an informal term for the transfer of electronic information by physically moving media such as magnetic tape, floppy disks, optical discs, USB flash drives or external hard drives between computers, rather than transmitting it over a computer network.
- The term, a tongue-in-cheek play on net(work) as in Internet or Ethernet, refers to walking in sneakers as the transport mechanism.

\* Source: Wikipedia



# Sneakernet



# Basic Network

- Copper Cable / Wi-Fi

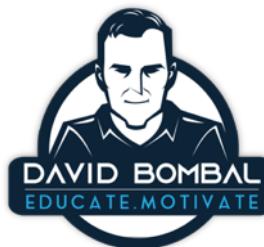




# iPhone Example



Wi-Fi / Bluetooth



# What is a Server?



# What is a Server?



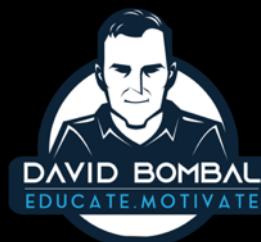
# What is a Server?



# What is a Server?

- In computing, a server is a computer program or a device that provides functionality for other programs or devices, called "clients".
- This architecture is called the client–server model, and a single overall computation is distributed across multiple processes or devices.

\* Source: Wikipedia



# What is a Client?



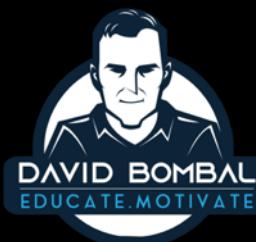
# What is a Client?



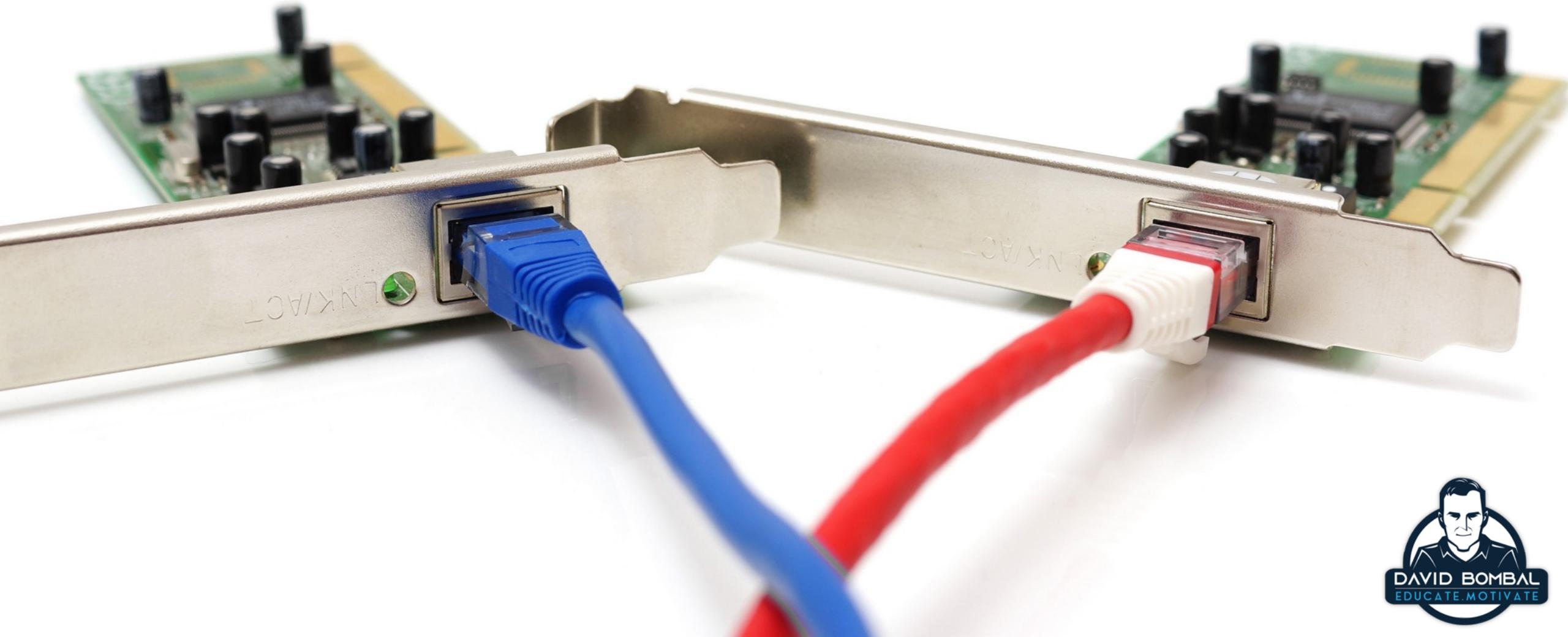
# What is a Client?

- A client is a piece of computer hardware or software that accesses a service made available by a server.
- The server is often (but not always) on another computer system, in which case the client accesses the service by way of a network.

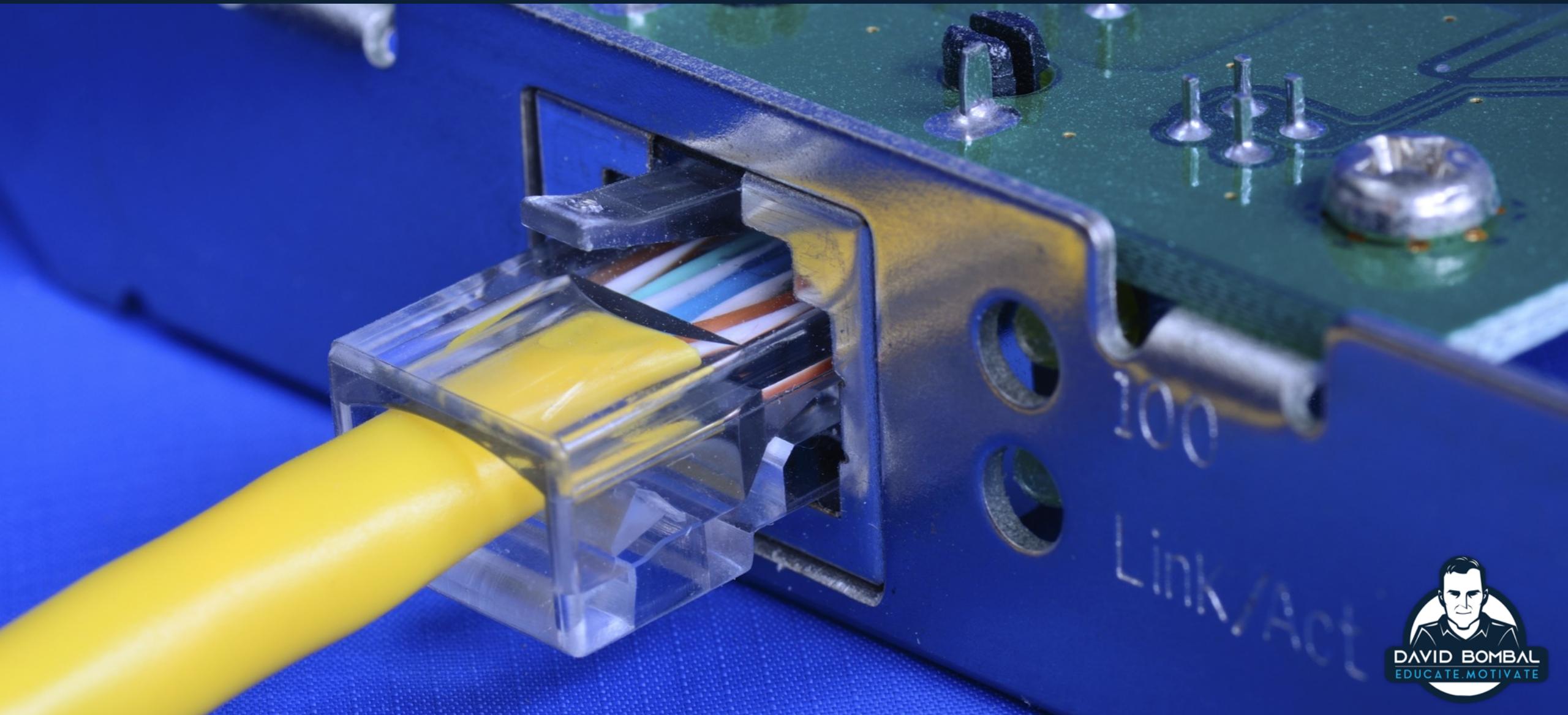
\* Source: Wikipedia



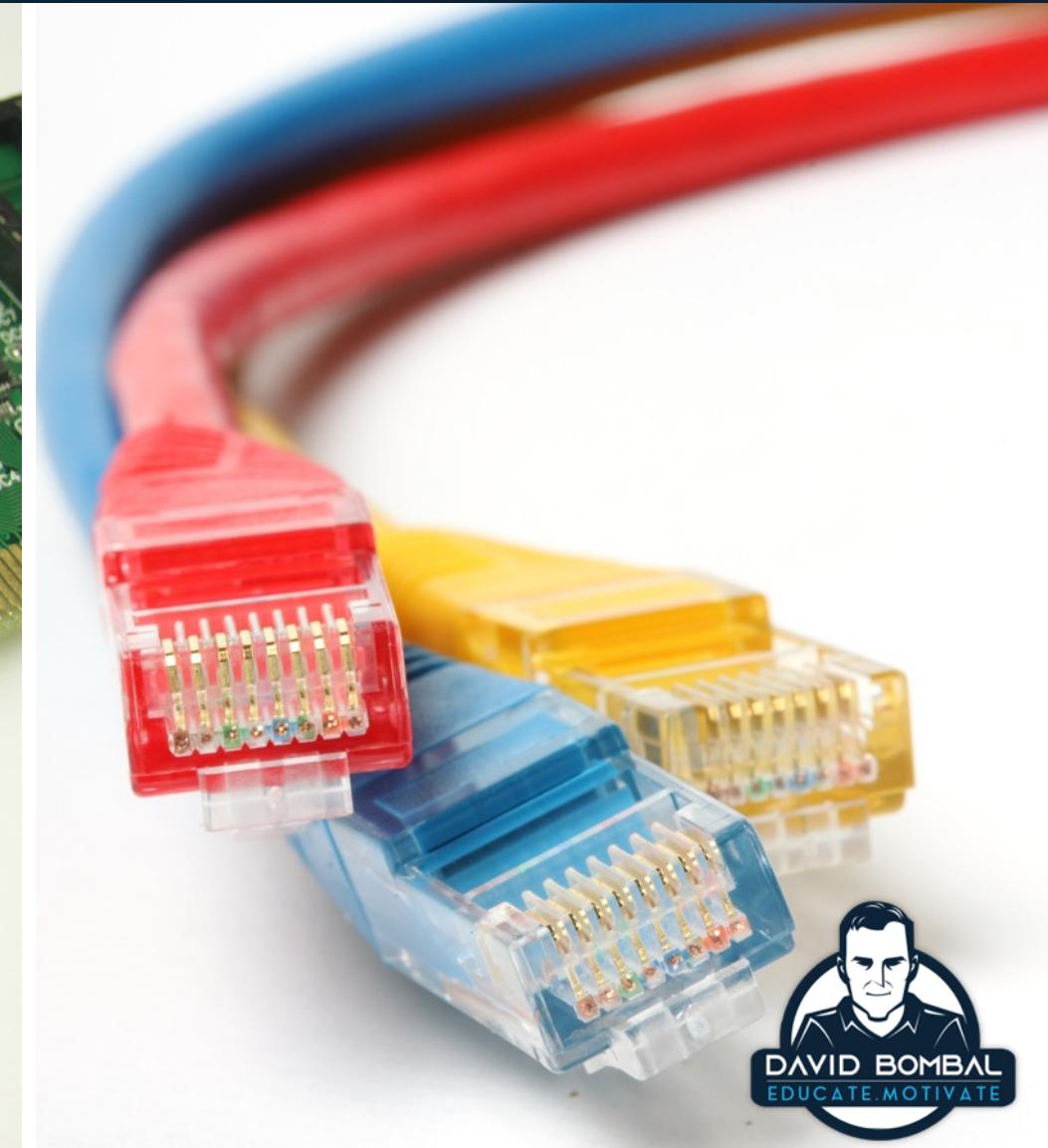
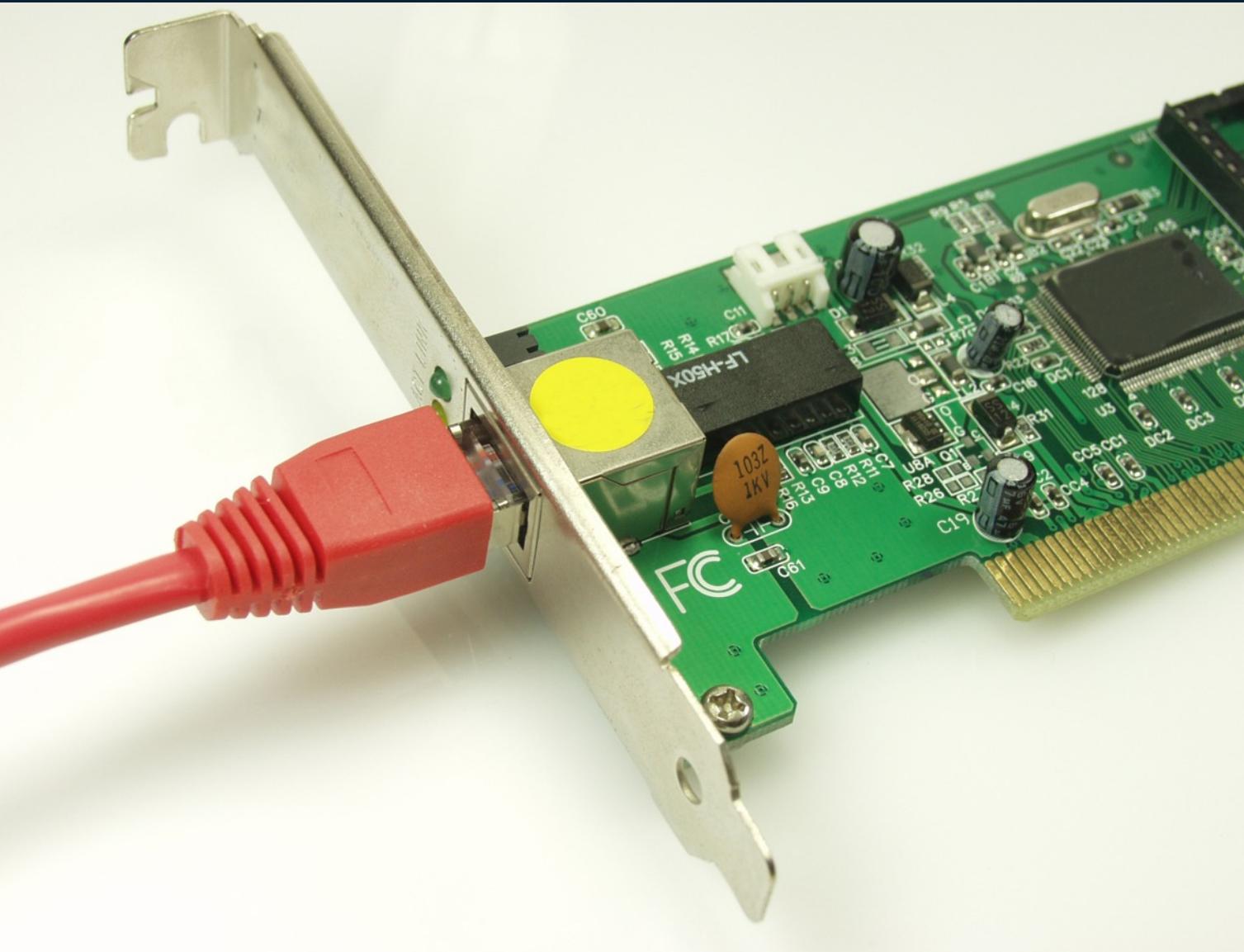
# What is a NIC?



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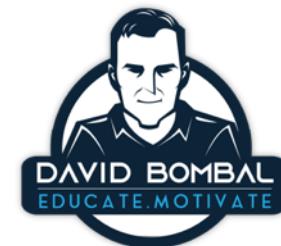
# What is a NIC?



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# What is a NIC?



# What is a NIC?

- A network interface controller (NIC, also known as a network interface card, network adapter, LAN adapter or physical network interface, and by similar terms) is a computer hardware component that connects a computer to a computer network.

\* Source: Wikipedia



# What is a MAC address?



```
Command Prompt
Connection-specific DNS Suffix . : lan
Description . . . . . : Realtek 8822BE Wireless LAN 802.11ac PCI-E NIC
Physical Address. . . . . : 0E-11-22-33-44-55 ←
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
IPv6 Address. . . . . : 2001::1(Preferred)
IPv6 Address. . . . . : fd66:628c:6006:0:b97b:99f9:d25b:ee12(Preferred)
Temporary IPv6 Address. . . . . : fd66:628c:6006:0:5c36:b00d:e609:6b62(Preferred)
Link-local IPv6 Address . . . . . : fe80::b97b:99f9:d25b:ee12%21(Preferred)
IPv4 Address. . . . . : 10.0.0.184(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : 31 March 2020 16:40:36
Lease Expires . . . . . : 02 April 2020 13:10:44
Default Gateway . . . . . : 2001::123
                           10.0.0.2
DHCP Server . . . . . : 10.0.0.2
DHCPv6 IAID . . . . . : 131921157
DHCPv6 Client DUID. . . . . : 00-01-00-01-25-C6-4D-77-00-11-22-33-44-55
DNS Servers . . . . . : fd66:628c:6006::1
```



# What is a MAC address?

- A media access control address (MAC address) is a unique identifier assigned to a network interface controller (NIC) for use as a network address in communications within a network segment.
- This use is common in most IEEE 802 networking technologies, including Ethernet, Wi-Fi, and Bluetooth.
- MAC addresses are recognizable as six groups of two hexadecimal digits, separated by hyphens, colons, or without a separator.

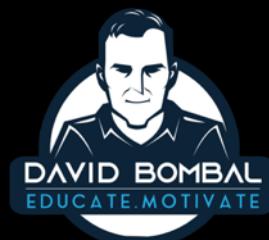
\* Source: Wikipedia



# What is a MAC address?

- MAC addresses are primarily assigned by device manufacturers, and are therefore often referred to as the burned-in address, or as an Ethernet hardware address, hardware address, and physical address.
- Each address can be stored in hardware, such as the card's read-only memory, or by a firmware mechanism. Many network interfaces, however, support changing their MAC address.
- The address typically includes a manufacturer's organizationally unique identifier (OUI). MAC addresses are formed according to the principles of two numbering spaces based on Extended Unique Identifiers (EUI) managed by the Institute of Electrical and Electronics Engineers (IEEE): EUI-48.

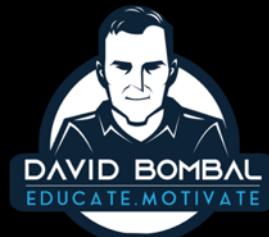
\* Source: Wikipedia



# What is modulation?

- In electronics and telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal that typically contains information to be transmitted. Most radio systems in the 20th century used frequency modulation (FM) or amplitude modulation (AM) for radio broadcast.
- A modulator is a device that performs modulation. A demodulator (sometimes detector or demod) is a device that performs demodulation, the inverse of modulation. A modem (from modulator–demodulator) can perform both operations.

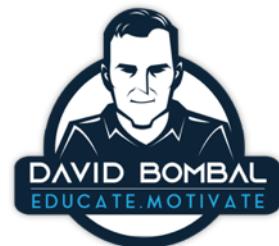
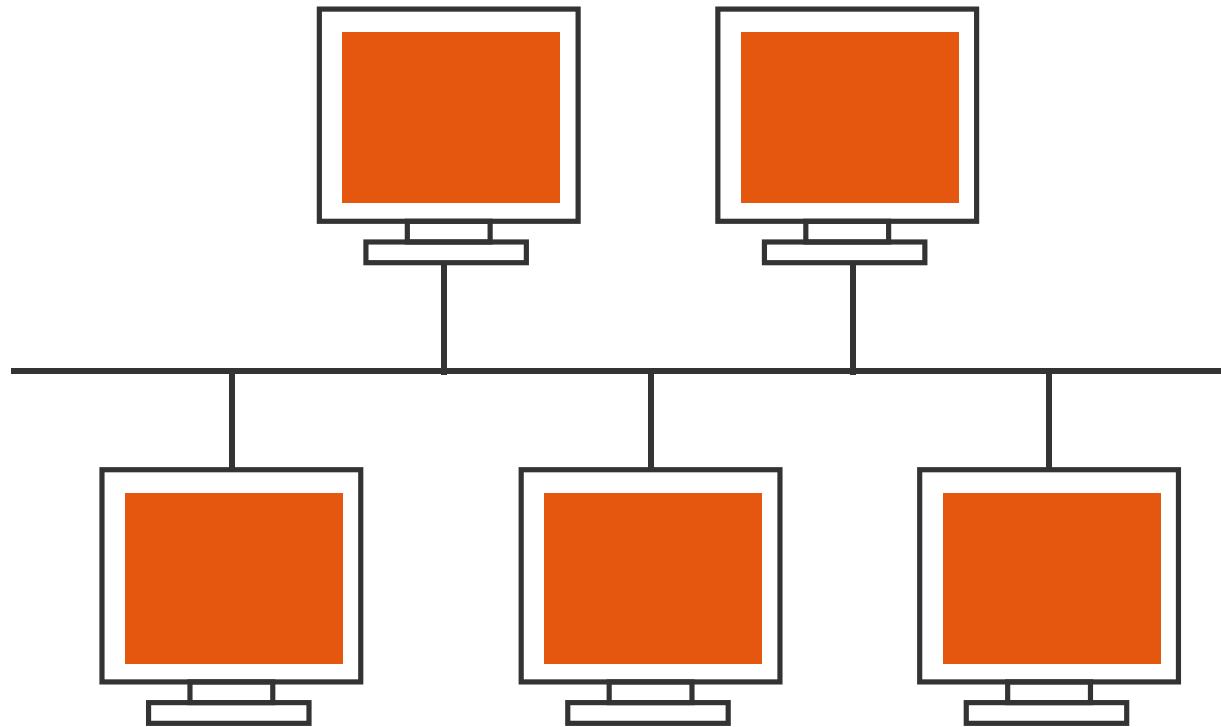
\* Source: Wikipedia



# What is a bus network?



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# What is a bus network?

- A bus network is a network topology in which nodes are directly connected to a common half-duplex link called a bus.
- A host on a bus network is called a station. In a bus network, every station will receive all network traffic, and the traffic generated by each station has equal transmission priority.
- A bus network forms a single network segment and collision domain. In order for nodes to share the bus, they use a medium access control technology such as carrier-sense multiple access (CSMA) or a bus master.
- If any link or segment of the bus is severed, all network transmission may fail due to signal reflection caused by the lack of electrical termination.

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# 10Base5 transceiver



# 10Base5, 10Base2, 10BaseT



10BaseT

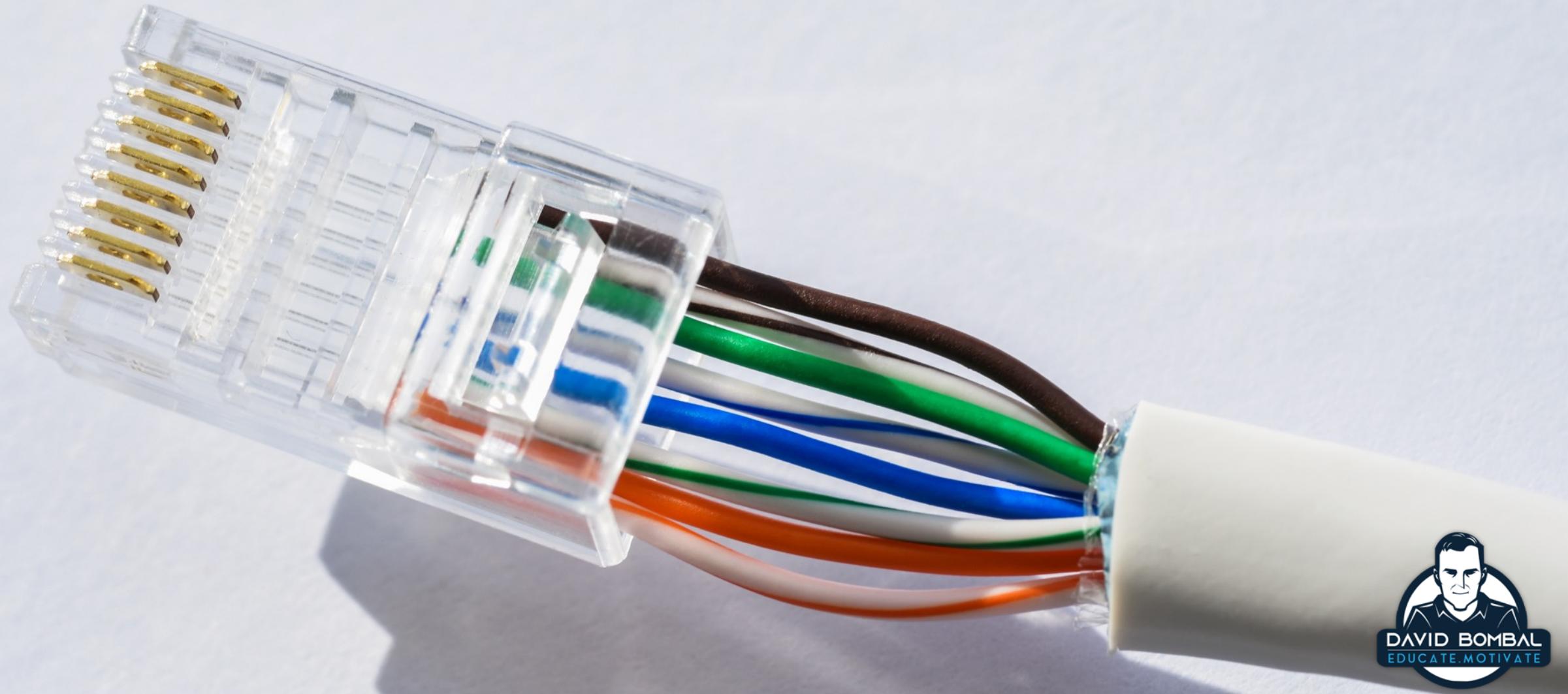
10Base2

10Base5

# RJ45



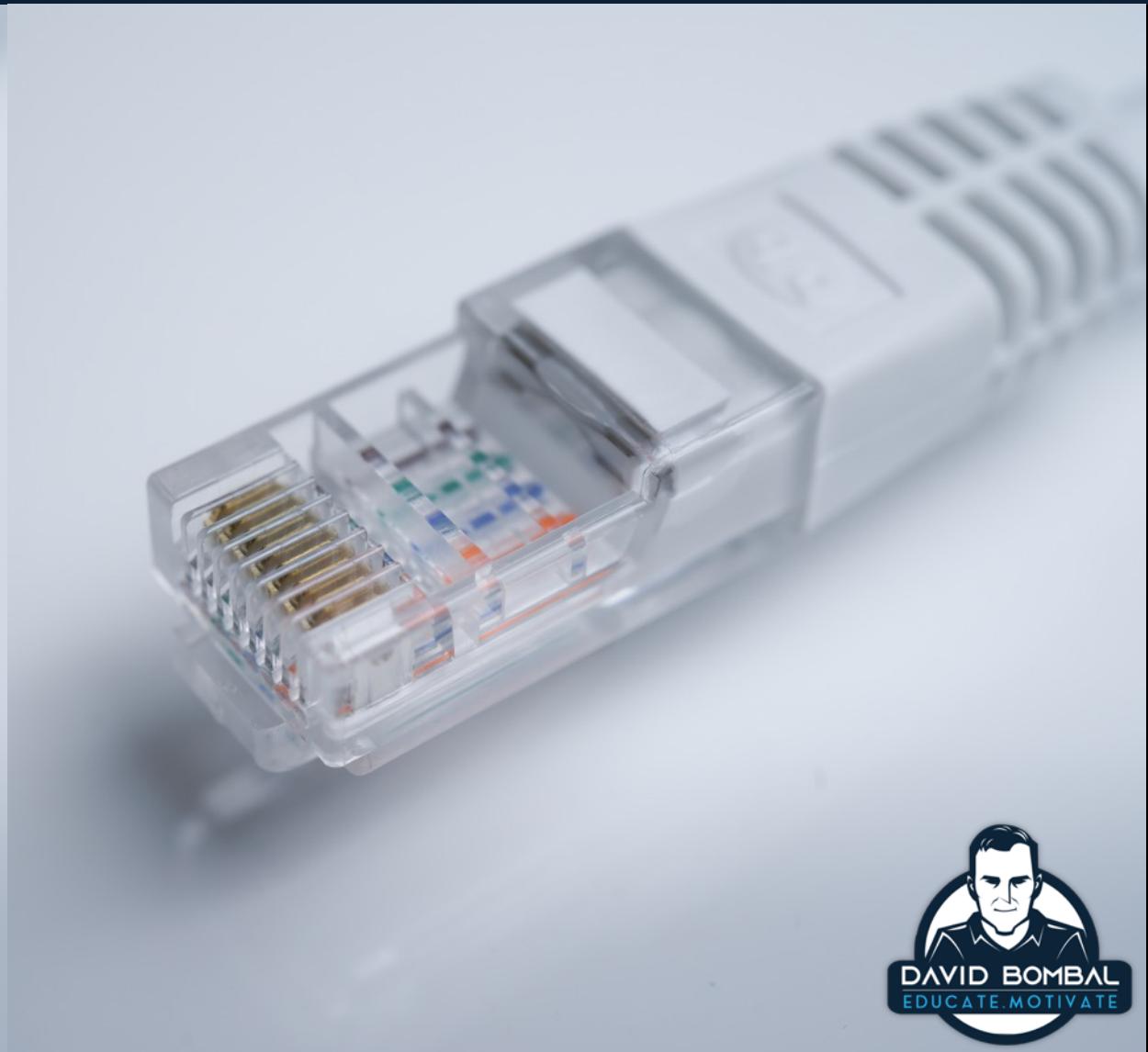
# RJ45



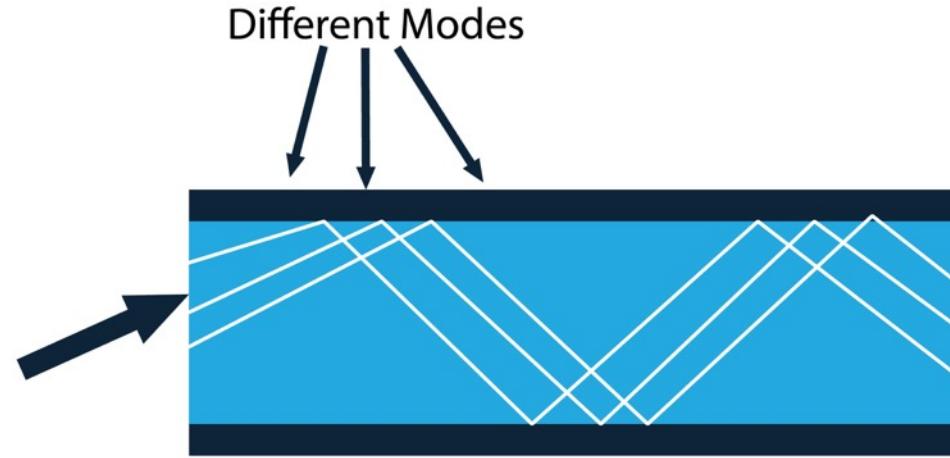
# RJ45



# RJ45



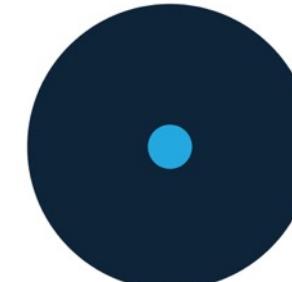
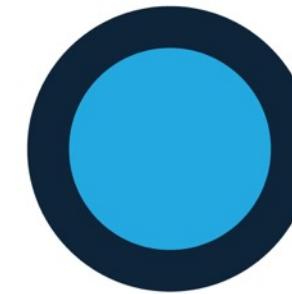
# Fiber



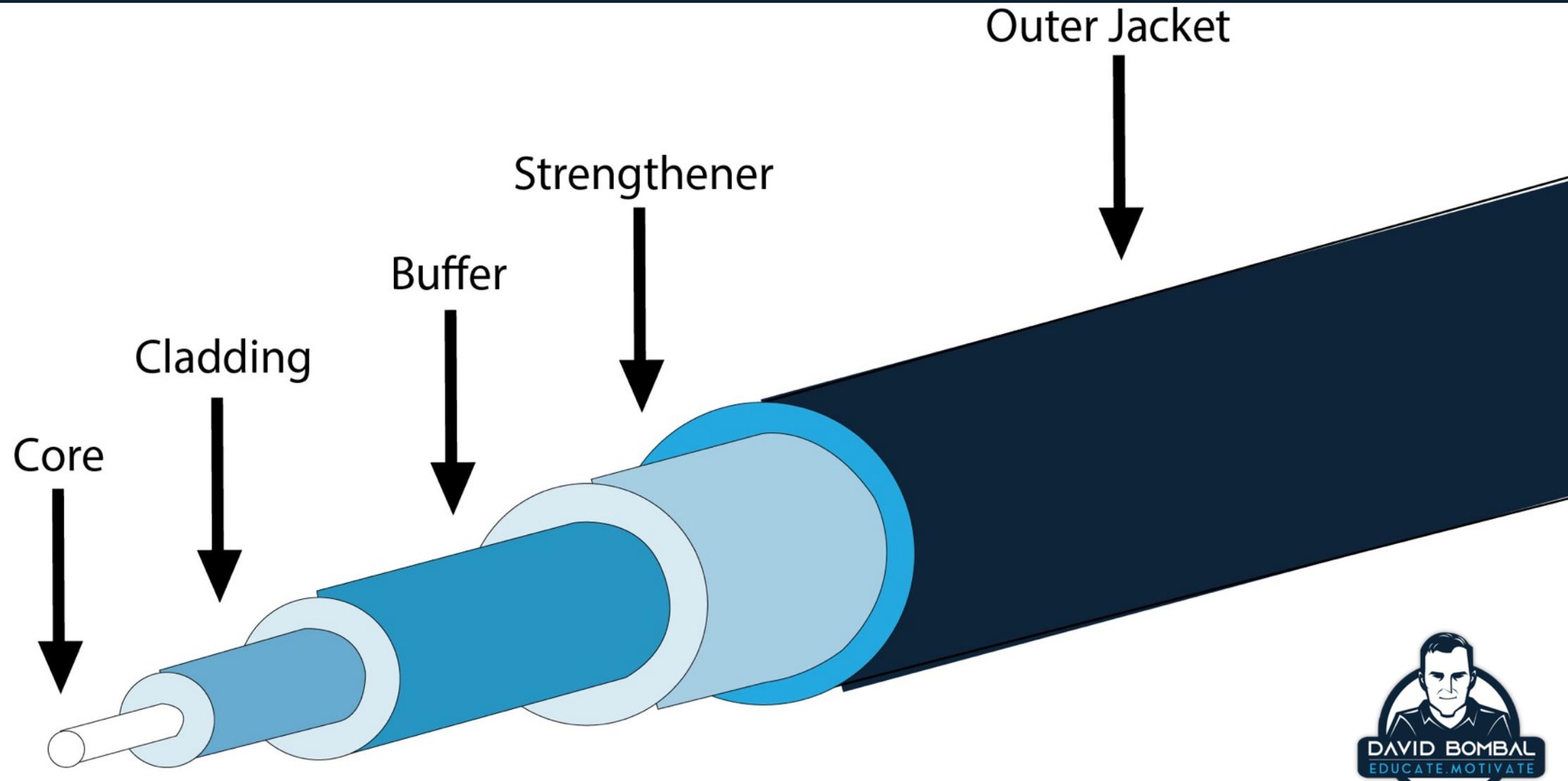
Multi-mode Fiber



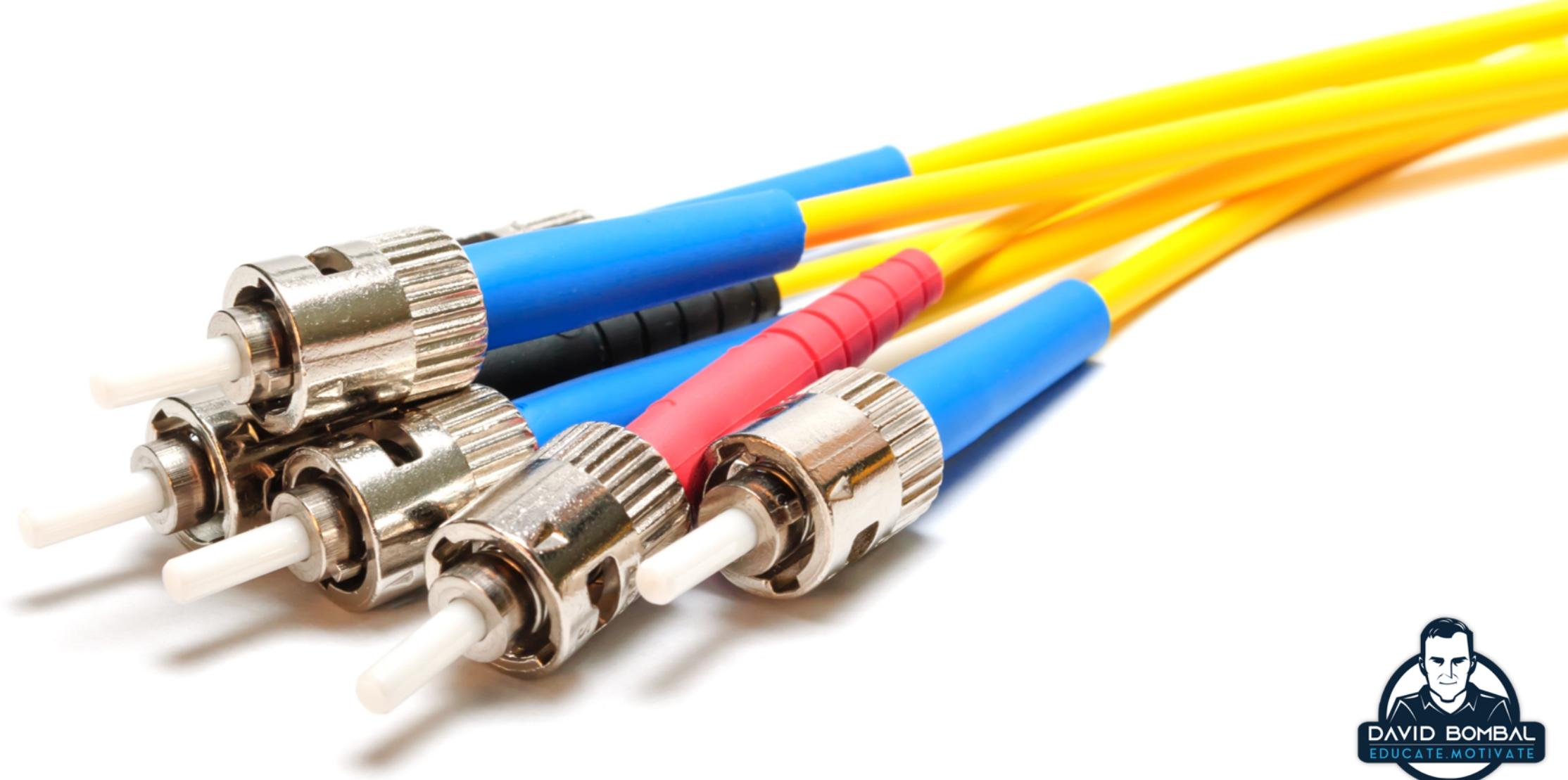
Single-mode Fiber



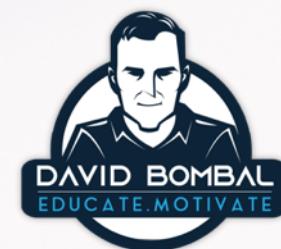
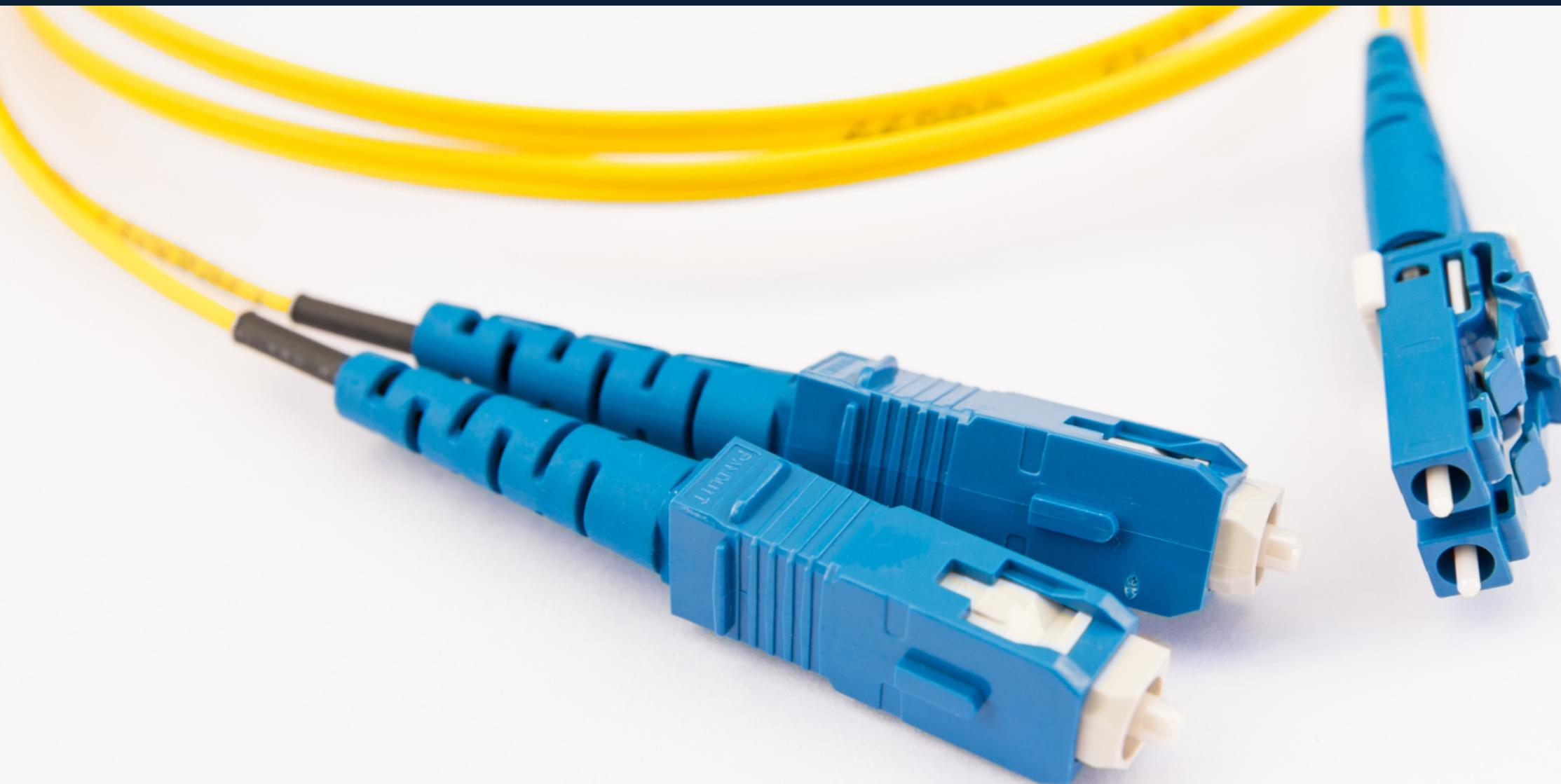
# Fiber

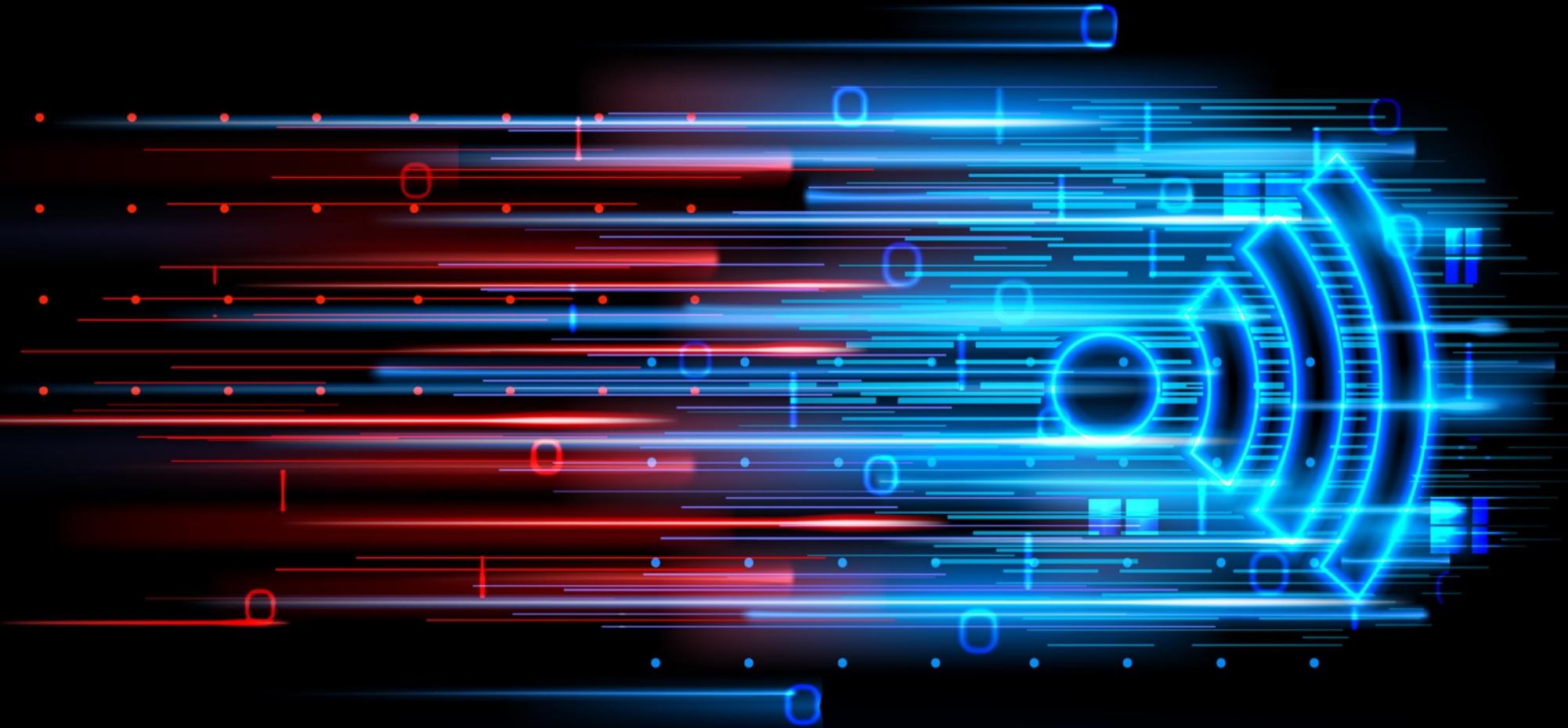


# Fiber



# Fiber





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