

Tech Moment

# Hey MAC!

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# Physical network interfaces

- LocalTalk
  - Apple proprietary
- Ethernet
  - Defined in IEEE 802.3 standard\*
- WiFi
  - Defined in IEEE 802.11 standard\*
- Bluetooth
  - Defined by the Bluetooth SIG

\* IEEE standards cost money. Don't bother as only hard core geeks can understand them.

## Typical interface



(iMac WiFi)

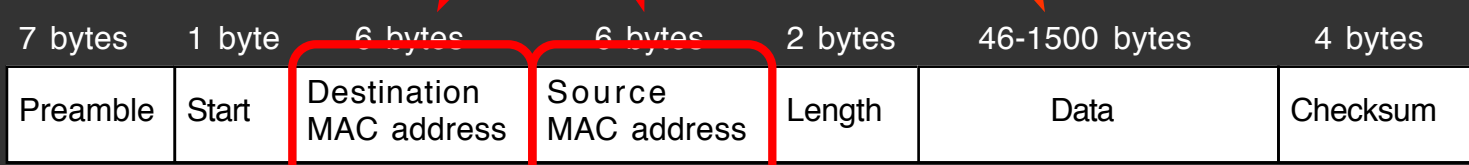
- Media Access Control (MAC)

# Network traffic

## Ethernet frame



Transmission order →



Transmission order →

Every Ethernet, WiFi, and Bluetooth interface in the world has a unique MAC address

- They are assigned by the manufacturer of the interface
- They are stored in its hardware, such as the card's read-only memory or some other firmware mechanism

## MAC addresses are 48 bits

- There are about 281 trillion possible addresses
- Binary:

```
000000000010100010100011001100010101111  
10100010
```

- Hexadecimal:

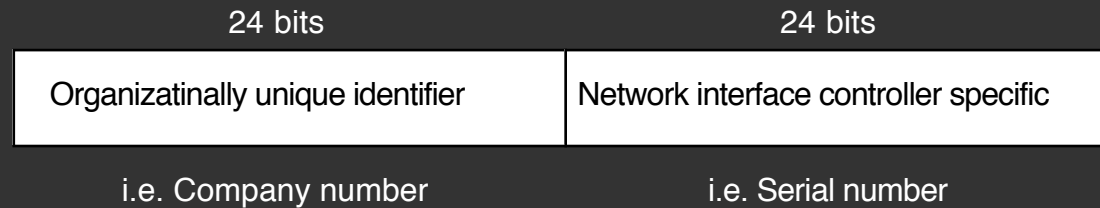
```
0014519afa2
```

- Usually noted as 8-bit hex separated by colons or hyphens

```
00:14:51:98:af:a2
```



# MAC address format



- 24-bits means there can be 16,777,215 company assignments of 16,777,215 serial numbers

# Company numbers are managed by the IEEE

## – Examples:

- 00-00-01 Xerox (1 of 12 assignments)
- 00-00-0C Cisco (1 of 744 assignments)
- 00-03-93 Apple (1 of 386 assignments)
- 00-09-5B Netgear (1 of 40 assignments)

Q. How are MAC addresses used by the interface?

- All traffic is sent to everyone on the network
- Only the Ethernet packets with the proper destination MAC address are passed through to the OS software
- Everything else is ignored!

## One exception

- A special MAC address of all ones (FF:FF:FF:FF:FF:FF) is the broadcast address
- Packets sent to the broadcast address are also passed through the interface

## Second exception

- The interface can be configured to be “promiscuous”
- Everything is passed through!

## Summary

- IEEE 802 network technologies, including Ethernet, WiFi, and Bluetooth all use MAC addresses
- Each and every one of the above network interfaces has a unique MAC address
- Traffic moves between Ethernet devices based on MAC addresses

Note that there has been no mention of IP addresses

Q. So where do IP addresses fit in?

A. Stay tuned for another episode of “Tech Moment”

