Broadcast Networks: ETHERNET

10 Base 2   10Mbps   "Thin" coax, 185m max.

10 Base 5   10Mbps   "Thick" coax, 500m max.

50Ω
terminator
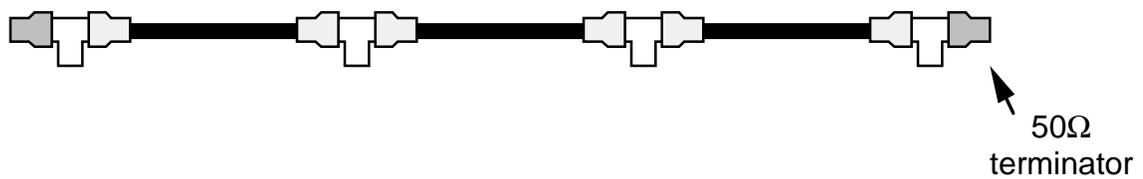
10 Base T   10Mbps   Unshielded Twisted Pair

100 Base T   100Mbps CAT-5 UTP

HUB

PC

HUB

HUB

PC   PC

PC   PC
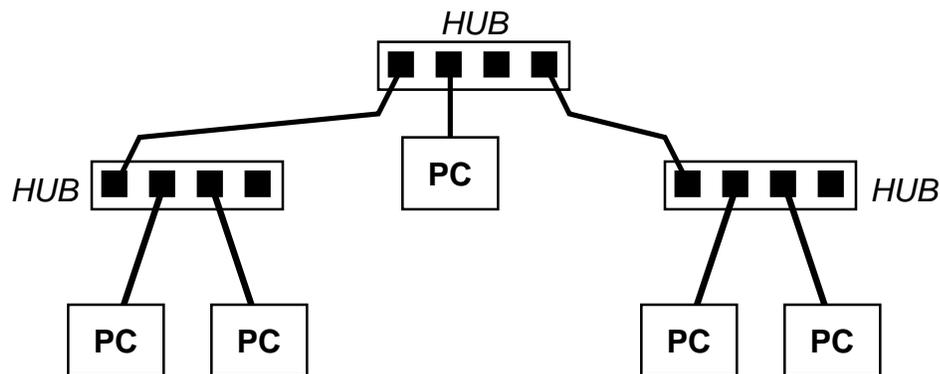
❏ **Max. 100m each cable**
❏ **Max. 4 hubs between any two PCs**

10 Base T Wiring

RJ45

1
2
3
4
5
6
7
8
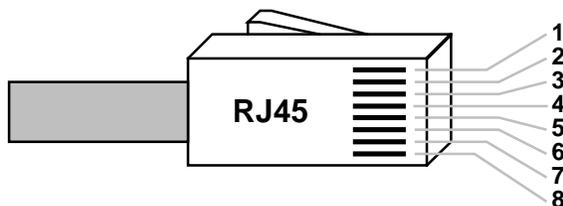
PC: "MDI"
*(media-dependent
interface)*

Hub: "MDI-X"
*(media-dependent
interface – crossover)*

Tx + **1**   **1** Rx +
Tx - **2**   **2** Rx -
Rx + **3**   **3** Tx +

Rx - **6**   **6** Tx -
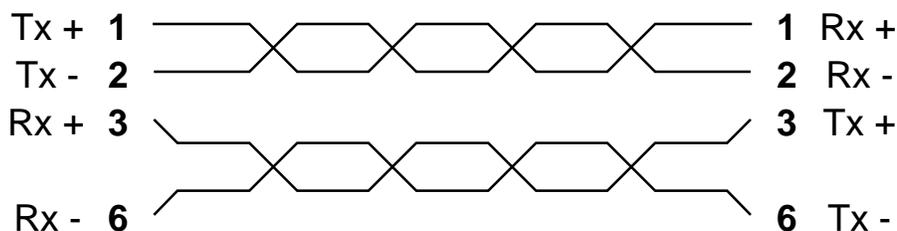
Must ensure pairs are twisted together!
Pick a colour scheme – and stick to it. e.g.

White/Orange	**1**
Orange	**2**
White/Green	**3**
Blue	4
White/Blue	5
Green	**6**
White/Brown	7
Brown	8

*This is the colour scheme
recommended in the*
comp.dcom.cabling
LAN wiring FAQ

PC

Tx + **1** ——

Tx - **2** ——

Rx + **3** ——

Rx - **6** ——

PC

—— **1** Tx +

—— **2** Tx -

—— **3** Rx +

—— **6** Rx -

Ethernet Frames

MAC Header	Data
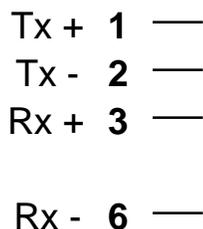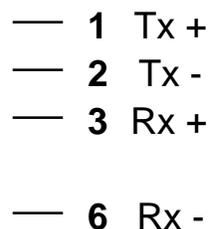
⟵——— Max 1500 bytes ———⟶
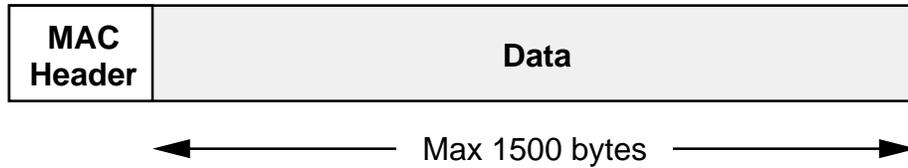
❏ **Card identified by "MAC address"**

❏ **Unique 48-bit binary number**

❏ **Burned into card by manufacturer**

> *e.g.* `00:80:F4:C7:3B:24`

❏ **All cards respond to "broadcast address"**

> `FF:FF:FF:FF:FF:FF`

IP Encapsulation

MAC Header	IP Header	IP Data

⟵——— MTU = 1500 ———⟶

Source MAC addr ***Dest MAC addr***

We know the source MAC address (our own) – but how do we know the MAC address of the recipient?
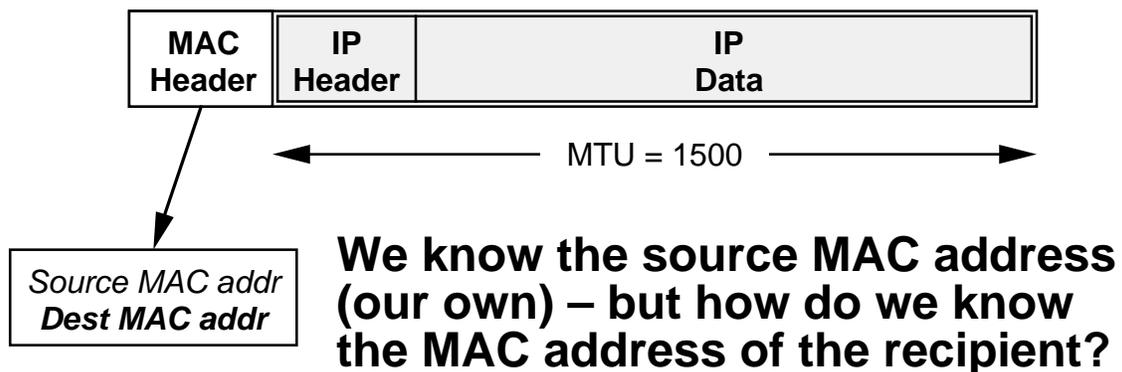
ARP - Address Resolution Protocol

We want to send a datagram to w.x.y.z

❏ **Send BROADCAST "ARP request: *w.x.y.z*"**

❏ **Machine with this IP number sends ARP response**

❏ **The ARP response contains that machine's MAC address (source MAC addr)**

❏ **So that's the MAC address we use to send the IP datagram**

NOTES:

❏ **You never ARP for a machine outside of your own network** – you ARP for the gateway that you want to forward via instead

❏ **For efficiency, every machine keeps a cache of ARP replies; they time out after typically 15 minutes** (in case the network changes)

`arp -an`	*Show ARP cache*
`arp -d` `w.x.y.z`	*Delete cache entry*

❏ **ARP packets are <u>not</u> IP datagrams!**