Broadcast Networks: ETHERNET

10 Base 2  10Mbps  “Thin” coax, 185m max.
10 Base 5  10Mbps  “Thick” coax, 500m max.

10 Base T  10Mbps  Unshielded Twisted Pair
100 Base T 100Mbps  CAT-5 UTP

- Max. 100m each cable
- Max. 4 hubs between any two PCs
10 Base T Wiring

PC: “MDI”  
(media-dependent interface)

Hub: “MDI-X”  
(media-dependent interface – crossover)

Must ensure pairs are twisted together!
Pick a colour scheme – and stick to it. e.g.

<table>
<thead>
<tr>
<th>PC</th>
<th></th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx + 1</td>
<td>—</td>
<td>1  Tx +</td>
</tr>
<tr>
<td>Tx - 2</td>
<td>—</td>
<td>2  Tx -</td>
</tr>
<tr>
<td>Rx + 3</td>
<td>—</td>
<td>3  Rx +</td>
</tr>
<tr>
<td>Rx - 6</td>
<td>—</td>
<td>6  Rx -</td>
</tr>
</tbody>
</table>

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
**Ethernet Frames**

- Card identified by “MAC address”
- Unique 48-bit binary number
- Burned into card by manufacturer
  
  \[00:80:F4:C7:3B:24\]

- All cards respond to “broadcast address”
  
  \[FF:FF:FF:FF:FF:FF\]

**IP Encapsulation**

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 not IP datagrams!