Standardization

- ISO - International Organization for Standardization
- ITU-T - International Telecommunication Union - Telecommunication Sector
- IEEE - Institute of Electrical and Electronic Engineers
- IETF - Internet Engineering Task Force
- *x* Forum / *x* Alliance / *x* Group

Standardization

- IEEE - Institute of Electrical and Electronic Engineers
  - 802.3an: 10GBASE-T 10 Gbit/s (1,250 MB/s) Ethernet over unshielded twisted pair (UTP)
  - 802.11ad: (in works) WiGig, next-gen of WiFi

- IETF - Internet Engineering Task Force
  - RFC791: Internet Protocol - DARPA Internet Program Protocol Specification (1981)

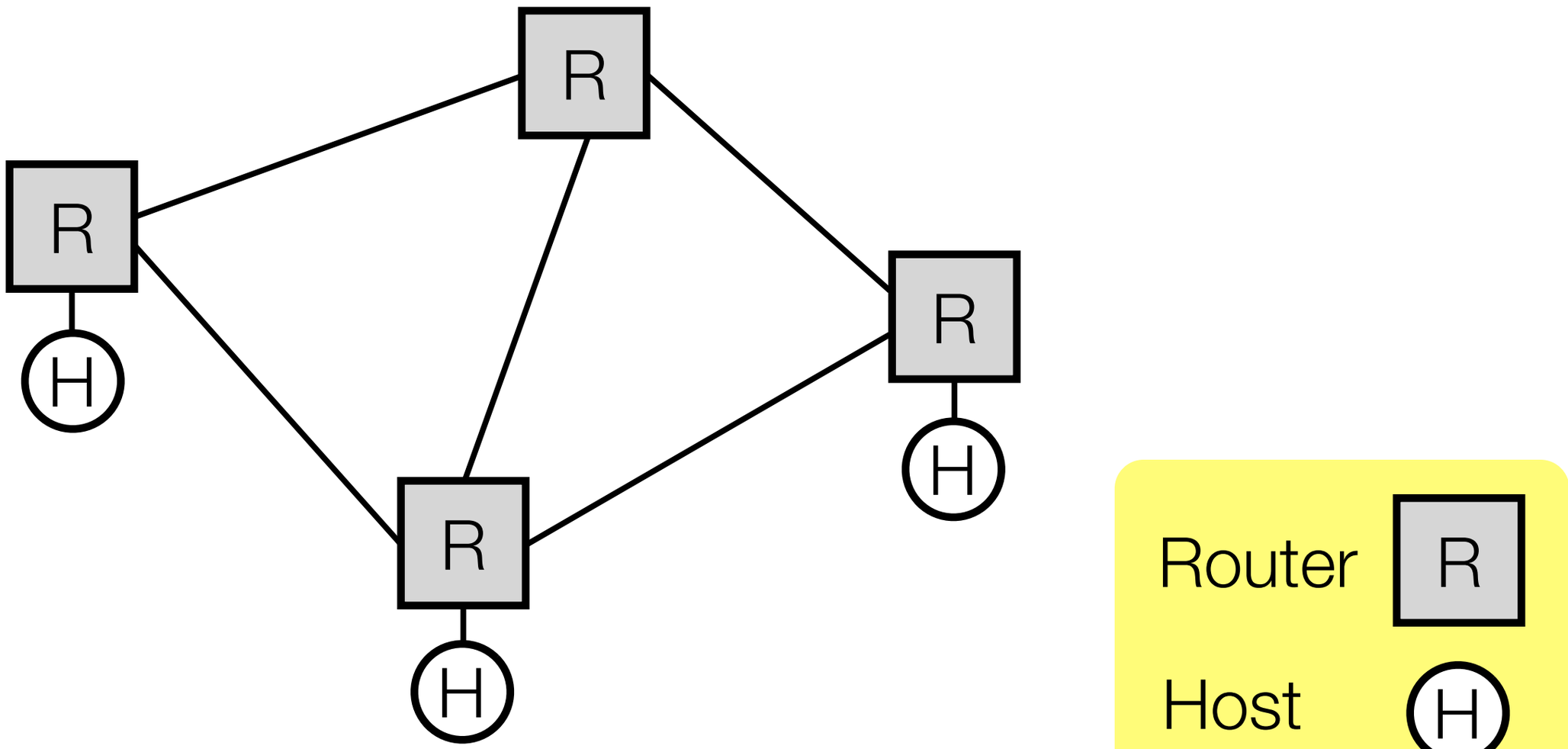
Standardization Process

- BOF - Birds of a Feather (... flock together)
- WG - Work Group
  - working documents / draft standards
- Editor
  - standard documents

Networking Basics

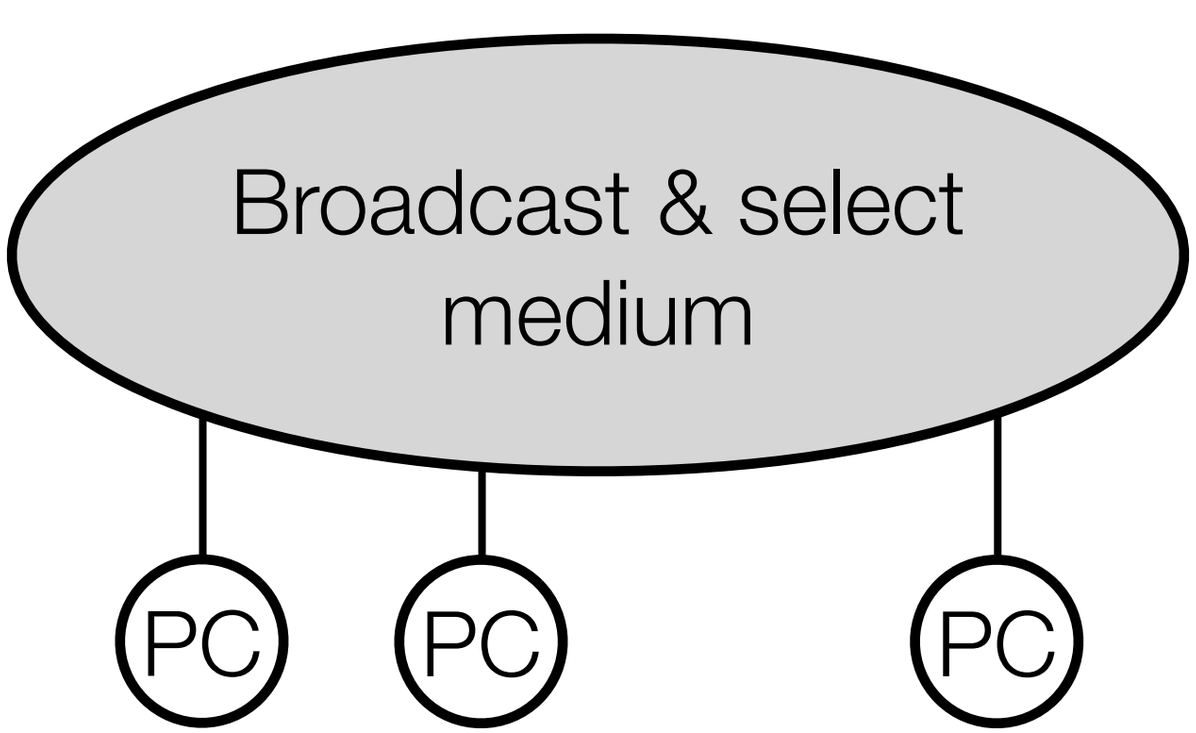
A bit of history...

- Packet switched networks (70’s - 80’s)
  - long-distance point to point (leased) lines



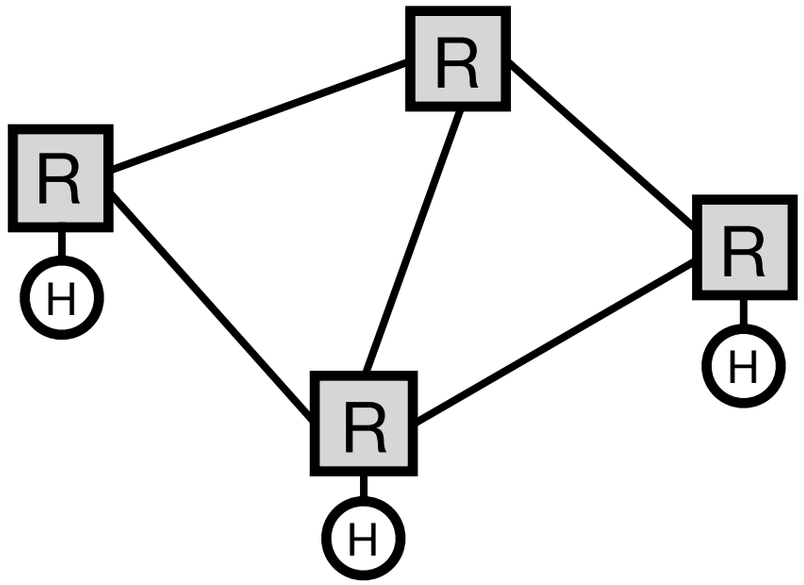
A bit of history...

- Local area networks (late 80's, early 90's)
  - based on broadcast & select medium



Comparison

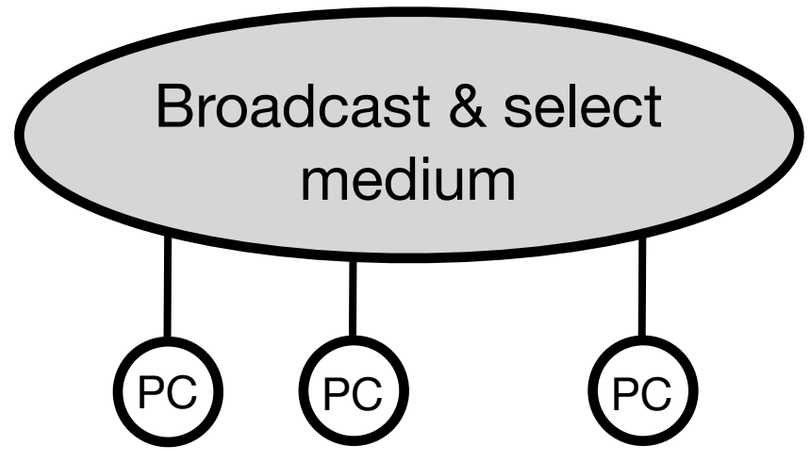
- Routed networks



- topology driven by geography
- long distances (high latency)
- need for scalability
- location-related addresses
- routing

➡ **Network Layer (L3)**

- Broadcast & select

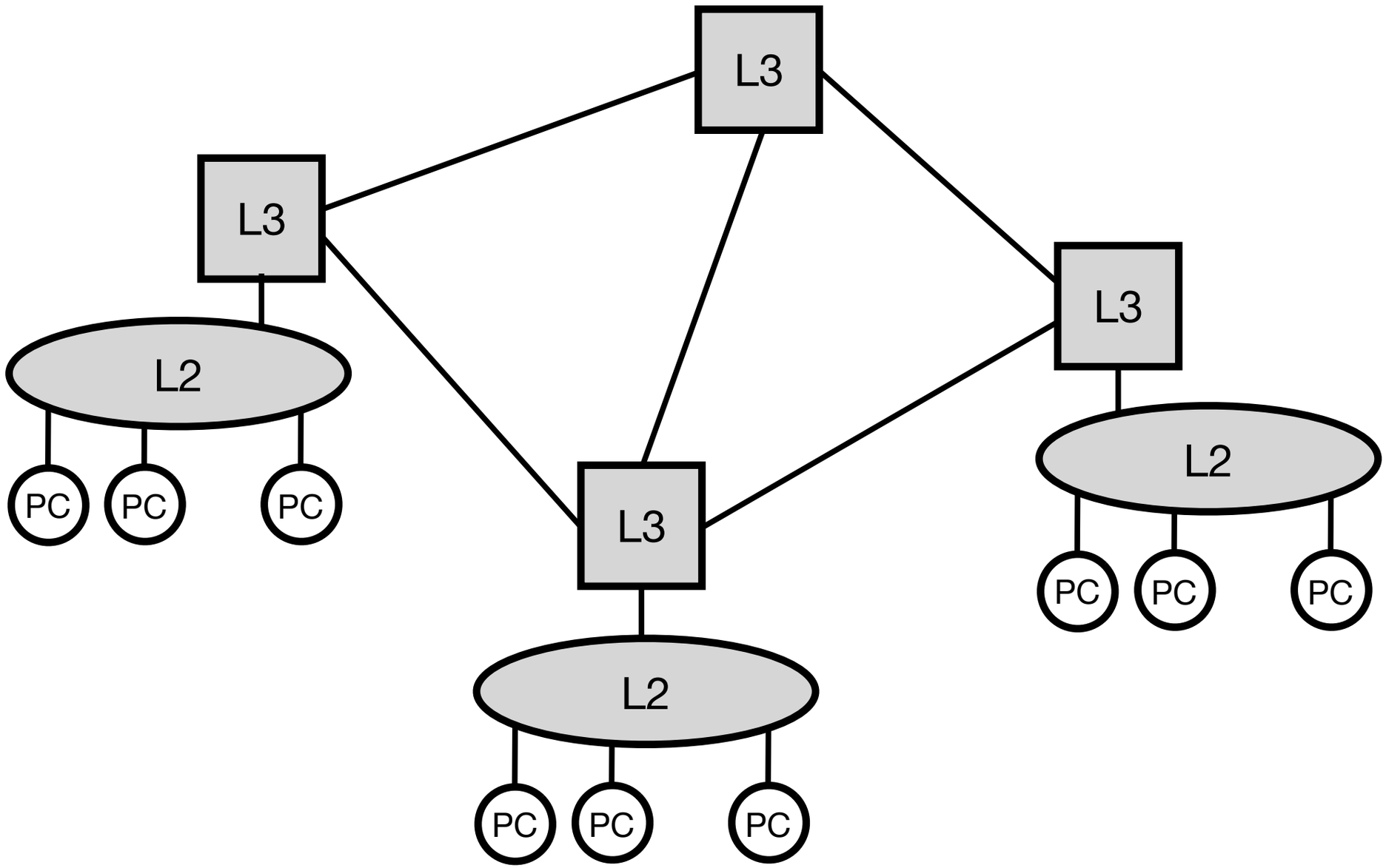


- everyone connected to everyone
- short distances (low latency)
- lesser need for scalability
- arbitrary addresses
- address discovery

➡ **Link Layer (L2)**

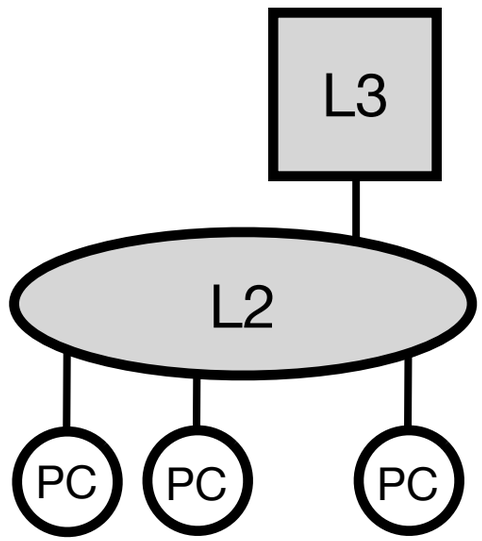
Today

Internet - a network to INTERconnect NETworks

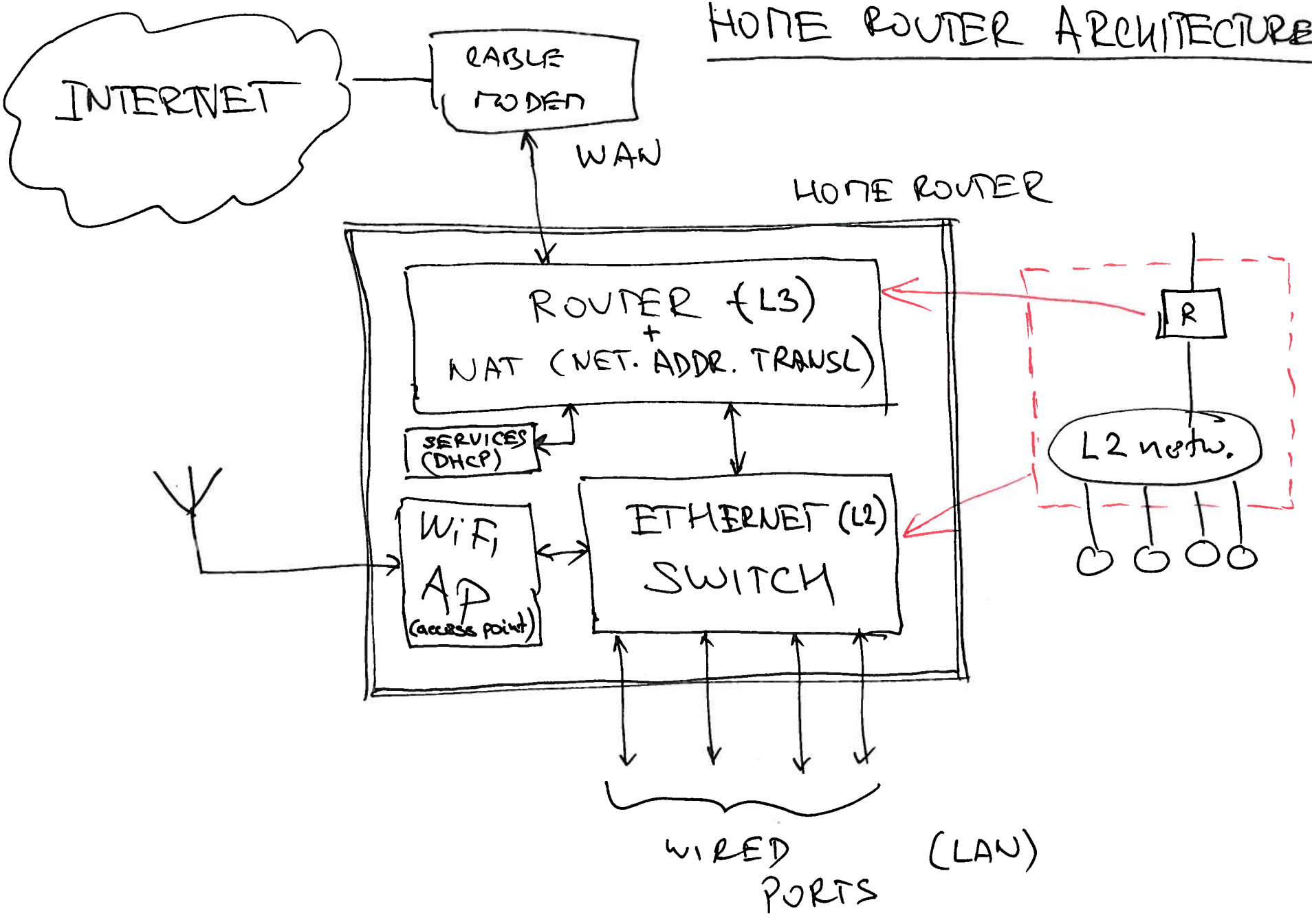


Networking Basics

- **Goals**: IP/MAC addresses, subnetting fundamental protocols, basics of routing/ switching,
- **Assumptions**:
  - packet switched network
  - nodes attached to a L2 broadcast-and-select network
  - each node “has” a MAC and an IP address



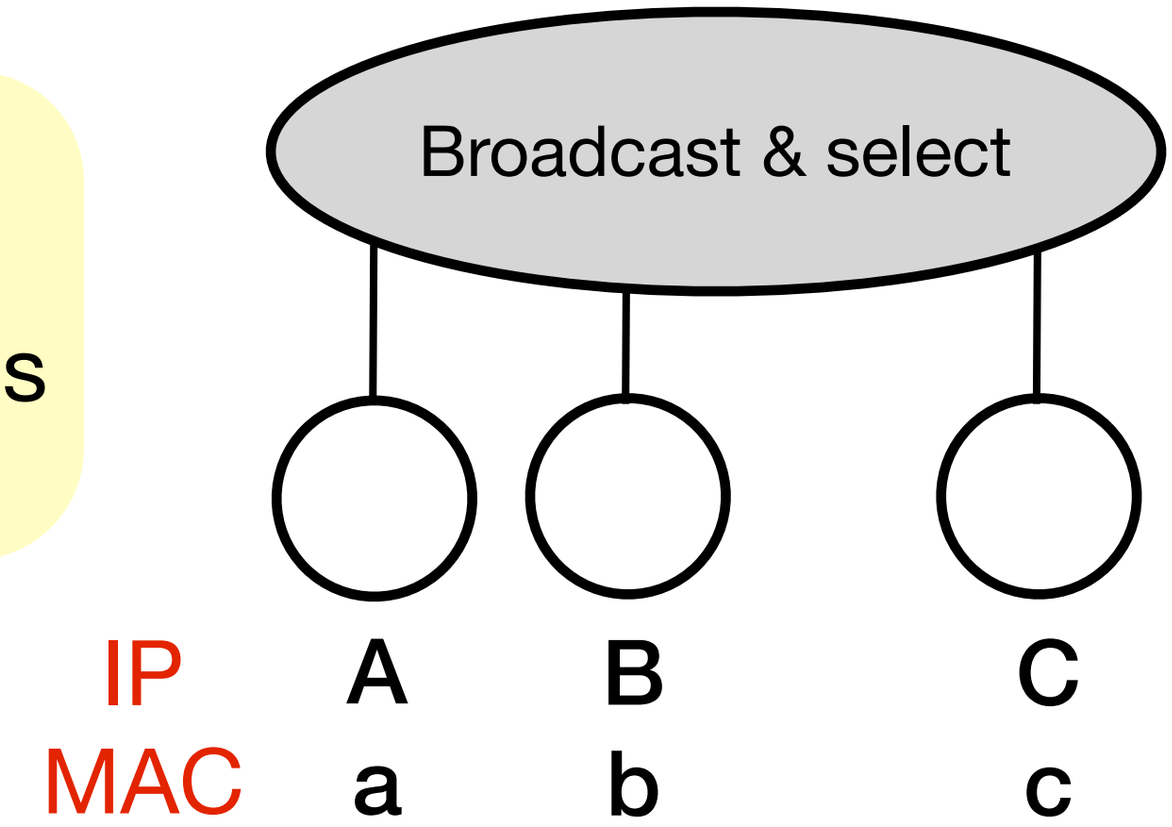
HOME ROUTER ARCHITECTURE



Address Resolution

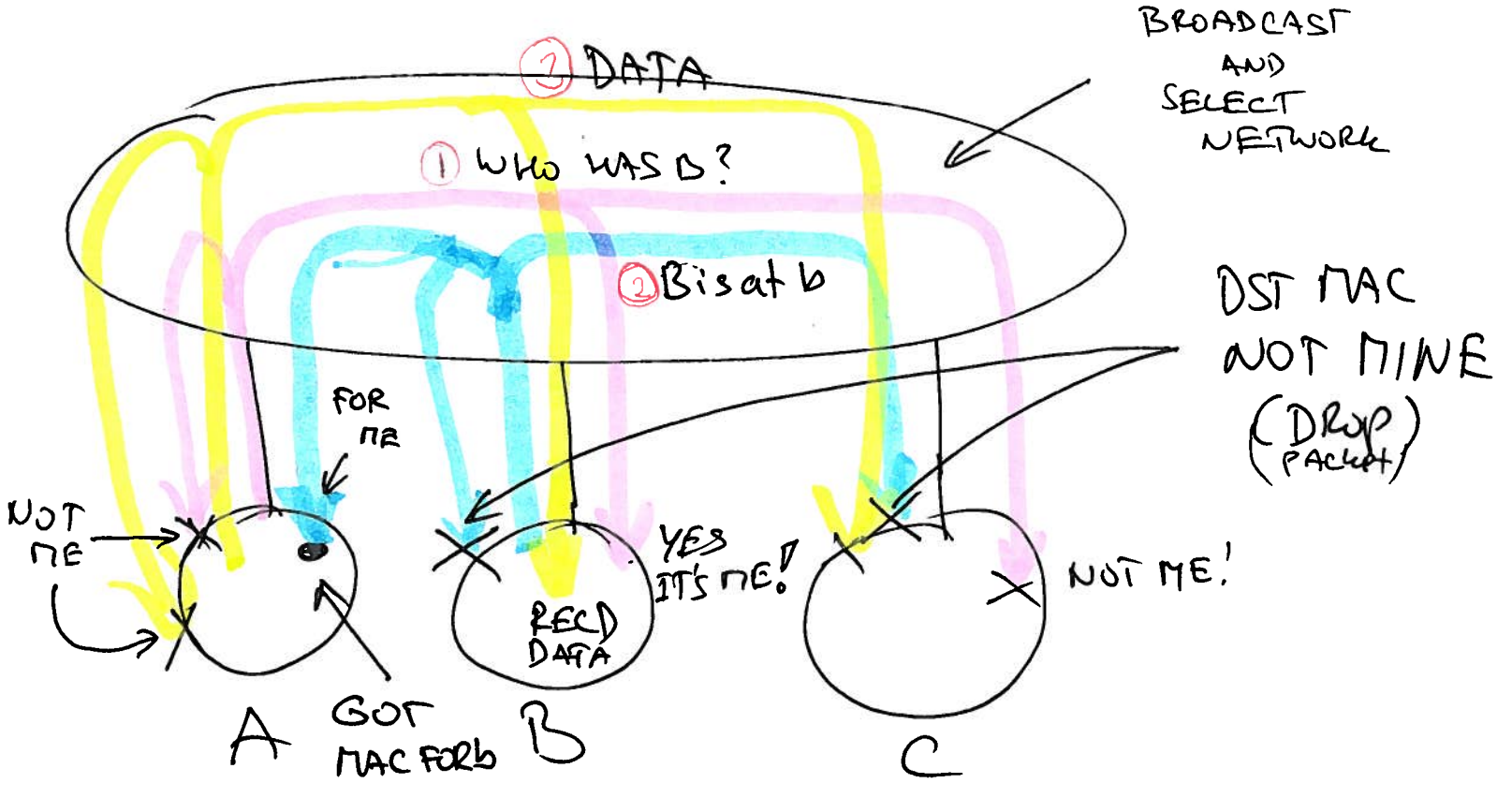
- Problem: Find MAC address of a node with a given IP address

A has a packet with IP destination address B, A needs B's MAC address to deliver the packet



- Solution: ARP - Address Resolution Protocol

ADDRESS RESOLUTION PROTOCOL (ARP)



STEP1: A BROADCASTS "WHO HAS IP = B"

STEP2: B SENDS REPLY (UNICAST TO MAC = a) "B is at b"

STEP3: A SENDS DATA TO B (UNICAST TO MAC = b)