Ethernet

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Contents

1 Ethernet Frame

- 7 Bytes used for preamble
  - Synchronizes communication between sender and receiver.
- 1 Byte start of frame delimiter
  - Marks the beginning of the frame.
- 6 Byte Destination MAC address
  - Specifies the recipient's physical address.
- 6 Byte Source MAC address
  - Specifies the sender's physical address.
- 2 Byte EtherType
  - Indicates the protocol encapsulated in the payload.
- Payload - 42 to 1500 bytes
  - Contains the encapsulated data.

2 Ethernet Switches

- Receive ethernet frames and decide to forward the frame, and which port
  - Provides smart forwarding
  - **Learns** MAC addresses of hosts seen on each switch interface
  - Hosts generally only see *packets sent to them* or broadcast packets
- Can store and forward ethernet frames

3 Address Resolution Protocol

3.1 Properties

- Used to determine the MAC address of where to sent things to
- USes a **link layer** broadcast message
  - Sends "Who has this IP address" to ff:ff:ff:ff:ff:ff
  - This is seen by all hosts on the LAN
  - IF someone has the address, they send their MAC address

3.2 ARP Message Types

- Unicast
  - One-To-All
- Broadcast
  - One-To-All-Potential
- Multicast
  - One-To-Any-Interested
- Anycast
  - One-To-Nearest

3.3 Nuances of ARP

- Not necessarily secure
  - Potentially open to spoofing
  - Machines might claim they have an IP address when they actually dont
- If an IP or MAC changes
  - Send a 'gratuitous ARP'
  - Enables quick updates of the correct information
- ARP probing
  - Can be used to detect clashes with IP addresses
  - Whether two things are using the same

4 Connecting LANs

- To connect two LANs together, we need to use an IP router
- This router then forwards IP packets between the LANs
  - Routers do not forward Ethernet broadcasts
- Router will advertise to other routers the reachability of the IP address range it directly serves

4.1 Routers

4.1.1 IPv4

- If destination on the same LAN, the destination MAC address is the receiver's Ethernet Address
- Else - Non local traffic is sent to the **default** router on the link-layer

4.1.2 IPv6

- Host finds the router with router solicitation
  - Routers also send Router Adverisements
- Non-local traffic is sent to that router on the link layer
- This is more efficient and dynamic