

- IC Graphs
- Round-Trip Time Graphing
- Command-line tools:
 - tshark
 - tcpdump
 - editcap
- Filters

(4)

Network layer protocols

- ARP (Address Resolution Protocol):

- ARP uses only 2 packets: an ARP request and an ARP response.

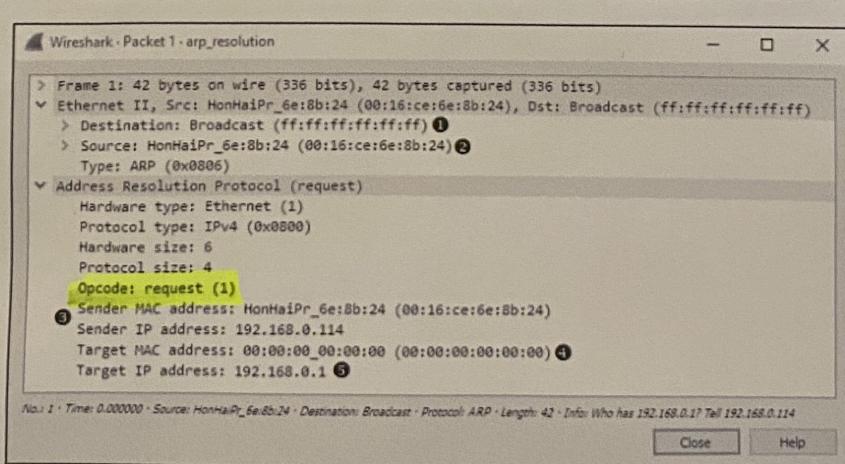


Figure 7-3: An ARP request packet

- ① Broadcast: Sent to all devices on the current network segment
- ② Source address of this packet.
- ③ Sender's MAC and IP addresses.
- ④ MAC address of the target is unknown (info. we are trying to get)
- ⑤ IP address of the target.

(5)

Response to
the initial
request.

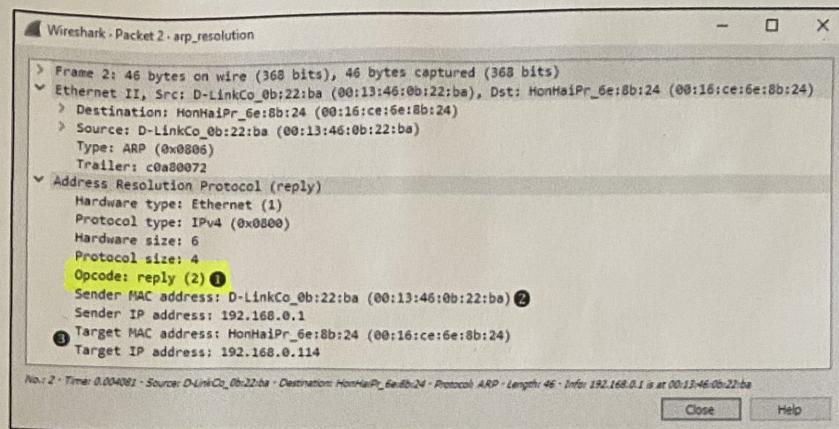


Figure 7-4: An ARP reply packet

- ④ Opcode == 2 \Rightarrow ARP reply packet
- ③ The addressing information is reversed - the sender MAC address and IP address are now the target MAC and IP addresses.
- ② All the information is present - we now have the MAC address of our host at 192.168.0.1

- Once this resolution process is completed, the transmitting device updates its cache with the MAC-to-IP address association of the receiving device and can begin sending data.

MAC addresses are needed because a switch that interconnects devices on a network uses a Content Addressable Memory (CAM) table, which lists the MAC addresses of all devices plugged into each of its ports.

(6)

A device's IP
can change

=>

ARP caches
will be
invalid.

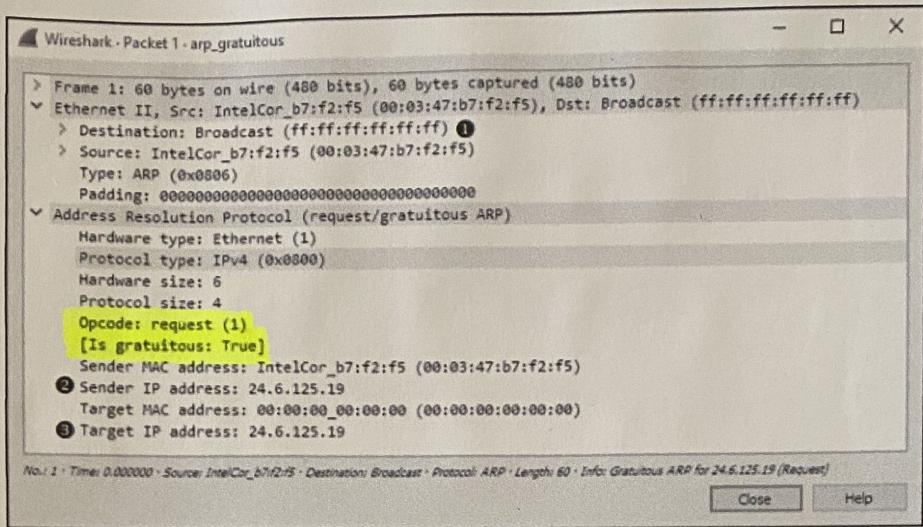


Figure 7-6: A gratuitous ARP packet

- To prevent this from causing communication errors, a gratuitous ARP packet is transmitted on the network to force any device that receives it to update its ARP cache with the new IP-to-MAC address mapping.
- ① Sent to everyone
 - ② + ③ The sender IP address and the target IP address are the same.

• IPv4 (Internet Protocol Version 4):

- IPv4 is the workhorse of the communication process and is ultimately responsible for carrying data between devices, regardless of where the communication endpoints are located.
- The internet itself is a collection of millions of LANs (Local Area Networks) and routers.

- IPv4 addresses are 32 bits long.