Address Resolution Protocol (ARP)

ARP

- Every system on a TCP/IP network has two addresses, one physical and one logical.

- The address resolution protocol (ARP) provides a necessary bridge between these two addresses.

- ARP is the Internet's lookup service. Given an IP address, ARP can obtain the hardware address to which network packets should be sent on the physical network.

- ARP is used by every machine on the Internet

ARP Working

- The system that needs a hardware address sends an ARP request message out onto the network.

- The sender doesn't know the hardware address of the system it's looking for, this message is broadcast to all systems on the physical network.

  - On Ethernet, address FF:FF:FF:FF:FF:FF is for broadcast messages.

ARP Working

- Included within the ARP request is the IP address (also known as, protocol address) of the target system and the sender's addresses.

- Each system that receives the broadcast ARP request checks to see if its local IP address matches the target protocol address in the ARP request.

- The system with that IP address sends an ARP reply directly to the requester.

ARP Working
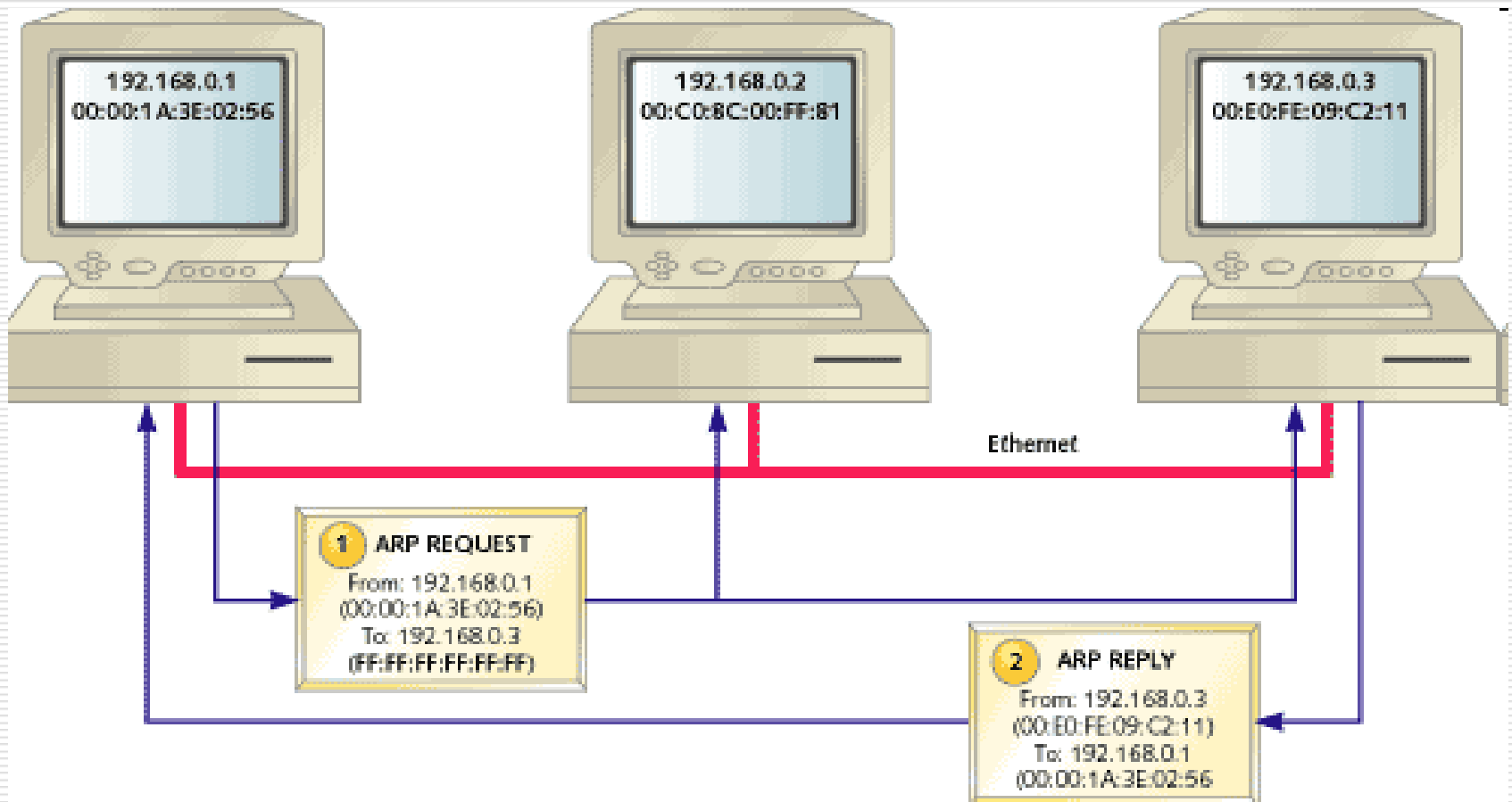
ARP Packet Format

0	8	16	31
Hardware type=1		ProtocolType=0x0800	
HLen=48	PLen=32	Operation	
SourceHardwareAddr (bytes 0–3)			
SourceHardwareAddr (bytes 4–5)		SourceProtocolAddr (bytes 0–1)	
SourceProtocolAddr (bytes 2–3)		TargetHardwareAddr (bytes 0–1)	
TargetHardwareAddr (bytes 2–5)			
TargetProtocolAddr (bytes 0–3)			

HardwareType: type of physical network (e.g., Ethernet)

ProtocolType: type of higher layer protocol (e.g., IP)

HLEN & PLEN: length of physical and protocol addresses

Operation: request or response

Source/Target Physical/Protocol addresses

RARP

- A related reverse-lookup service called RARP can obtain the IP address of a machine given only its hardware address.