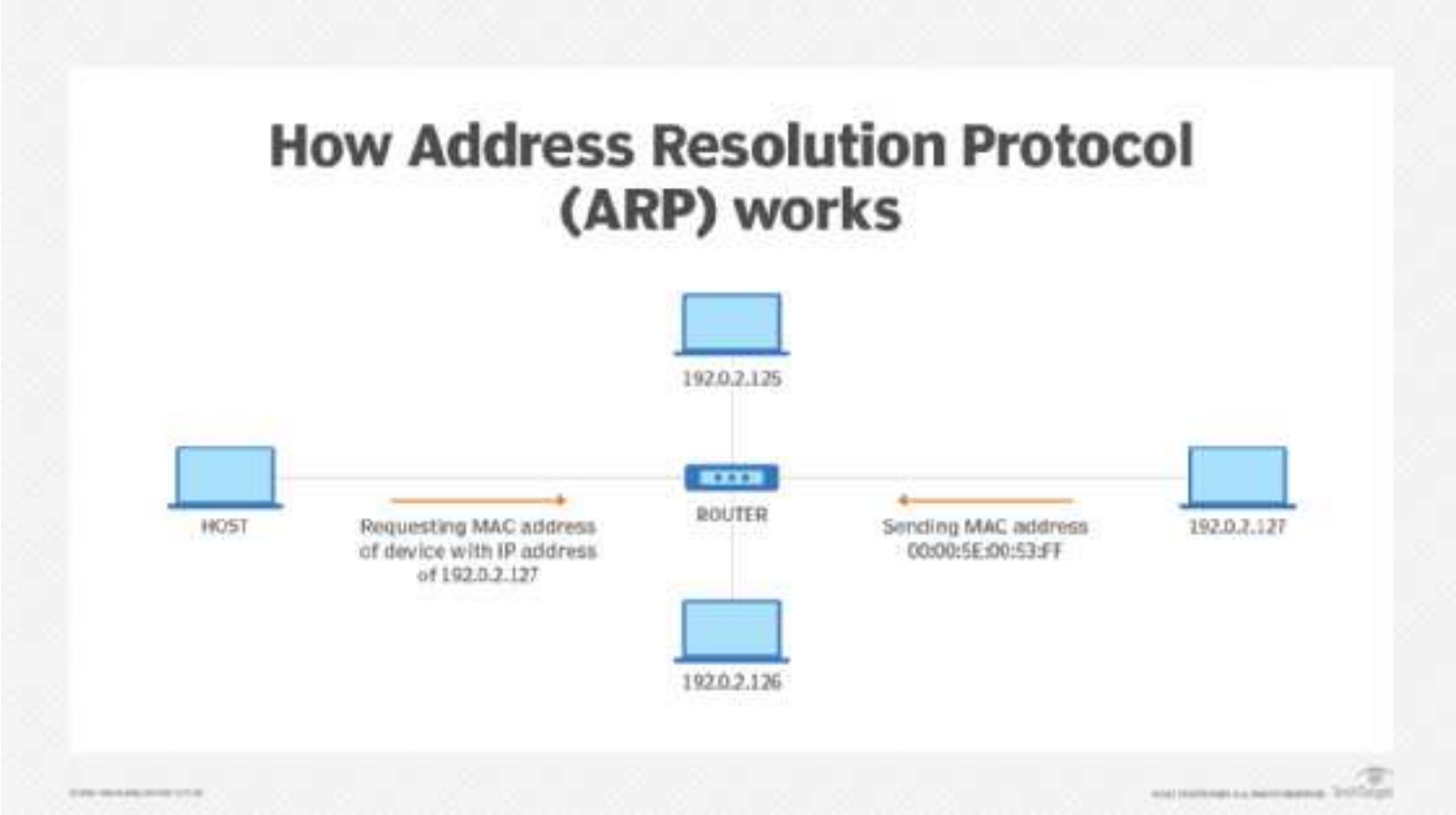
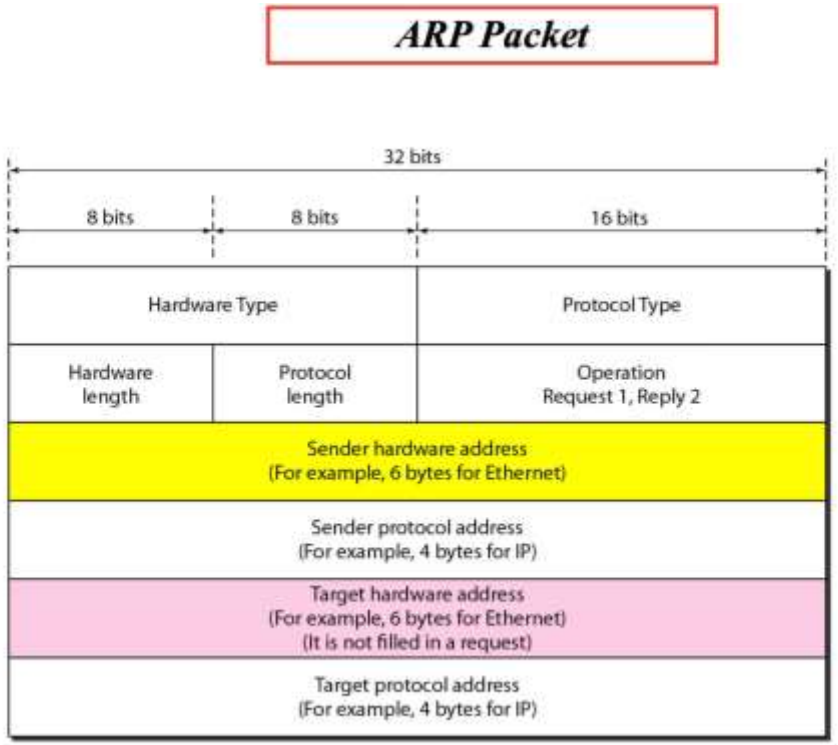
ARP-Address Resolution Protocol

- Address Resolution Protocol (ARP) is a procedure for mapping a dynamic IP address to a permanent physical machine address in a local area network (LAN). The physical machine address is also known as a media access control (MAC) address.
- The job of ARP is essentially to translate 32-bit addresses to 48-bit addresses and vice versa. This is necessary because IP addresses in IP version 4 (IPv4) are 32 bits, but MAC addresses are 48 bits.

- When an incoming packet destined for a host machine on a particular LAN arrives at a gateway, the gateway asks the ARP program to find a MAC address that matches the IP address.
- A table called the **ARP cache** maintains a record of each IP address and its corresponding MAC address.
- ARP broadcasts a request packet to all the machines on the LAN and asks if any of the machines are using that particular IP address. When a machine recognizes the IP address as its own, it sends a reply so ARP can update the cache


How Address Resolution Protocol (ARP) works
192.0.2.125
HOST
Requesting MAC address of device with IP address of 192.0.2.127
ROUTER
Sending MAC address 00:00:5E:00:53:FF
192.0.2.127
192.0.2.126

ARP Packet Format



Hardware type: This is 16 bits field defining the type of the network on which ARP is running. Ethernet is given type 1.

Protocol type: This is 16 bits field defining the protocol.

Hardware length: This is an 8 bits field defining the length of the physical address in bytes. Ethernet is the value 6.

Protocol length: This is an 8 bits field defining the length of the logical address in bytes. For the IPv4 protocol, the value is 4.

Operation (**request or reply):** This is a 16 bits field defining the type of packet. Packet types are ARP request (1), and ARP reply (2).

- **Sender hardware address:** This is a variable length field defining the physical address of the sender. For example, for Ethernet, this field is 6 bytes long.
- **Sender protocol address:** This is also a variable length field defining the logical address of the sender For the IP protocol, this field is 4 bytes long.
- **Target hardware address:** This is a variable length field defining the physical address of the target. For Ethernet, this field is 6 bytes long. For the ARP request messages, this field is all Os because the sender does not know the physical address of the target.
- **Target protocol address:** This is also a variable length field defining the logical address of the target. For the IPv4 protocol, this field is 4 bytes long.

RARP

Reverse Address Resolution Protocol (RARP) is a network-specific standard protocol. Some network hosts, such as a diskless workstation, do not know their own IP address when they are booted. To determine their own IP address, they use a mechanism similar to ARP

- The reverse address resolution is performed the same way as the ARP address resolution. The same packet format is used for the ARP.
- An exception is the operation code field that now takes the following values−
- **3 for RARP request**
- **4 for RARP reply**