

Q1) Capture and analyze ARP packets using Wireshark. Inspect the ARP request and reply frames, and discuss the role of the sender's IP and MAC address in these packets.

The screenshot shows the Wireshark interface with a packet capture of ARP traffic. The packet list pane displays several ARP packets. Packet 502 is selected, showing it is an ARP request from 76:5f:18:7e:33:e8 to LiteonTechno_ee:c1:47. The packet details pane shows the Ethernet II header and the ARP (request) protocol. The packet bytes pane displays the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
502	7.245858	76:5f:18:7e:33:e8	LiteonTechno_ee:c1:47	ARP	42	Who has 192.168.157.47? Tell 192.168.157.91
503	7.245908	LiteonTechno_ee:c1:47	76:5f:18:7e:33:e8	ARP	42	192.168.157.47 is at f8:28:19:ee:c1:47
895	24.913922	76:5f:18:7e:33:e8	LiteonTechno_ee:c1:47	ARP	42	Who has 192.168.157.47? Tell 192.168.157.91
896	24.913982	LiteonTechno_ee:c1:47	76:5f:18:7e:33:e8	ARP	42	192.168.157.47 is at f8:28:19:ee:c1:47
1057	42.615208	76:5f:18:7e:33:e8	LiteonTechno_ee:c1:47	ARP	42	Who has 192.168.157.47? Tell 192.168.157.91
1058	42.615253	LiteonTechno_ee:c1:47	76:5f:18:7e:33:e8	ARP	42	192.168.157.47 is at f8:28:19:ee:c1:47

Packet 502 details:

- Frame 502: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF{...}
- Ethernet II, Src: 76:5f:18:7e:33:e8 (76:5f:18:7e:33:e8), Dst: LiteonTechno_ee:c1:47 (f8:28:19:ee:c1:47)
- Address Resolution Protocol (request)

Packet bytes:

```
0000 f8 28 19 ee c1 47 76 5f 18 7e 33 e8 06 00 01 00 00 06 04 00 01 76 5f 18 7e 33 e8 c0 a8 9d 5b
0010 00 00 00 00 00 00 e0 a8 9d 2f
```

The screenshot shows the Wireshark packet details window for packet 502. It displays the Ethernet II header and the ARP (request) protocol. The packet bytes pane is empty.

Frame 502: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF{E5886681-0FCE-4AD8-B6E0-AF6CC688F0B2}, id 0

- Ethernet II, Src: 76:5f:18:7e:33:e8 (76:5f:18:7e:33:e8), Dst: LiteonTechno_ee:c1:47 (f8:28:19:ee:c1:47)
- Address Resolution Protocol (request)

Frame (frame) 42 bytes

☐ Show packet bytes Layout: Vertical (Stacked)

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Inspection of ARP Request and Reply Frames

Captured ARP Request Frame Details:

Field	Value	Explanation
Source MAC	76:5f:18:7e:33:e8	The device at this MAC address is requesting the MAC of a specific IP.
Source IP	192.168.157.91	The sender wants to know the MAC address of 192.168.157.47 .
Destination MAC	FF:FF:FF:FF:FF:FF	ARP requests are broadcast to all devices on the LAN.
Target IP	192.168.157.47	The sender is looking for the MAC address of this IP.
Target MAC	00:00:00:00:00:00	Unknown at this stage, as the sender does not know it yet.
Message	"Who has 192.168.157.47? Tell 192.168.157.91"	The sender is asking which device owns this IP.

ARP Reply Frame Details:

Field	Value	Explanation
Source MAC	LiteonTechno_ee:c1:47	This is the MAC of 192.168.157.47 , responding to the request.
Source IP	192.168.157.47	Confirms ownership of this IP address.
Destination MAC	76:5f:18:7e:33:e8	Reply is unicast back to the requesting device.
Destination IP	192.168.157.91	The IP of the device that originally made the ARP request.
Message	"192.168.157.47 is at LiteonTechno_ee:c1:47"	Confirms its MAC address to the requestor.

Role of the Sender's IP and MAC in ARP

1. In ARP Request:

- The sender (192.168.157.91, MAC: 76:5f:18:7e:33:e8) is **querying the network** to resolve the MAC of 192.168.157.47.
- The request is **broadcasted** to all devices in the subnet.

2. In ARP Reply:

- The device with 192.168.157.47 **sends back a unicast reply** containing its MAC address.
- The sender (192.168.157.91) **updates its ARP cache** with the resolved MAC, avoiding future requests for this IP.

ARP Request is Broadcast, ARP Reply is Unicast.

Sender's IP and MAC identify the requesting device.

Target's MAC is initially unknown and learned from the ARP reply. ARP is essential for communication in local networks using Ethernet.