
 Marwadi University Marwadi Chandarana Group	Marwadi University Faculty of Engineering and Technology Department of Information and Communication Technology	
Subject: Computer Networks (01CT0503)	Aim: Monitor the live/real time network and analyze the concepts of various networking protocols like ARP, RARP, DHCP, HTTP, etc.	
Experiment No: 12	Date: 18-11-2024	Enrolment No: 92200133021

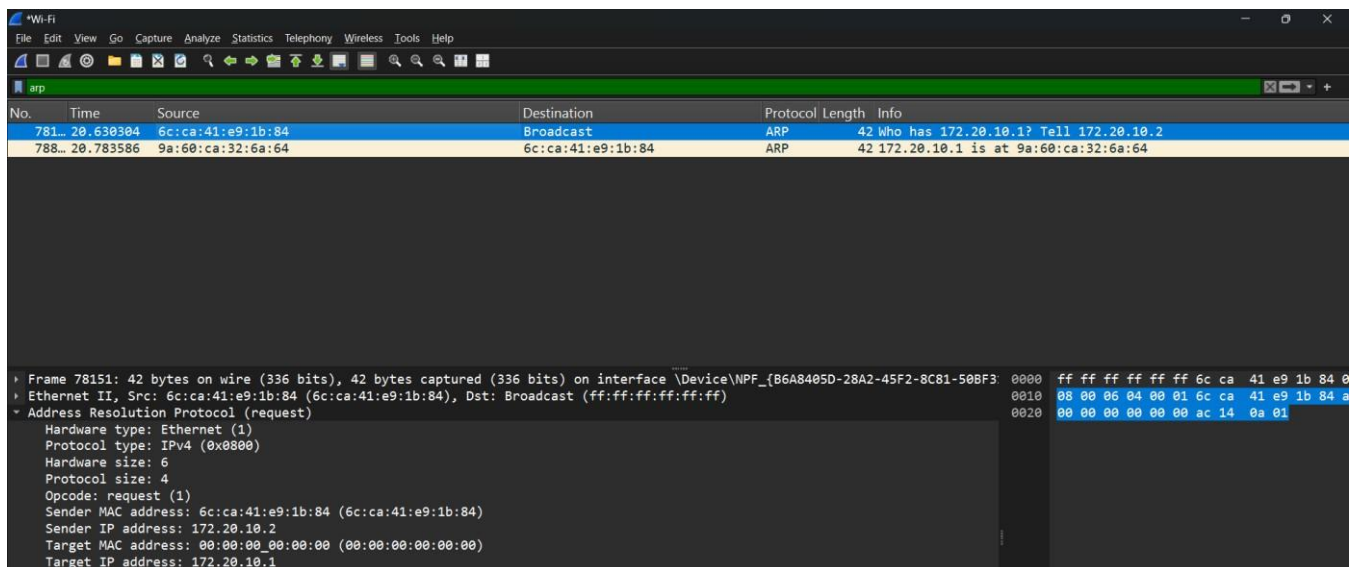
Aim: Monitor the live/real time network and analyze the concepts of various networking protocols like ARP, RARP, DHCP, HTTP, etc.

Address Resolution Protocol: It is a network protocol used to map an IP address (logical address) to a corresponding MAC address (physical address) within a local network. ARP operates at the Data Link Layer (Layer 2) and is crucial for communication within a LAN (Local Area Network).

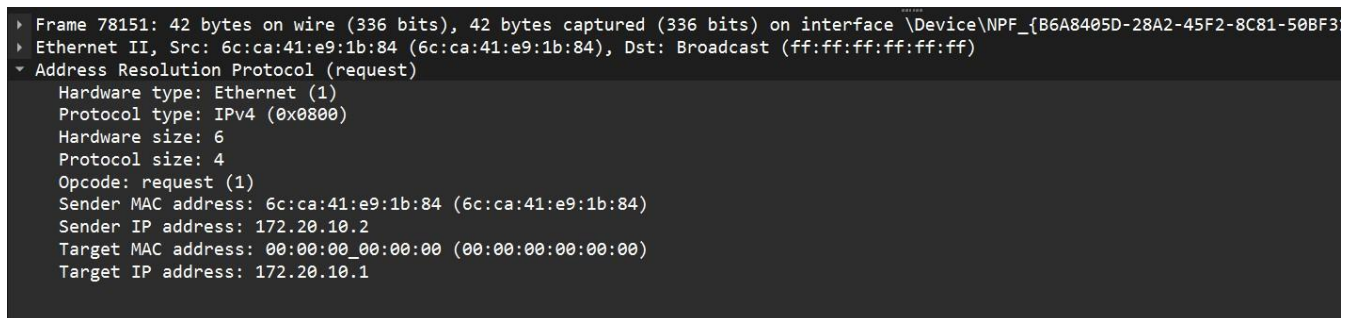
ARP Packet Header	
Hardware type (2B)	Protocol type (2B)
Hardware Address length (1B)	Protocol Address length (1B)
Opcode (2B) 1: ARP_request 2: ARP_reply	
Sender IP Address	
Sender MAC Address	
Target IP Address	
Target MAC Address	
Ethernet Header	
Ethernet Sender Address	
Ethernet Target Address	
Ethernet Frame Type	

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First select the Wireshark Select Wifi interface and Put the display filter of arp Then we would like to remove our ARP map we can do that by opeing the command prompt as administrator type arp -d hit enter it will remove the ARP data and system will put request for to ARP and we will see the pacakge in Wireshark.



Here we can ARP request and reply



This is a request as the opcode is 1 and it's broadcast


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```

> Frame 78876: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF_{B6A8405D-28A2-45F2-8C81-50BF3...
> Ethernet II, Src: 9a:60:ca:32:6a:64 (9a:60:ca:32:6a:64), Dst: 6c:ca:41:e9:1b:84 (6c:ca:41:e9:1b:84)
< Address Resolution Protocol (reply)
  Hardware type: Ethernet (1)
  Protocol type: IPv4 (0x0800)
  Hardware size: 6
  Protocol size: 4
  Opcode: reply (2)
  Sender MAC address: 9a:60:ca:32:6a:64 (9a:60:ca:32:6a:64)
  Sender IP address: 172.20.10.1
  Target MAC address: 6c:ca:41:e9:1b:84 (6c:ca:41:e9:1b:84)
  Target IP address: 172.20.10.2

```

This is a reply as the opcode is 2. And we get the MAC address of target device that is 6c:ca:41:e9:1b:84 (6c:ca:41:e9:1b:84)

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Reverse Address Resolution Protocol: RARP stands for Reverse Address Resolution Protocol. It's a networking protocol that allows a device to obtain its IP address by broadcasting its MAC address to a RARP server on the same network. This is the opposite of the more common Address Resolution Protocol (ARP), which maps an IP address to a MAC address.

RARP has the same format as ARP with few changes such as operation field in either 3 or 4 ie. 3-RARP request and 4-RARP reply.

There is no way for client PC to do RARP request and reply and in a established network. So I will be using a third party file.

```

1 0.000000 VMware_34:0b:de Broadcast RARP 42 Who is 00:0c:29:34:0b:de? Tell 00:0c:29:34:0b:de
2 0.002000 VMware_c5:f6:9b VMware_34:0b:de RARP 42 00:0c:29:34:0b:de is at 10.1.1.100

Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface 0
Ethernet II, Src: VMware_34:0b:de (00:0c:29:34:0b:de), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
Address Resolution Protocol (reverse request)
  Hardware type: Ethernet (1)
  Protocol type: IPv4 (0x0800)
  Hardware size: 6
  Protocol size: 4
  Opcode: reverse request (3)
  Sender MAC address: VMware_34:0b:de (00:0c:29:34:0b:de)
  Sender IP address: 0.0.0.0
  Target MAC address: VMware_34:0b:de (00:0c:29:34:0b:de)
  Target IP address: 0.0.0.0

```

This is the broadcast request to find the devices IP from it's MAC

```


No. Time Source Destination Protocol Length Info
1 0.000000 VMware_34:0b:de Broadcast RARP 42 Who is 00:0c:29:34:0b:de? Tell 00:0c:29:34:0b:de
2 0.002000 VMware_c5:f6:9b VMware_34:0b:de RARP 42 00:0c:29:34:0b:de is at 10.1.1.100

Frame 2: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface 0
Ethernet II, Src: VMware_c5:f6:9b (00:0c:29:c5:f6:9b), Dst: VMware_34:0b:de (00:0c:29:34:0b:de)
Address Resolution Protocol (reverse reply)
  Hardware type: Ethernet (1)
  Protocol type: IPv4 (0x0800)
  Hardware size: 6
  Protocol size: 4
  Opcode: reverse reply (4)
  Sender MAC address: VMware_c5:f6:9b (00:0c:29:c5:f6:9b)
  Sender IP address: 10.1.1.10
  Target MAC address: VMware_34:0b:de (00:0c:29:34:0b:de)
  Target IP address: 10.1.1.100

```

This is the RARP reply for with the target IP address.

This was all about the ARP and RARP protocol.

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Dynamic Host Configuration Protocol (DHCP): Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to dynamically assign an IP address to any device, or node, on a network so they can communicate using IP (Internet Protocol). DHCP automates and centrally manages these configurations. There is no need to manually assign IP addresses to new devices. Therefore, there is no requirement for any user configuration to connect to a DHCP based network.

```
C:\Windows\System32>ipconfig -renew

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :


Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2402:3a80:4428:8d66:9ecb:9b16:923d:5dbd
    Temporary IPv6 Address. . . . . : 2402:3a80:4428:8d66:c49b:905f:ab57:a74
    Link-local IPv6 Address . . . . . : fe80::7ffd:429:5d54:985e%17
    IPv4 Address. . . . . : 172.20.10.2
    Subnet Mask . . . . . : 255.255.255.240
    Default Gateway . . . . . : fe80::9860:caff:fe32:6a64%17
                                172.20.10.1

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

C:\Windows\System32>ipconfig -release
```



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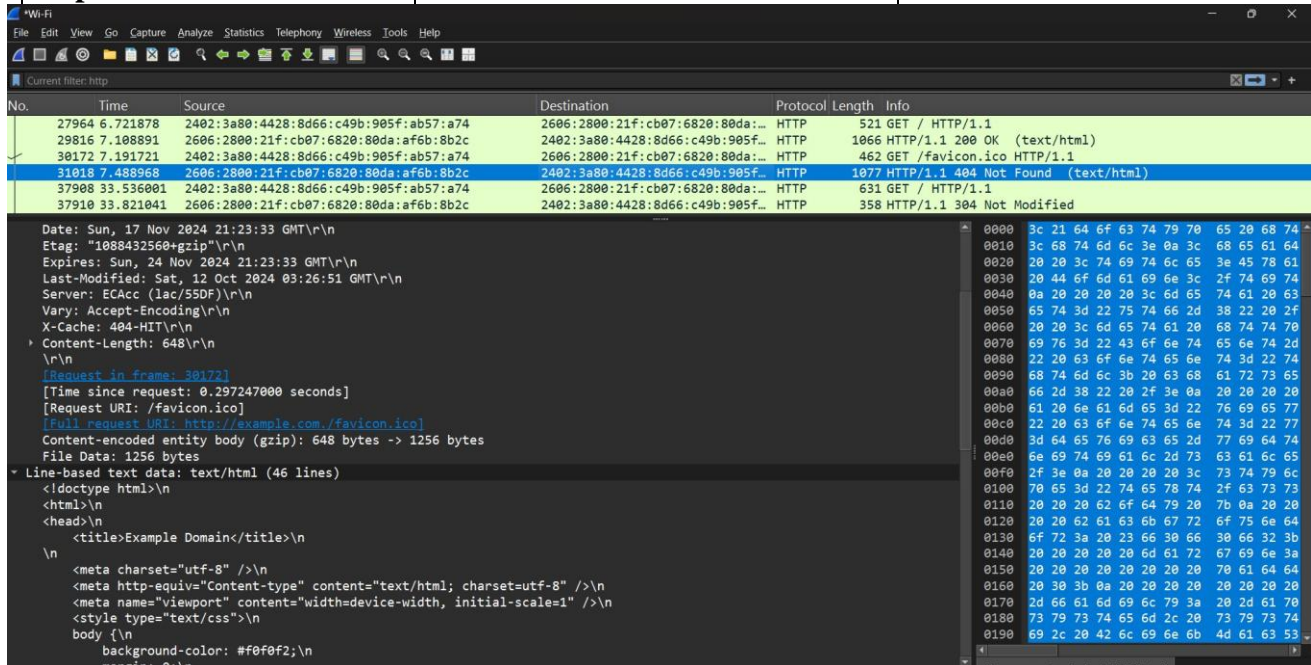
Hypertext Transfer Protocol(HTTP: it is the foundational communication protocol of the World Wide Web, enabling the transfer of data such as HTML documents, images, videos, and other resources between a client (browser) and a server. It operates on a **request-response model** and is the backbone of web communication.

No.	Time	Source	Destination	Protocol	Length	Info
27964	6.721878	2402:3a80:4428:8d66:c49b:905f:ab57:a74	2606:2800:21f:cb07:6820:80da:af6b:8b2c	HTTP	521	GET / HTTP/1.1
29816	7.108891	2606:2800:21f:cb07:6820:80da:af6b:8b2c	2402:3a80:4428:8d66:c49b:905f:ab57:a74	HTTP	1066	HTTP/1.1 200 OK (text/html)
30172	7.191721	2402:3a80:4428:8d66:c49b:905f:ab57:a74	2606:2800:21f:cb07:6820:80da:af6b:8b2c	HTTP	462	GET /favicon.ico HTTP/1.1
31018	7.488968	2606:2800:21f:cb07:6820:80da:af6b:8b2c	2402:3a80:4428:8d66:c49b:905f:ab57:a74	HTTP	1077	HTTP/1.1 404 Not Found (text/html)
37908	33.536001	2402:3a80:4428:8d66:c49b:905f:ab57:a74	2606:2800:21f:cb07:6820:80da:af6b:8b2c	HTTP	631	GET / HTTP/1.1
37910	33.821041	2606:2800:21f:cb07:6820:80da:af6b:8b2c	2402:3a80:4428:8d66:c49b:905f:ab57:a74	HTTP	358	HTTP/1.1 304 Not Modified

Frame 27964: 521 bytes on wire (4168 bits), 521 bytes captured (4168 bits) on interface \Device\NPF_{B6A8405D-28A2-45F2-8C81-5...}		0040	91	82	50	18	00	ff	6c	49	00	00	47	45
Ethernet II, Src: 6c:ca:41:e9:1b:84 (6c:ca:41:e9:1b:84), Dst: 9a:60:ca:32:6a:64 (9a:60:ca:32:6a:64)		0050	48	54	54	50	2f	31	2e	31	0d	0a	48	6f
Internet Protocol Version 6, Src: 2402:3a80:4428:8d66:c49b:905f:ab57:a74, Dst: 2606:2800:21f:cb07:6820:80da:af6b:8b2c		0060	65	78	61	6d	70	6c	65	2e	63	6f	6d	2e
Transmission Control Protocol, Src Port: 50657, Dst Port: 80, Seq: 1, Ack: 1, Len: 447		0070	6e	6e	65	63	74	69	6f	6e	3a	20	6b	65
Hypertext Transfer Protocol		0080	6c	69	76	65	0d	0a	44	4e	54	3a	20	31
GET / HTTP/1.1\r\n		0090	67	72	61	64	65	2d	49	6e	73	65	63	75
Host: example.com.\r\n		00a0	65	71	75	65	73	74	73	3a	20	31	0d	0a
Connection: keep-alive\r\n		00b0	2d	41	67	65	6e	74	3a	20	4d	6f	7a	69
DNT: 1\r\n		00c0	35	2e	30	20	28	57	69	6e	64	6f	77	73
Upgrade-Insecure-Requests: 1\r\n		00d0	31	30	2e	30	3b	20	57	69	6e	36	34	3b
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/130.0.0.0 Safari/537.36		00e0	29	29	41	70	70	6c	65	57	65	62	4b	69
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.0		00f0	37	2e	33	36	20	28	4b	48	54	4d	4c	2c
Accept-Encoding: gzip, deflate\r\n		0100	65	20	47	65	63	6b	6f	29	20	43	68	72
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8\r\n		0110	31	33	30	2e	30	2e	30	2e	30	20	53	61
\r\n		0120	2f	35	33	37	2e	33	36	0d	0a	41	63	63
[Full request URI: http://example.com/]		0130	20	74	65	78	74	2f	68	74	6d	6c	2c	61
		0140	63	61	74	69	6f	6e	2f	78	68	74	6d	6c

Here is HTTP request that is request page from <http://example.com>

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We are getting the HTML text in the response.

Conclusion:

Using Wireshark, I explored networking protocols like ARP, RARP, DHCP, and HTTP, uncovering their functionality and limitations. ARP and RARP enable local address mapping but remain confined to local networks. DHCP simplifies IP address assignment through the DORA process but revealed potential connectivity issues during disruptions. HTTP's request-response mechanism facilitates web communication, yet its lack of encryption exposes vulnerabilities. This complies the essential roles of these protocols while underscoring their shortcomings in addressing modern network security and reliability challenges.



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