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[PRAKTIKUM KOMUNIKASI DATA]

MODUL 5 TUGAS – ETHERNET CONCEPTS

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[PRAKTIKUM KOMUNIKASI DATA]

PERSIAPAN MATERI

Praktikan diharapkan mempelajari Group Exam Modules 4 - 7: Ethernet Concepts Exam yang terdiri dari beberapa chapter berikut :

1. Physical Layer (Chapter 4)
2. Number Systems (Chapter 5)
3. Data Link Layer (Chapter 6)
4. Ethernet Switching (Chapter 7)

TUJUAN PRAKTIKUM

1. Bagian 1: Memeriksa Header dalam Frame Ethernet 2
2. Bagian 2: Menggunakan Wireshark untuk mengambil dan menganalisis Frame Ethernet

PERSIAPAN SOFTWARE/APLIKASI

- Komputer/Laptop
- Sistem operasi Windows/Linux/Max OS
- Wireshark 3.6.6 <https://www.wireshark.org/download.html>

MATERI POKOK**Bagian 1: Memeriksa Header dalam Frame Ethernet 2**

1. Meninjau deskripsi dan panjang pada Header Ethernet 2

Preamble	Destination Address	Source Address	Frame Type	Data	FCS
8 Bytes	6 Bytes	6 Bytes	2 Bytes	46 – 1500 Bytes	4 Bytes

2. Memeriksa konfigurasi jaringan pada PC

Alamat IP host PC adalah 192.168.1.147 dan default gateway memiliki alamat IP 192.168.1.1

```
C:\> ipconfig /all
```

```
Ethernet adapter Ethernet:
```

```
Connection-specific DNS Suffix  . :
Description . . . . . : Intel(R) 82579LM Gigabit Network
```

Connection

```

Physical Address. . . . . : F0-1F-AF-50-FD-C8
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::58c5:45f2:7e5e:29c2%11 (Preferred)
IPv4 Address. . . . . : 192.168.1.147 (Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Friday, September 6, 2019 11:08:36 AM
Lease Expires . . . . . : Saturday, September 7, 2019 11:08:36 AM
Default Gateway . . . . . : 192.168.1.1
DHCP Server . . . . . : 192.168.1.1
<output omitted>

```

3. Memeriksa frame Ethernet dalam sebuah Wireshark.

Hasil screenshoot di bawah ini menunjukkan paket yang dihasilkan oleh ping yang dikeluarkan dari host PC ke default gateway-nya.

Permintaan ARP

The screenshot shows the Wireshark interface with the filter 'arp or icmp'. The packet list shows several ICMP Echo (ping) requests and replies. The selected packet is Frame 65, an ARP request from Dell_50:fd:c8 to Broadcast. The packet details pane shows the Ethernet II header, destination and source MAC addresses, and the ARP request structure. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
65	12.995821	Dell_50:fd:c8	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.147
66	12.996247	Netgear_99:c5:72	Dell_50:fd:c8	ARP	60	192.168.1.1 is at 30:46:9a:99:c5:72
72	19.346624	192.168.1.147	192.168.1.1	ICMP	74	Echo (ping) request id=0x0001, seq=81/2
73	19.346931	192.168.1.1	192.168.1.147	ICMP	74	Echo (ping) reply id=0x0001, seq=81/2
74	20.356540	192.168.1.147	192.168.1.1	ICMP	74	Echo (ping) request id=0x0001, seq=82/2
75	20.356880	192.168.1.1	192.168.1.147	ICMP	74	Echo (ping) reply id=0x0001, seq=82/2
76	21.367689	192.168.1.147	192.168.1.1	ICMP	74	Echo (ping) request id=0x0001, seq=83/2
77	21.368063	192.168.1.1	192.168.1.147	ICMP	74	Echo (ping) reply id=0x0001, seq=83/2

Frame 65: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface 0

Ethernet II, Src: Dell_50:fd:c8 (f0:1f:af:50:fd:c8), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

- Destination: Broadcast (ff:ff:ff:ff:ff:ff)
- Source: Dell_50:fd:c8 (f0:1f:af:50:fd:c8)
- Type: ARP (0x0806)

Address Resolution Protocol (request)

- Hardware type: Ethernet (1)
- Protocol type: IPv4 (0x0800)
- Hardware size: 6
- Protocol size: 4

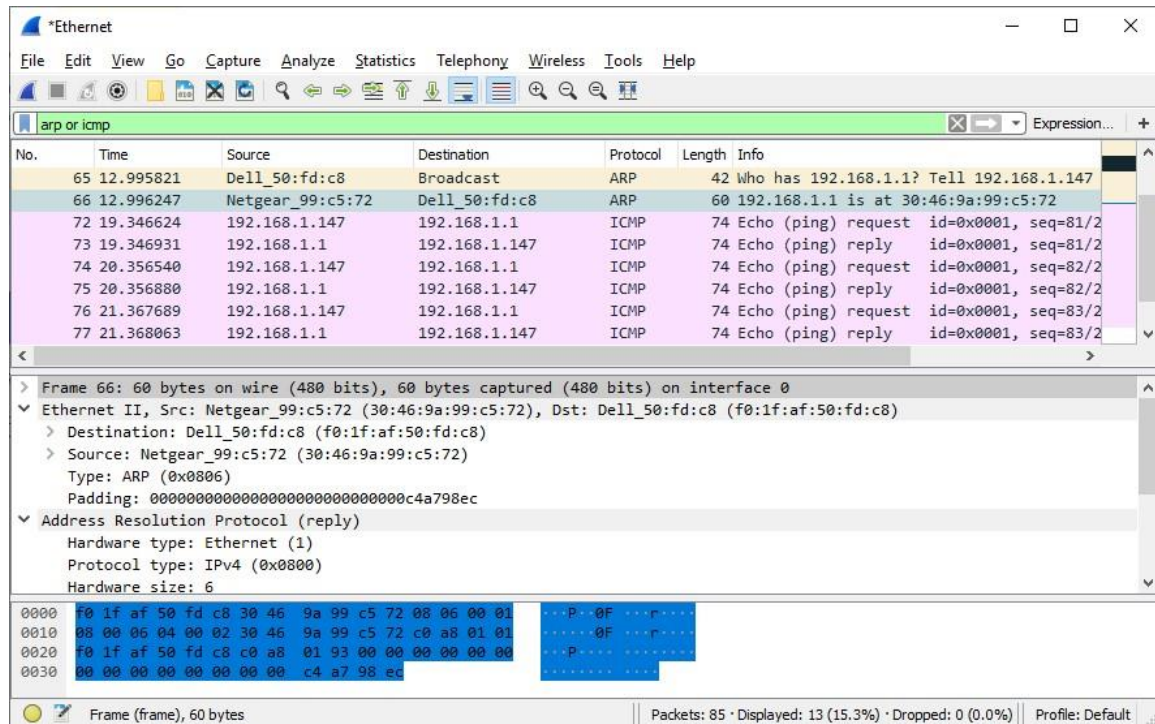
0000 ff ff ff ff ff f0 1f af 50 fd c8 08 06 00 01P.....

0010 08 00 06 04 00 01 f0 1f af 50 fd c8 c0 a8 01 93P.....

0020 00 00 00 00 00 00 c0 a8 01 01P.....

Frame (frame), 42 bytes | Packets: 85 · Displayed: 13 (15.3%) · Dropped: 0 (0.0%) | Profile: Default

Balasan ARP



4. Memeriksa konten header Ethernet 2 dari permintaan ARP.

Field	Value	Description
Preamble	Not shown in capture	This field contains synchronizing bits, processed by the NIC hardware.
Destination Address	Broadcast (ff:ff:ff:ff:ff:ff)	Layer 2 addresses for the frame. Each address is 48 bits long, or 6 octets, expressed as 12 hexadecimal digits, 0-9,A-F. A common format is 12:34:56:78:9A:BC. The first six hex numbers indicate the manufacturer of the network interface card (NIC), the last six hex numbers are the serial number of the NIC.
Source Address	Netgear_99:c5:72 (30:46:9a:99:c5:72)	The destination address may be a broadcast, which contains all ones, or a unicast. The source address is always unicast.
Frame Type	0x0806	For Ethernet II frames, this field contains a hexadecimal value that is used to indicate the type of upper-layer protocol in the data field. There are numerous upper-layer protocols supported by Ethernet II. Two common frame types are these: <div> Value Description 0x0800 IPv4 Protocol </div>

		0x0806 Address Resolution Protocol (ARP)
Data	ARP	Contains the encapsulated upper-level protocol. The data field is between 46 – 1,500 bytes.
FCS	Not shown in capture	Frame Check Sequence, used by the NIC to identify errors during transmission. The value is computed by the sending device, encompassing frame addresses, type, and data field. It is verified by the receiver.

Bagian 2: Menggunakan Wireshark untuk mengambil dan menganalisis Frame Ethernet

1. Tentukan alamat IP dari gateway default pada PC.
 - a. Pastikan menggunakan model Realtime
 - b. Buka Command Prompt pada tab Desktop
 - c. Masukkan command **ipconfig**

```
C:\Users\alfia>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : umm.ac.id

Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix . : 
    Link-Local IPv6 Address . . . . . : fe80::1442:e4db:b551:1787%17
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

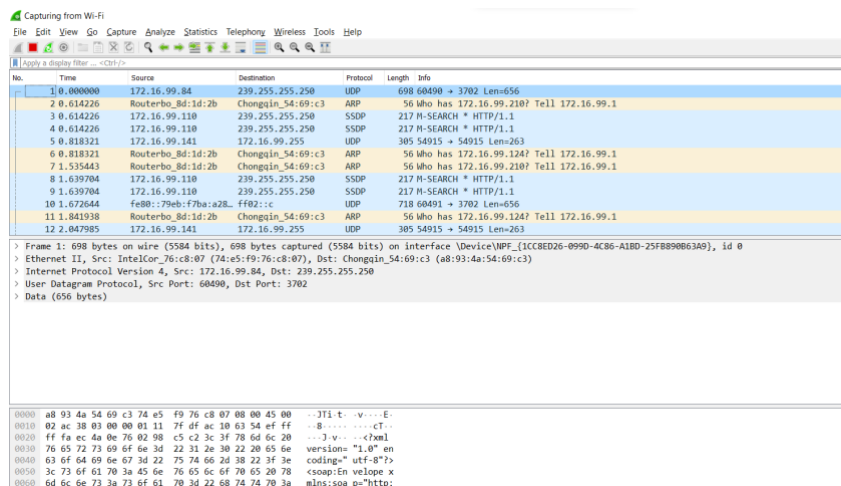
Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

2. Lakukan pengambilan data lalu lintas di NIC PIC.
 - a. Buka Wireshark untuk melakukan pengambilan data
 - b. Amatilah lalu lintas yang muncul pada daftar paket.



3. Lakukan filtering wireshark agar menampilkan lalu lintas ICMP saja
 - a. Gunakan filter di wireshark untuk memblokir visibilitas lalu lintas yang tidak diinginkan.
 - b. Agar hanya lalu lintas ICMP saja yang akan muncul. Pada kotak filter wireshark silahkan ketik ICMP
 - c. Kotak akan berubah menjadi warna hijau, jika sudah difilter dengan benar.
 - d. Klik “Terapkan” (panah kanan) untuk menerapkan filter.

icmp							
No.	Time	Source	Destination	Protocol	Length	Info	
785	102.473526	172.16.99.2	172.16.99.1	ICMP	74	Echo (ping) request	id=0x0001, seq=104/26624, ttl=128 (reply in 786)
786	102.486406	172.16.99.1	172.16.99.2	ICMP	74	Echo (ping) reply	id=0x0001, seq=104/26624, ttl=64 (request in 785)
792	103.488722	172.16.99.2	172.16.99.1	ICMP	74	Echo (ping) request	id=0x0001, seq=105/26880, ttl=128 (reply in 793)
793	103.494388	172.16.99.1	172.16.99.2	ICMP	74	Echo (ping) reply	id=0x0001, seq=105/26880, ttl=64 (request in 792)
802	104.507889	172.16.99.2	172.16.99.1	ICMP	74	Echo (ping) request	id=0x0001, seq=106/27136, ttl=128 (reply in 803)
803	104.509438	172.16.99.1	172.16.99.2	ICMP	74	Echo (ping) reply	id=0x0001, seq=106/27136, ttl=64 (request in 802)
814	105.512554	172.16.99.2	172.16.99.1	ICMP	74	Echo (ping) request	id=0x0001, seq=107/27392, ttl=128 (reply in 815)

4. Lakukan ping gateway default PC pada command prompt
 - a. Lakukan ping gateway default menggunakan alamat IP pada langkah 1

```
C:\Users\alfia>ping 172.16.99.1

Pinging 172.16.99.1 with 32 bytes of data:
Reply from 172.16.99.1: bytes=32 time=13ms TTL=64
Reply from 172.16.99.1: bytes=32 time=5ms TTL=64
Reply from 172.16.99.1: bytes=32 time=1ms TTL=64
Reply from 172.16.99.1: bytes=32 time=10ms TTL=64

Ping statistics for 172.16.99.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 13ms, Average = 7ms

C:\Users\alfia>
```

5. Lakukan pemberhentian pengambilan data lalu lintas di NIC
 - a. Klik ikon **Stop Capturing Packets** untuk berhenti



6. Periksa permintaan Echo (ping) pertama di Wireshark.
 - a. Pada panel bagian atas, klik frame pertama yang terdaftar. Akan muncul permintaan Echo (ping) dibawah judul Info
 - b. Periksa baris pertama di bagian tengah. Baris ini menampilkan panjang dari frame.
 - c. Baris kedua di panel detail paket menunjukkan Frame Ethernet 2. Alamat MAC sumber dan tujuan juga ikut ditampilkan.
 - d. Klik tanda (>) diawal baris kedua untuk informasi tentang Frame Ethernet 2

```
> Frame 785: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{1CC8ED26-099D-4C86-A1BD-25FB890B63A9}, id 0
  > Ethernet II, Src: Chongqin_54:69:c3 (a8:93:4a:54:69:c3), Dst: Routerbo_8d:1d:2b (b8:69:f4:8d:1d:2b)
    > Destination: Routerbo_8d:1d:2b (b8:69:f4:8d:1d:2b)
    > Source: Chongqin_54:69:c3 (a8:93:4a:54:69:c3)
    Type: IPv4 (0x0800)
  > Internet Protocol Version 4, Src: 172.16.99.2, Dst: 172.16.99.1
  > Internet Control Message Protocol
```

- e. Dua baris terakhir yang ditampilkan di bagian tengah memberikan informasi tentang bidang data. Perhatikan bahwa data berisi informasi alamat IPv4 sumber dan tujuan.
- f. Pilih garis mana saja di bagian tengah untuk menyorot bagian frame tersebut (hex dan ASCII) di panel Packet Bytes (bagian bawah). Klik baris Internet Control Message Protocol di bagian tengah dan periksa apa yang disorot di panel Packet Bytes.

```
> Frame 785: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{1CC8ED26-099D-4C86-A18D-25FB890B63A9}, id 0
> Ethernet II, Src: Chongqin_54:69:c3 (a8:93:4a:54:69:c3), Dst: Routerbo_8d:1d:2b (b8:69:f4:8d:1d:2b)
> Internet Protocol Version 4, Src: 172.16.99.2, Dst: 172.16.99.1
  > Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4cf3 [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 104 (0x0068)
    Sequence Number (LE): 26624 (0x6800)
    [Response frame: 786]
  > Data (32 bytes)
```

- g. Klik next frame dibagian atas dan periksa balasan Echo. Perhatikan bahwa alamat MAC sumber dan tujuan telah dibalik, karena frame ini dikirim dari router gateway default sebagai balasan untuk ping pertama

```
> Frame 786: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{1CC8ED26-099D-4C86-A18D-25FB890B63A9}, id 0
  > Ethernet II, Src: Routerbo_8d:1d:2b (b8:69:f4:8d:1d:2b), Dst: Chongqin_54:69:c3 (a8:93:4a:54:69:c3)
    > Destination: Chongqin_54:69:c3 (a8:93:4a:54:69:c3)
    > Source: Routerbo_8d:1d:2b (b8:69:f4:8d:1d:2b)
    Type: IPv4 (0x0800)
  > Internet Protocol Version 4, Src: 172.16.99.1, Dst: 172.16.99.2
  > Internet Control Message Protocol
```

7. Pengambilan paket untuk host jarak jauh
 - a. Klik **Start Capture** untuk memulai pengambilan wireshark baru. Lalu akan menerima sebuah pop-up yang menanyakan apakah ingin menyimpan paket yang diambil sebelumnya ke file sebelum memulai pengambilan baru. Klik **Continue without Saving**.
 - b. Pada command prompt, ping www.tokopedia.com

```
C:\Users\alfia>ping www.tokopedia.com

Pinging e10893.akamaiedge.net [23.36.49.96] with 32 bytes of data:
Reply from 23.36.49.96: bytes=32 time=32ms TTL=55
Reply from 23.36.49.96: bytes=32 time=57ms TTL=55
Reply from 23.36.49.96: bytes=32 time=35ms TTL=55
Reply from 23.36.49.96: bytes=32 time=32ms TTL=55

Ping statistics for 23.36.49.96:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 32ms, Maximum = 57ms, Average = 39ms

C:\Users\alfia>
```

- c. Hentikan pengambilan paket.
- d. Periksa data baru di panel daftar paket wireshark

Capturing from Wi-Fi

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

No.	Time	Source	Destination	Protocol	Length	Info
133	27.129315	172.16.99.2	23.36.49.96	ICMP	74	Echo (ping) request id=0x0001, seq=108/27648, ttl=128 (reply in 135)
135	27.161420	23.36.49.96	172.16.99.2	ICMP	74	Echo (ping) reply id=0x0001, seq=108/27648, ttl=55 (request in 133)
138	28.116843	172.16.99.2	23.36.49.96	ICMP	74	Echo (ping) request id=0x0001, seq=109/27904, ttl=128 (reply in 140)
140	28.193731	23.36.49.96	172.16.99.2	ICMP	74	Echo (ping) reply id=0x0001, seq=109/27904, ttl=55 (request in 138)
142	29.158647	172.16.99.2	23.36.49.96	ICMP	74	Echo (ping) request id=0x0001, seq=110/28160, ttl=128 (reply in 144)
144	29.186814	23.36.49.96	172.16.99.2	ICMP	74	Echo (ping) reply id=0x0001, seq=110/28160, ttl=55 (request in 142)
147	30.156954	172.16.99.2	23.36.49.96	ICMP	74	Echo (ping) request id=0x0001, seq=111/28416, ttl=128 (reply in 149)
149	30.189664	23.36.49.96	172.16.99.2	ICMP	74	Echo (ping) reply id=0x0001, seq=111/28416, ttl=55 (request in 147)

> Frame 133: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{1CC8ED26-0990-4C86-A1B0-25FB890063A9}, id 0

> Ethernet II, Src: Chongain_54:69:c3 (a8:93:4a:54:69:c3), Dst: Routerbo_Bd:Id:2b (b8:69:f4:8d:1d:2b)

> Source: chongain_54:69:c3 (a8:93:4a:54:69:c3)

> Type: IPv4 (0x0800)

> Internet Protocol Version 4, Src: 172.16.99.2, Dst: 23.36.49.96

> Internet Control Message Protocol

```

0000  b8 69 f4 8d 1d 2b a8 93 4a 54 69 c3 08 00 45 00  -I... .JTI...E
0010  00 3c d0 7c 00 00 80 01 12 ae ac 10 63 02 17 24  -<.|.... .c.$
0020  31 60 08 00 4c ef 00 01 00 6c 61 62 63 64 65 66  -1'.L....labcdef
0030  67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76  -ghijklm opqrstuv
0040  77 61 62 63 64 65 66 67 68 69                    -wabcdefg hi

```

PERTANYAAN TUGAS

1. Apa alamat IP sumber dan IP tujuan yang terdapat dalam Data Field of the Frame?
2. Bandingkan alamat yang ada di jawaban nomor 1 dengan alamat yang diterima di step 6!
3. Dari jawaban soal nomor 2, mengapa destination IP address berubah, sedangkan destination MAC address masih sama?

CATATAN

1. Batas maksimal dikerjakan H-1 praktikum dan dikumpulkan di i-Lab dengan format [Nama_Nim_Modul5].rar
2. Batas maksimal pengerjaan netacad adalah 1 minggu setelah jadwal praktikum

KRITERIA PENILAIAN TUGAS

>81 : Praktikan mampu mengerjakan serta menjelaskan tugas yang ada di materi tugas dengan benar

70 – 40 : Praktikan mampu mengerjakan serta menjelaskan tugas yang ada di materi tugas namun kurang maksimal.

KRITERIA PENILAIAN PRAKTEK

>81 : Praktikan mampu memahami, menjawab dan menjelaskan materi praktek kepada asisten.

70 – 80 : Praktikan mampu memahami, menjawab dan menjelaskan materi praktek kepada asisten namun kurang maksimal.

55 – 69 : Praktikan mampu menjawab soal yang ada di materi praktek kepada asisten namun tidak bisa menjelaskan proses yang terjadi.

<55 : Praktikan tidak memahami, menjawab dan menjelaskan materi praktek kepada asisten.

DETAIL PENILAIAN PRAKTIKUM

ASPEK PENILAIAN	POIN
TUGAS	30
PRAKTEK	70