

**Internet dan Aplikasinya**  
**TUGAS 4 : ARP**



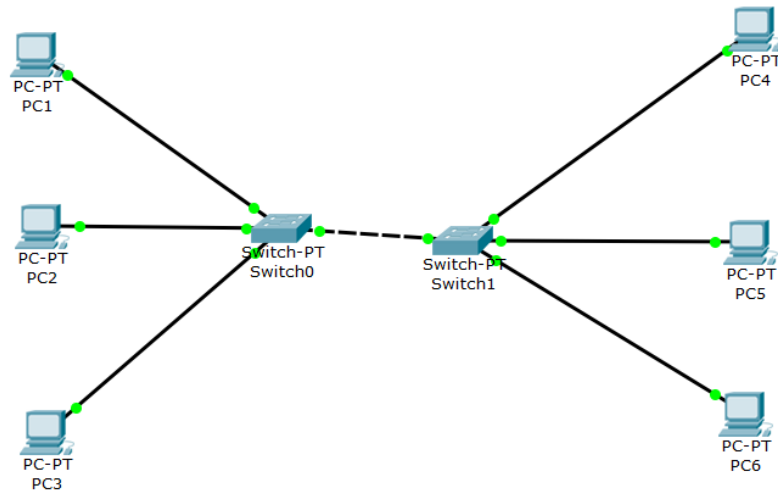
**Oleh :**

Nama : Johanes Yogtan Wicaksono Raharja  
NIM : 215314105

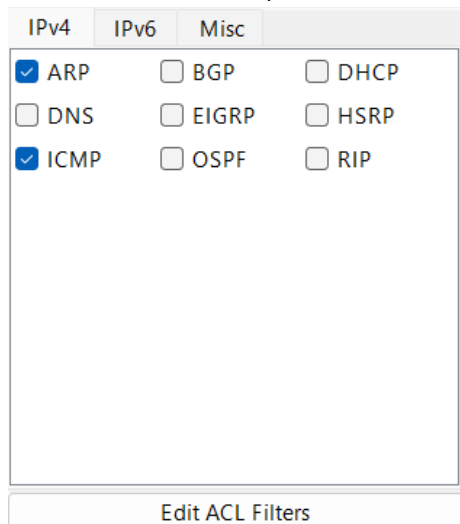
**PROGRAM STUDI INFORMATIKA**  
**FAKULTAS SAINS DAN TEKNOLOGI**  
**UNIVERSITAS SANATA DHARMA**  
**YOGYAKARTA**  
**2022**

## A. Mengamati ARP

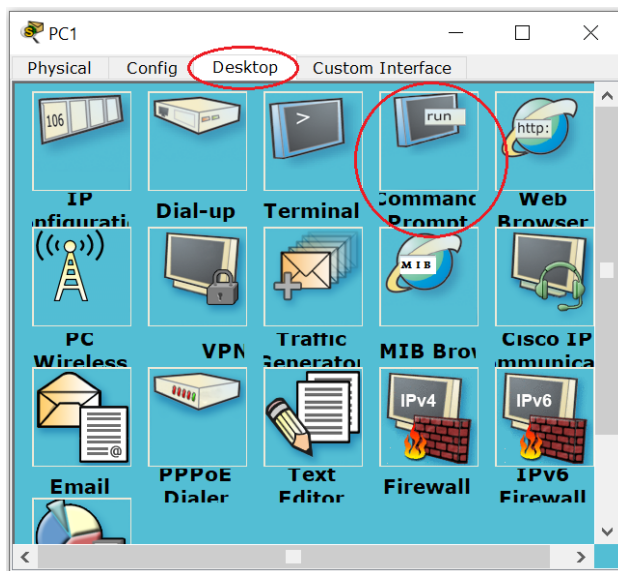
1. Gunakan topologi (switch) yang kemarin Anda buat (**SS topologi kalian**)



2. Masuk ke simulation mode  
Lihat di bagian bawah klik show all/none sehingga event listnya bersih  
Klik **Edit Filters : ARP** (dan ICMP kalau perlu)



3. **Masuk ke Command Prompt** pada PC1 (dan PC3)



4. **Cek tabel ARP di PC1** (dan PC3) dengan menjalankan perintah **arp -a** di PC1 (dan PC3)

**PC1 :**

```
Packet Tracer PC Command Line 1.0
PC>arp
Packet Tracer PC ARP
Display ARP entries: arp -a
Clear ARP table: arp -d

PC>arp -a
No ARP Entries Found
PC>
```

**PC3:**

```
Packet Tracer PC Command Line 1.0
PC>arp
Packet Tracer PC ARP
Display ARP entries: arp -a
Clear ARP table: arp -d

PC>aro -a
Invalid Command.

PC>arp -a
No ARP Entries Found
PC>
```

5. **Ping** dari PC1 ke PC3 dan **Amati jalannya paket ARP** (dan ICMP kalau perlu), maka akan terlihat paket ARP, sbb:

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.000	--	PC1	ICMP	
	0.000	--	PC1	ARP	
	0.001	PC1	Switch0	ARP	
	0.002	Switch0	PC2	ARP	
	0.002	Switch0	PC3	ARP	
	0.002	Switch0	Switch1	ARP	
	0.003	PC3	Switch0	ARP	
	0.003	Switch1	PC4	ARP	
	0.003	Switch1	PC5	ARP	
	0.003	Switch1	PC6	ARP	
	0.004	Switch0	PC1	ARP	
	0.004	--	PC1	ICMP	
	0.005	PC1	Switch0	ICMP	
	0.006	Switch0	PC3	ICMP	
	0.007	PC3	Switch0	ICMP	
	0.008	Switch0	PC1	ICMP	

(buka / inspeksi paket ARP yang dikirim oleh PC1 dan balasan dari PC3)

6. **Setelah Selesai langkah 5**

Masuk ke Command Prompt dan **jalankan lagi perintah arp -a** di PC 1 dan PC 3

(bandingkan hasil dengan arp -a sebelumnya / langkah 4)

**PC1 :**

```
PC>arp -a
Internet Address      Physical Address      Type
192.168.105.3         0003.cccc.cccc       dynamic
PC>
```

**PC3:**

```
PC>arp -a
Internet Address      Physical Address      Type
192.168.105.1         0001.aaaa.aaaa       dynamic
PC>
```

7. **Ping ulang** dari PC1 ke PC3

ketika di PC 1 terdapat ARP entry PC3 **jalankan lagi** (perintah ping)

(Amati dan bandingkan dengan jalannya simulasi sebelumnya / langkah 5.

Apakah ada paket ARP ?)

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.000	--	PC1	ICMP	
	0.001	PC1	Switch0	ICMP	
	0.002	Switch0	PC2	ICMP	
	0.002	Switch0	PC3	ICMP	
	0.002	Switch0	Switch1	ICMP	
	0.003	PC3	Switch0	ICMP	
	0.003	Switch1	PC4	ICMP	
	0.003	Switch1	PC5	ICMP	
	0.003	Switch1	PC6	ICMP	
	0.004	Switch0	PC1	ICMP	

8. Delete Tabel ARP dengan perintah arp -d, lalu **Ping ulang** dari PC1 ke PC3   
ketika di PC 1 terdapat ARP entry PC3 **jalankan lagi** (perintah ping)  
(Amati dan bandingkan dengan jalannya simulasi sebelumnya / langkah 7.  
Apakah ada paket ARP ?)

Delete table ARP PC1

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.000	--	PC1	ARP	
	0.000	--	PC1	ICMP	
	0.000	--	PC1	ARP	
	0.001	PC1	Switch0	ARP	
	0.001	--	PC1	ARP	
	0.002	PC1	Switch0	ARP	
	0.002	Switch0	PC2	ARP	

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.002	Switch0	PC3	ARP	
	0.002	Switch0	Switch1	ARP	
	0.003	Switch0	PC2	ARP	
	0.003	Switch0	PC3	ARP	
	0.003	Switch0	Switch1	ARP	
	0.003	Switch1	PC4	ARP	
	0.003	Switch1	PC5	ARP	

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.003	Switch1	PC6	ARP	
	0.004	PC3	Switch0	ARP	
	0.004	Switch1	PC4	ARP	
	0.004	Switch1	PC5	ARP	
	0.004	Switch1	PC6	ARP	
	0.005	Switch0	PC1	ARP	
	0.005	--	PC1	ICMP	

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.006	PC1	Switch0	ICMP	
	0.007	Switch0	PC3	ICMP	
	0.008	PC3	Switch0	ICMP	
	0.009	Switch0	PC1	ICMP	

PC 1 terdapat ARP entry PC3 **jalankan lagi**

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.000	--	PC1	ICMP	
	0.001	PC1	Switch0	ICMP	
	0.002	Switch0	PC3	ICMP	
	0.003	PC3	Switch0	ICMP	
	0.004	Switch0	PC1	ICMP	

#### 9. **Ping ulang** dari PC1 ke PC4

ketika di PC 1 terdapat ARP entry PC3, jalankan perintah **ping** dari **PC1** ke **PC4**

**(Amati dan bandingkan dengan jalannya simulasi sebelumnya / langkah 7.**

**Apakah ada paket ARP ? Kearah mana ?)**

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.000	--	PC1	ICMP	
	0.000	--	PC1	ARP	
	0.001	PC1	Switch0	ARP	
	0.002	Switch0	PC2	ARP	
	0.002	Switch0	PC3	ARP	
	0.002	Switch0	Switch1	ARP	
	0.003	Switch1	PC4	ARP	

Vis.	Time(sec)	Last Devi	At Devic	Type	Info
	0.003	Switch1	PC5	ARP	
	0.003	Switch1	PC6	ARP	
	0.004	PC4	Switch1	ARP	
	0.005	Switch1	Switch0	ARP	
	0.006	Switch0	PC1	ARP	
	0.006	--	PC1	ICMP	
	0.007	PC1	Switch0	ICMP	

	0.008	Switch0	Switch1	ICMP	
	0.009	Switch1	PC4	ICMP	
	0.010	PC4	Switch1	ICMP	
	0.011	Switch1	Switch0	ICMP	
	0.012	Switch0	PC1	ICMP	

ARP PC1

```
PC>arp -a
Internet Address      Physical Address      Type
192.168.105.3         0003.cccc.cccc       dynamic
192.168.105.4         0004.dddd.dddd       dynamic
PC>
```

PC4 Sebelum ping

```
PC>arp -a
No ARP Entries Found
PC>
```

PC4 Sesudah Ping

```
PC>arp -a
Internet Address      Physical Address      Type
192.168.105.1         0001.aaaa.aaaa       dynamic
PC>
```

## B. Pertanyaan

1. Apa arti perintah arp -a dan arp -d ?

ARP(Address Resolution Protocol) berfungsi untuk mencari tahu dan memberi tahu MAC Address suatu computer, di dalam ARP terdapat arp -a yang berfungsi untuk melihat alamat mac yang masuk dan arp -d yang berfungsi untuk menghapus alamat mac yang sudah masuk.

2. Kapan paket ARP akan muncul ?

Untuk mengirimkan pesan ke host lain di jaringan IPv4/ network yang sama, host terlebih dahulu harus mengetahui IPv4 network dan alamat MAC tujuan. Setelah mengetahui alamat IPv4/network, **paket ARP akan muncul** untuk mengetahui MAC Addressnya harus menggunakan ARP.

3. Topologi sudah memakai switch, kenapa paket ARP masih broadcast ?

Switch bekerja untuk menerima dan membaca alamat tujuan, namun pada saat pertama kali mengirim pesan alamat penerima dan tujuan belum ada, oleh karena itu dengan adanya ARP dapat mencari alamat penerima dan tujuan yang harus di broadcast sehingga alamat penerima dan tujuan dapat diketahui dan pesan dapat dikirimkan

4. Amati isi paket ARP yang keluar dari PC1 dan jawaban dari PC3 ketika dilakukan pengiriman paket dari PC 1 ke PC 3 (Juga ketika mengirimkan paket dari PC1 ke arah PC6)  
Catat (kalau perlu dibuat dalam tabel)/ **(screenshot PDU)**

**DIBAWAH**

Paket	Last Dev	At Dev	Inter-face	Des.Mac
PC1 ke PC3	--	PC1	Out	<div>Ethernet II<div>0481419 bytes<div><div>PREAMBLE:101010...1011</div><div>DEST MAC:FFFF.FFFF.FFFF</div><div>SRC MAC:0001.AAAA.A</div></div><div>TYPE:0x806</div><div>DATA (VARIABLE LENGTH)</div><div>FCS:0x0</div></div></div> <div>ARP<div>081631 Bits<div><div>HARDWARE TYPE: 0x1</div><div>PROTOCOL TYPE:</div></div><div>HLEN: 0x6</div><div>PLEN: 0x4</div><div>OPCODE: 0x1</div><div>SOURCE MAC: 0001.AAAA.AAAA (48 bits)</div><div>SOURCE IP (32 bits)</div><div>192.168.105.1</div><div>TARGET MAC: 0000.0000.0000 (48 bits)</div><div>TARGET IP: 192.168.105.3 (32 bits)</div></div></div>
	PC1	Switch 0	In	<div>Ethernet II<div>0481419 bytes<div><div>PREAMBLE:101010...1011</div><div>DEST MAC:FFFF.FFFF.FFFF</div><div>SRC MAC:0001.AAAA.A</div></div><div>TYPE:0x806</div><div>DATA (VARIABLE LENGTH)</div><div>FCS:0x0</div></div></div> <div>ARP<div>081631 Bits<div><div>HARDWARE TYPE: 0x1</div><div>PROTOCOL TYPE:</div></div><div>HLEN: 0x6</div><div>PLEN: 0x4</div><div>OPCODE: 0x1</div><div>SOURCE MAC: 0001.AAAA.AAAA (48 bits)</div><div>SOURCE IP (32 bits)</div><div>192.168.105.1</div><div>TARGET MAC: 0000.0000.0000 (48 bits)</div><div>TARGET IP: 192.168.105.3 (32 bits)</div></div></div>
	Switch 0	PC3	In	<div>Ethernet II<div>0481419 bytes<div><div>PREAMBLE:101010...1011</div><div>DEST MAC:FFFF.FFFF.FFFF</div><div>SRC MAC:0001.AAAA.A</div></div><div>TYPE:0x806</div><div>DATA (VARIABLE LENGTH)</div><div>FCS:0x0</div></div></div> <div>ARP<div>081631 Bits<div><div>HARDWARE TYPE: 0x1</div><div>PROTOCOL TYPE:</div></div><div>HLEN: 0x6</div><div>PLEN: 0x4</div><div>OPCODE: 0x1</div><div>SOURCE MAC: 0001.AAAA.AAAA (48 bits)</div><div>SOURCE IP (32 bits)</div><div>192.168.105.1</div><div>TARGET MAC: 0000.0000.0000 (48 bits)</div><div>TARGET IP: 192.168.105.3 (32 bits)</div></div></div>
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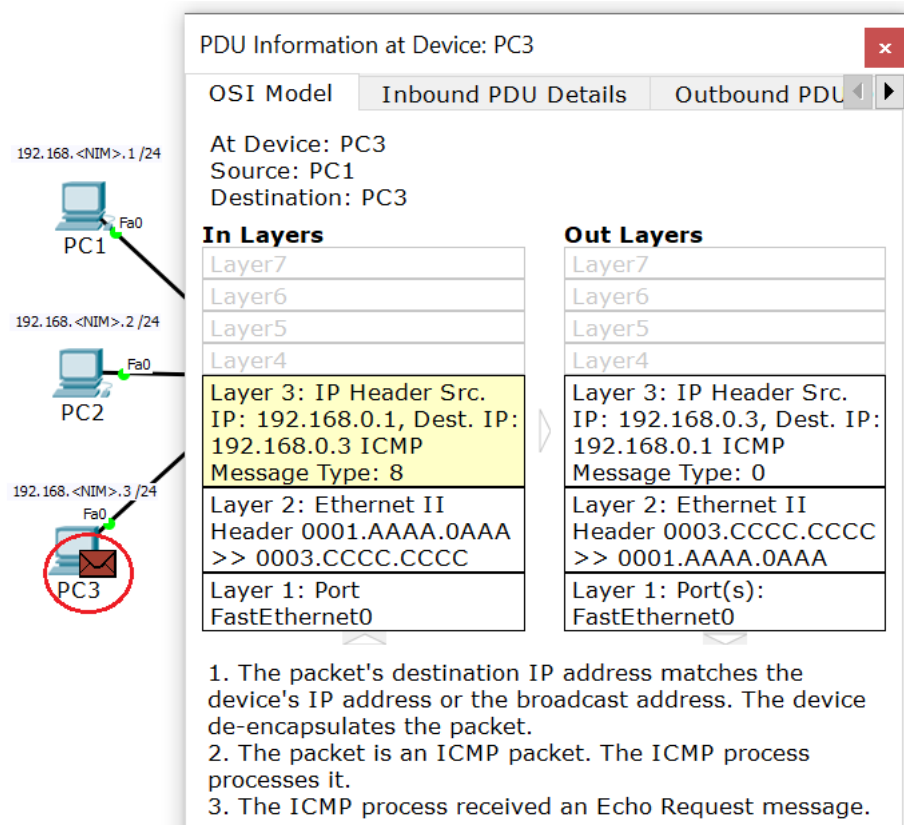


PC3 ke PC1	PC3	Switch 0	In	<div>Ethernet II 0 4 8 14 19 bytes PREAMBLE: 101010...1011 DEST MAC: 0001.AAAA.A SRC MAC: 0003.CCCC.C TYPE: 0x806 DATA (VARIABLE LENGTH) FCS: 0x0</div> <div>ARP 0 8 16 31 Bits HARDWARE TYPE: 0x1 PROTOCOL TYPE: HLEN: 0x6 PLEN: 0x4 OPCODE: 0x2 SOURCE MAC: 0003.CCCC.CCCC (48 bits) SOURCE IP (32 bits) 192.168.105.3 TARGET MAC: 0001.AAAA.AAAA (48 bits) TARGET IP: 192.168.105.1 (32 bits)</div>
	Switch 0	PC1	In	<div>Ethernet II 0 4 8 14 19 bytes PREAMBLE: 101010...1011 DEST MAC: 0001.AAAA.A SRC MAC: 0003.CCCC.C TYPE: 0x806 DATA (VARIABLE LENGTH) FCS: 0x0</div> <div>ARP 0 8 16 31 Bits HARDWARE TYPE: 0x1 PROTOCOL TYPE: HLEN: 0x6 PLEN: 0x4 OPCODE: 0x2 SOURCE MAC: 0003.CCCC.CCCC (48 bits) SOURCE IP (32 bits) 192.168.105.3 TARGET MAC: 0001.AAAA.AAAA (48 bits) TARGET IP: 192.168.105.1 (32 bits)</div>
PC1 ke PC6	--	PC1	Out	<div>Ethernet II 0 4 8 14 19 bytes PREAMBLE: 101010...1011 DEST MAC: FFFF.FFFF.FFFF SRC MAC: 0001.AAAA.A TYPE: 0x806 DATA (VARIABLE LENGTH) FCS: 0x0</div> <div>ARP 0 8 16 31 Bits HARDWARE TYPE: 0x1 PROTOCOL TYPE: HLEN: 0x6 PLEN: 0x4 OPCODE: 0x1 SOURCE MAC: 0001.AAAA.AAAA (48 bits) SOURCE IP (32 bits) 192.168.105.1 TARGET MAC: 0000.0000.0000 (48 bits) TARGET IP: 192.168.105.6 (32 bits)</div>

	PC1	Switch 0	In	<div>Ethernet II</div> <div><div>04819 bytes</div><table><tr><td colspan="2">PREAMBLE: 101010...1011</td><td>DEST MAC: FFFF.FFFF.FFFF</td><td>SRC MAC: 0001.AAAA.A</td><td>-</td></tr><tr><td>TYPE: 0x806</td><td colspan="2">DATA (VARIABLE LENGTH)</td><td colspan="2">FCS: 0x0</td></tr></table></div> <div>ARP</div> <div><div>081631 Bits</div><table><tr><td colspan="2">HARDWARE TYPE: 0x1</td><td colspan="3">PROTOCOL TYPE:</td></tr><tr><td>HLEN: 0x6</td><td>PLEN: 0x4</td><td colspan="3">OPCODE: 0x1</td></tr><tr><td colspan="2">SOURCE MAC: 0001.AAAA.AAAA (48 bits)</td><td colspan="3">SOURCE IP (32 bits)</td></tr><tr><td colspan="2">192.168.105.1</td><td colspan="3"></td></tr><tr><td colspan="2">TARGET MAC: 0000.0000.0000 (48 bits)</td><td colspan="3"></td></tr><tr><td colspan="2">TARGET IP: 192.168.105.6 (32 bits)</td><td colspan="3"></td></tr></table></div>	PREAMBLE: 101010...1011		DEST MAC: FFFF.FFFF.FFFF	SRC MAC: 0001.AAAA.A	-	TYPE: 0x806	DATA (VARIABLE LENGTH)		FCS: 0x0		HARDWARE TYPE: 0x1		PROTOCOL TYPE:			HLEN: 0x6	PLEN: 0x4	OPCODE: 0x1			SOURCE MAC: 0001.AAAA.AAAA (48 bits)		SOURCE IP (32 bits)			192.168.105.1					TARGET MAC: 0000.0000.0000 (48 bits)					TARGET IP: 192.168.105.6 (32 bits)				
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PC5	--																																											

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PREAMBLE: 101010...1011		DEST MAC: 0001.AAAA.A AAA	SRC MAC: 0006.FFFF.FFFF																																	
TYPE: 0x806	DATA (VARIABLE LENGTH)		FCS: 0x0																																	
HARDWARE TYPE: 0x1		PROTOCOL TYPE:																																		
HLEN: 0x6	PLEN: 0x4	OPCODE: 0x2																																		
SOURCE MAC: 0006.FFFF.FFFF (48 bits)		SOURCE IP (32 bits)																																		
192.168.105.6																																				
TARGET MAC: 0001.AAAA.AAAA (48 bits)																																				
TARGET IP: 192.168.105.1 (32 bits)																																				
Switch 0	PC 1	In	<div>Ethernet II</div> <div><div>0481419 bytes</div><table><tr><td colspan="2">PREAMBLE: 101010...1011</td><td>DEST MAC: 0001.AAAA.A AAA</td><td>SRC MAC: 0006.FFFF.FFFF</td></tr><tr><td>TYPE: 0x806</td><td colspan="2">DATA (VARIABLE LENGTH)</td><td>FCS: 0x0</td></tr></table></div> <div>ARP</div> <div><div>081631 Bits</div><table><tr><td colspan="2">HARDWARE TYPE: 0x1</td><td colspan="2">PROTOCOL TYPE:</td></tr><tr><td>HLEN: 0x6</td><td>PLEN: 0x4</td><td colspan="2">OPCODE: 0x2</td></tr><tr><td colspan="2">SOURCE MAC: 0006.FFFF.FFFF (48 bits)</td><td colspan="2">SOURCE IP (32 bits)</td></tr><tr><td colspan="2">192.168.105.6</td><td colspan="2"></td></tr><tr><td colspan="2">TARGET MAC: 0001.AAAA.AAAA (48 bits)</td><td colspan="2"></td></tr><tr><td colspan="2">TARGET IP: 192.168.105.1 (32 bits)</td><td colspan="2"></td></tr></table></div>	PREAMBLE: 101010...1011		DEST MAC: 0001.AAAA.A AAA	SRC MAC: 0006.FFFF.FFFF	TYPE: 0x806	DATA (VARIABLE LENGTH)		FCS: 0x0	HARDWARE TYPE: 0x1		PROTOCOL TYPE:		HLEN: 0x6	PLEN: 0x4	OPCODE: 0x2		SOURCE MAC: 0006.FFFF.FFFF (48 bits)		SOURCE IP (32 bits)		192.168.105.6				TARGET MAC: 0001.AAAA.AAAA (48 bits)				TARGET IP: 192.168.105.1 (32 bits)				
PREAMBLE: 101010...1011		DEST MAC: 0001.AAAA.A AAA	SRC MAC: 0006.FFFF.FFFF																																	
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TARGET IP: 192.168.105.1 (32 bits)																																				

5. Amati paket ICMP yang dikirimkan oleh PC1 ketika sudah sampai di PC3  
(Perhatikan pada bagian **In Layers** dan **Out Layer** pada Layer 3. Jelaskan pak maksudnya)



Layer 3 merupakan Network layer yang dimana bertugas untuk membaca alamat ip agar setiap computer saling terkoneksi dalam satu network dan juga membuat header untuk setiap paket data. Seperti halnya dengan gambar diatas in layers membaca ip source(awal alamat ip) PC1 dan juga destination(tujuan alamat ip) sehingga PC1 ke PC3 dapat terkoneksi, sama halnya di out layers namun bedanya ini antara PC3 ke PC1, sehingga antara PC1 ke PC3 dan PC3 ke PC1 dapat saling terkoneksi dan juga melaksanakan pesan karena sudah saling mengetahui alamat ipnya