



Cisco packet tracer TCP UDP Exploration

S1 Teknik Telekomunikasi
Fakultas Teknik Elektro
Telkom University





Outline

- Getting Started
- Create Simple Network topology
- TCP UDP Exploration Packet





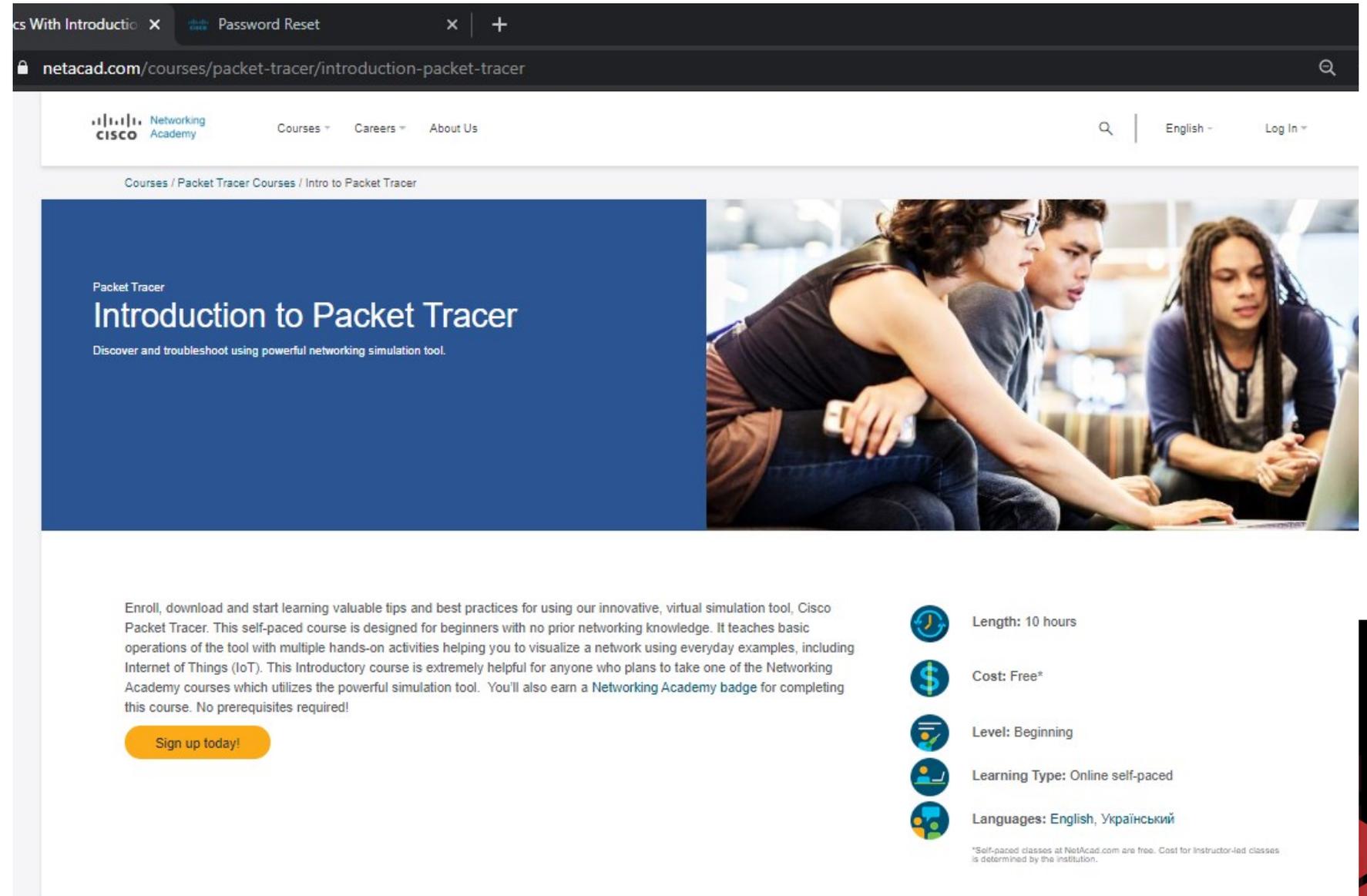
Getting Started



Getting Started

Untuk memulai, silahkan sign up pada course packet tracer di website resmi netacad jika belum memiliki akun netacad:

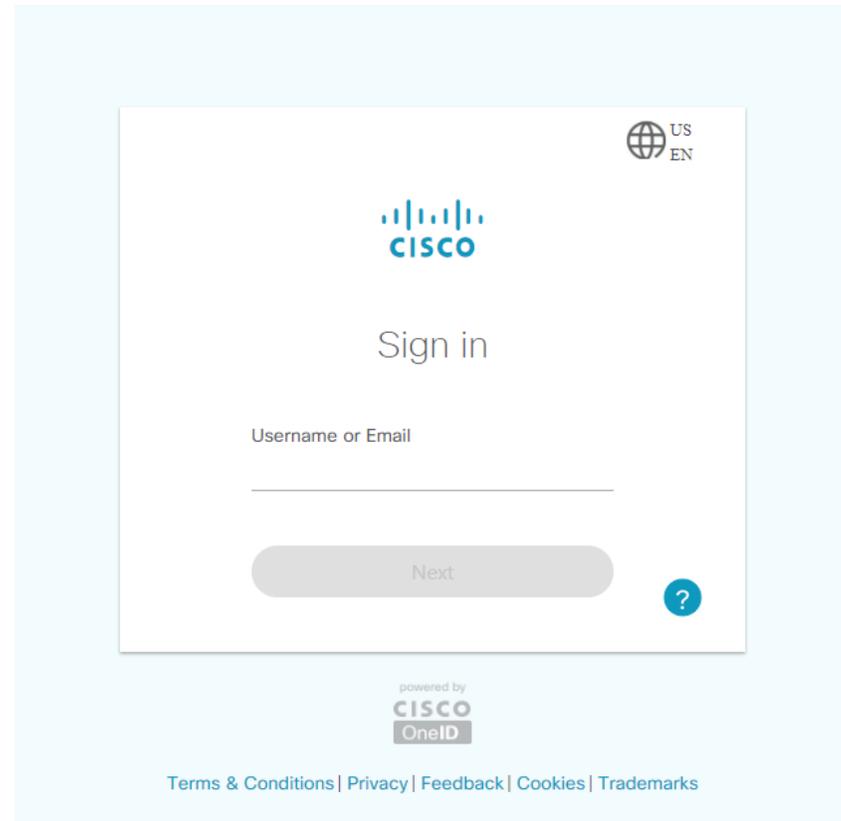
netacad.com/courses/packet-tracer/introduction-packet-tracer



The screenshot shows a web browser window with two tabs: 'cs With Introductio' and 'Password Reset'. The address bar displays 'netacad.com/courses/packet-tracer/introduction-packet-tracer'. The page header includes the Cisco Networking Academy logo and navigation links for 'Courses', 'Careers', and 'About Us'. A search bar and language selector (English) are also present. The main content area features a blue header with the text 'Packet Tracer Introduction to Packet Tracer' and a sub-header 'Discover and troubleshoot using powerful networking simulation tool.' Below this is a large image of three people (two men and one woman) sitting around a table, looking at a laptop. The main body of the page contains a detailed description of the course, a 'Sign up today!' button, and a list of course details: Length: 10 hours, Cost: Free*, Level: Beginning, Learning Type: Online self-paced, and Languages: English, Український. A small disclaimer at the bottom right states: '*Self-paced classes at NetAcad.com are free. Cost for instructor-led classes is determined by the institution.'

Getting Started

Setelah Enroll dan daftar akun (untuk yang belum memiliki akun netacad, kemudian bisa login langsung ke halaman netacad)



The screenshot shows the Cisco OneID Sign in page. At the top right, there is a globe icon with 'US' and 'EN' options. The Cisco logo is centered at the top. Below it, the text 'Sign in' is displayed. Underneath, there is a label 'Username or Email' followed by a horizontal input field. Below the input field is a grey button labeled 'Next'. To the right of the 'Next' button is a blue circular icon with a white question mark. At the bottom center, it says 'powered by CISCO OneID'. At the very bottom, there is a footer with links: 'Terms & Conditions | Privacy | Feedback | Cookies | Trademarks'.

Getting Started

The screenshot shows the Cisco Networking Academy website. The navigation bar includes 'My NetAcad', 'Resources', 'Courses', 'Careers', and 'About Us'. A search bar and user profile icons are on the right. The main content area is titled 'I'm Learning' and shows 'Courses I've Enrolled In'. A dropdown menu is open under 'Resources', with 'Download Packet Tracer' selected. Below, a course card for 'Introduction to Packet Tracer 0620' is visible, with a red box highlighting a star icon and a red box on the right side of the card. The course card also shows a play button icon and the text 'Please finish by 30 Oct 2020'. At the bottom right, there is a pagination control showing 'Showing 6' and '1 - 1 of 1'.

✓ Setelah sukses login pada website netacad, pilih Resources, dan Download Packet Tracer

✓ Pada halaman ini juga, kita bisa mengikuti kelas gratis packet tracer dari cisco networking academy ini. Arahkan kursor di kotak bertanda merah di samping, kemudian launch course

Getting Started



[My NetAcad](#) ▾ [Resources](#) ▾ [Courses](#) ▾ [Careers](#) ▾ [About Us](#)



[Asterisk](#) ▾

[Home](#) / [Resources](#) / [Download Packet Tracer](#)

Download Packet Tracer

Cisco Packet Tracer

The best way to learn about networking is to do it. Cisco Packet Tracer, an innovative network configuration simulation tool, helps you hone your networking configuration skills from your desktop or mobile device. Use Packet Tracer to:

- Sharpen your skills for a job interview
- Prepare for a certification exam
- Practice what you learn in networking courses

Download

Choose the OS you are using and download the relevant files. Read the [FAQ](#). View [Tutorials](#).

Packet Tracer requires authentication with your login and password when you first use it and for each new OS login session. (1)

Considering to upgrade?

For CCNA 7, Packet Tracer 7.3.0 is the minimal version that supports CCNA 7.

For CCNA 6 (and older versions), we recommend instructors and students stay with Packet Tracer 7.2.2.

If you are learning/teaching both CCNA 6 and 7, please use Packet Tracer 7.3.0.

When using Packet Tracer 7.3.0 for CCNA 6, there is a small possibility you may encounter a warning message.

If so, you may disregard the message. It is simply a warning that scripts in this file need to be updated for Packet Tracer 7.3.0 compatibility.

Windows Desktop Version 7.3.0 English

[64 Bit Download](#)

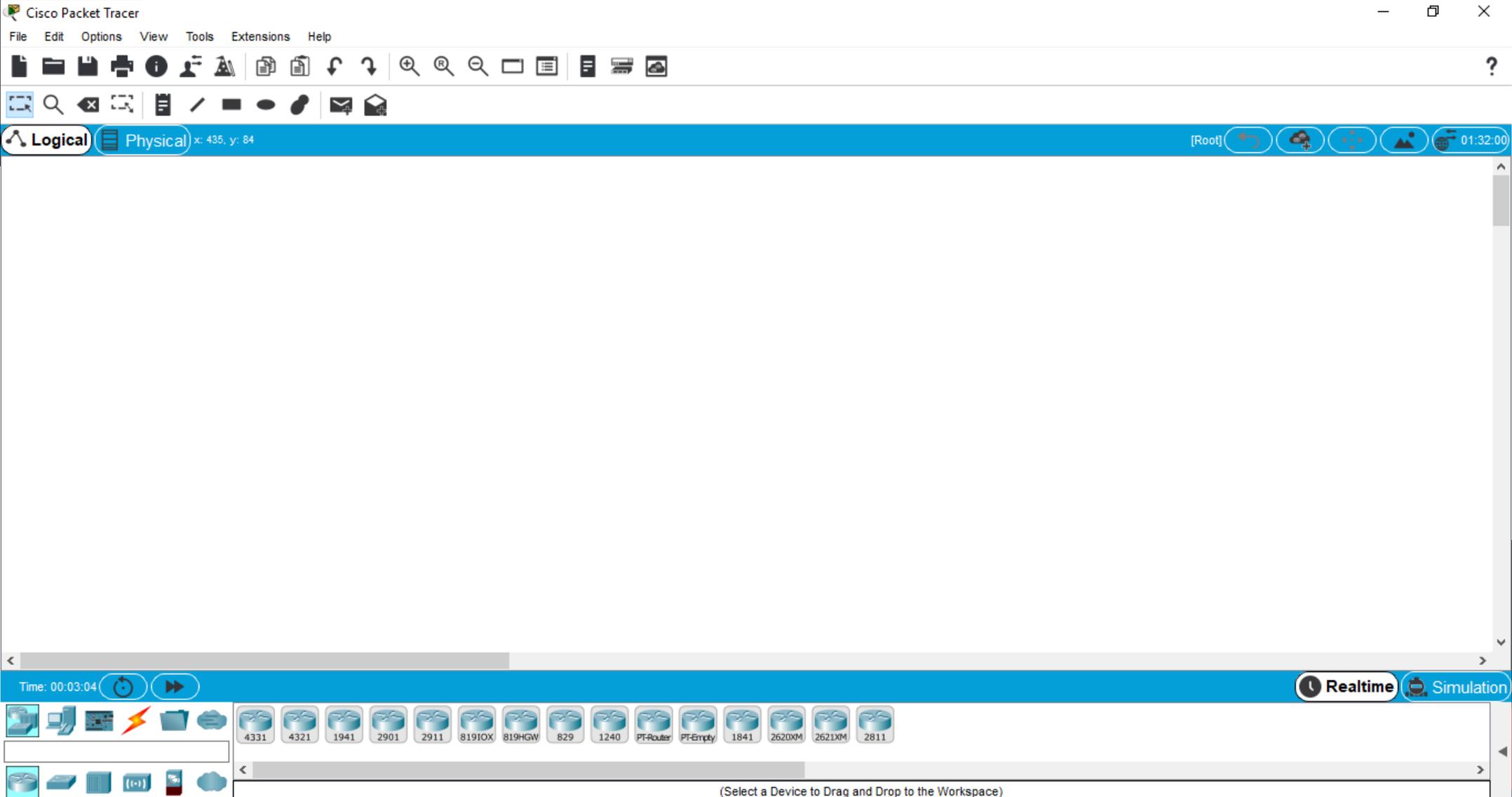
[32 Bit Download](#)

Linux Desktop Version 7.3.0 English

[64 Bit Download](#)

Download dan
install Cisco
Packet Tracer
sesuai sistem
operasi yang
dipakai

Cisco Packet Tracer User Interface





Create Simple Network Topology





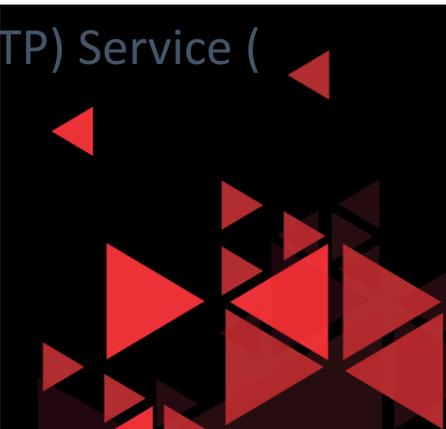
Create Simple Network Topology

- Pada modul ini, kita akan membuat topologi jaringan lokal sederhana dengan menggunakan IPv4
 - Perangkat yang akan digunakan adalah 1 buah server, 2 buah PC Client, dan 1 buah switch
 - Setelah topologi jaringan terbentuk, aktifkan beberapa layanan di server yaitu HTTP webserver, dns server, dan email server
 - Setelah itu akan disimulasikan request layanan dari sisi client ke server untuk melihat header paket yang diproses dari setiap layanan
- 



Create Simple Network Topology

Berikut detail teknis konfigurasi jaringan pada server dan client :

1. Server (static IP 192.168.1.2, subnet mask 255.255.255.0, default gateway 192.168.1.1, DNS Server 192.168.1.2)
 2. PC Client 1 (static IP 192.168.1.3, subnet mask 255.255.255.0, default gateway 192.168.1.1, DNS Server 192.168.1.2)
 3. PC Client 2 (static IP 192.168.1.4, subnet mask 255.255.255.0, default gateway 192.168.1.1, DNS Server 192.168.1.2)
 4. Pada Server enable HTTP Web service, DNS (domain name elearning.com), Email (SMTP) Service (2 akun adi@elearning.com, dan budi@elearning.com) password test123
- 

Menambah Server

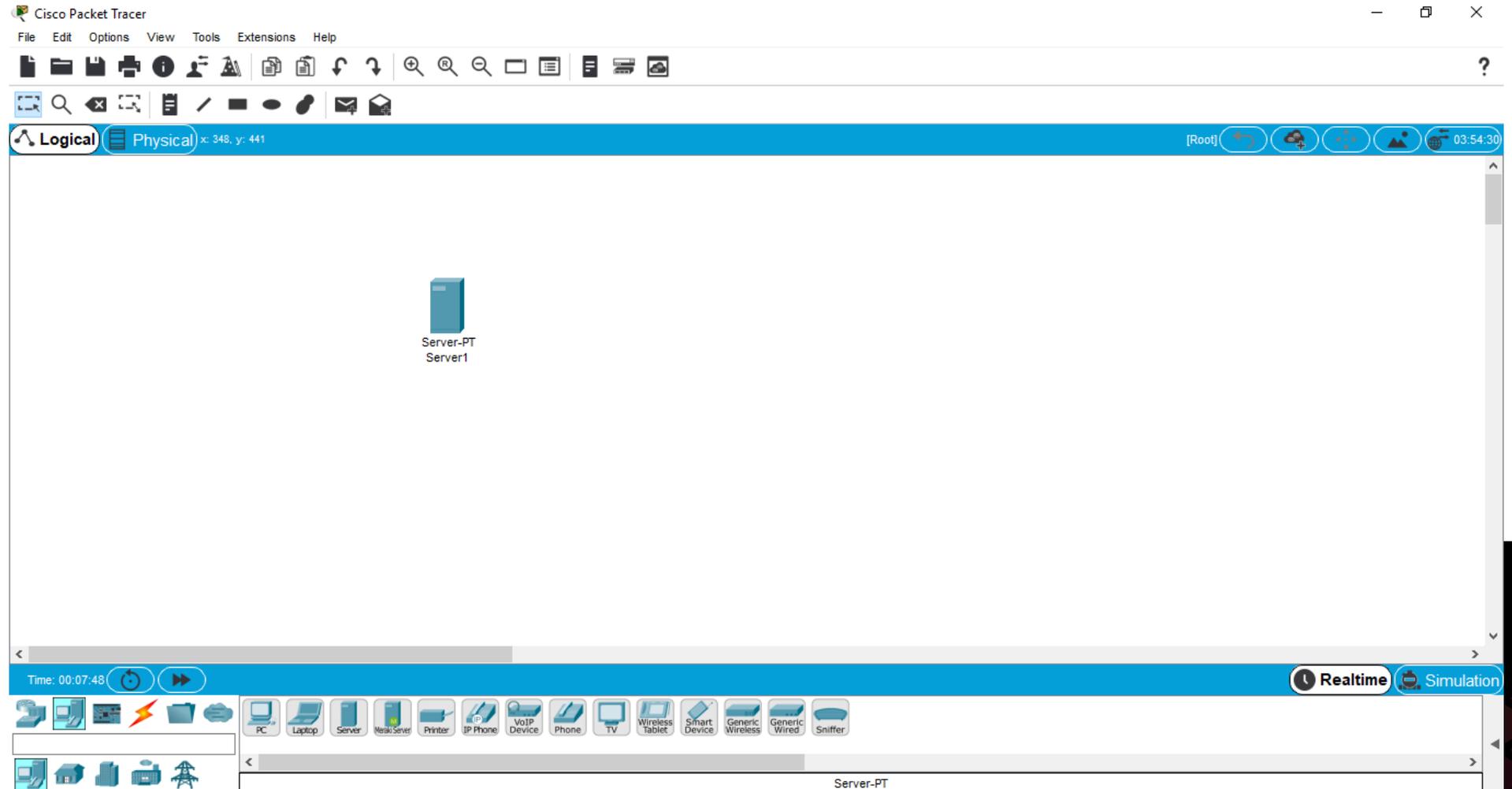
✓ Tambahkan satu

buah server pada packet tracer

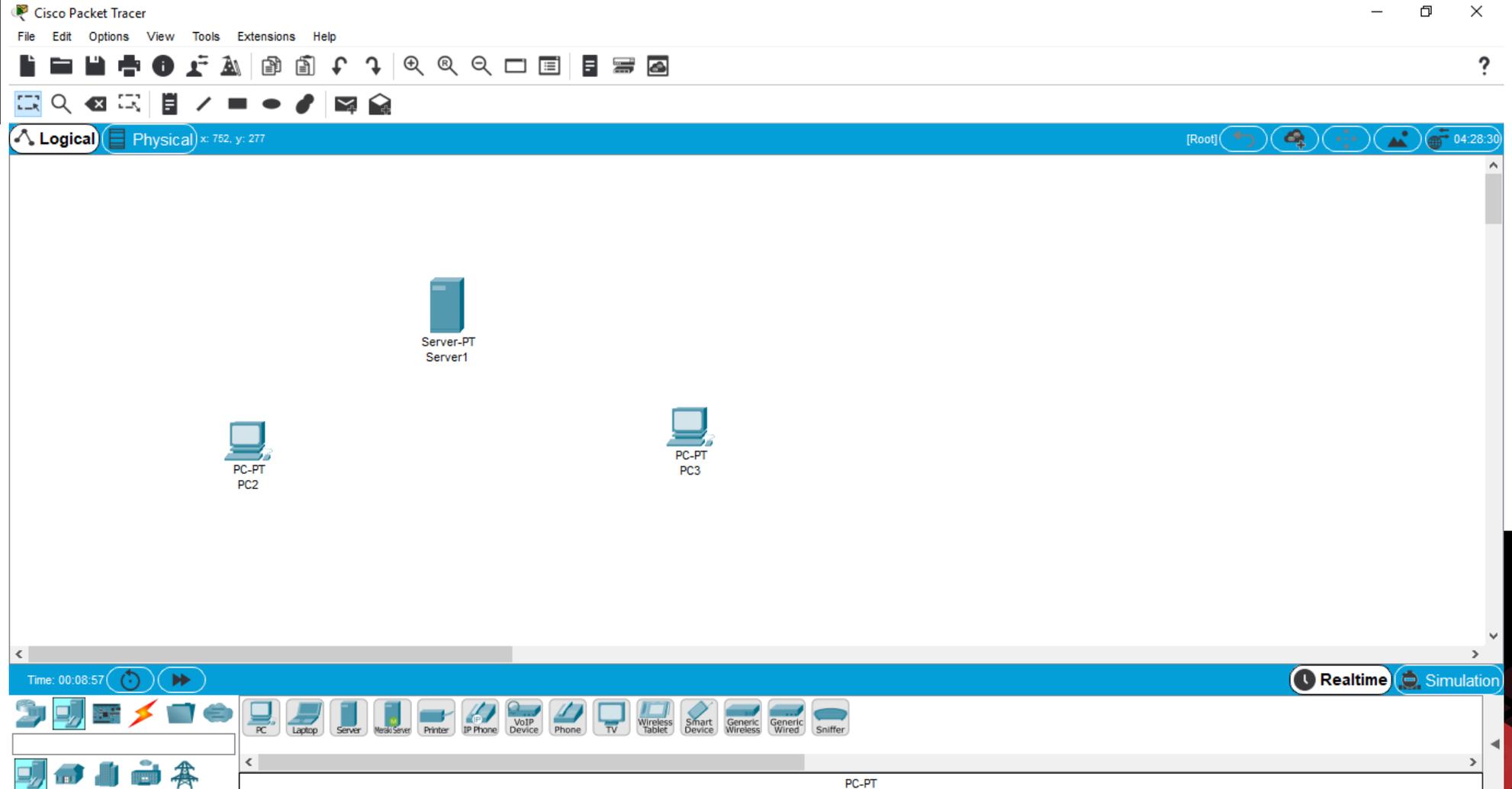
✓ Pilih pada bagian end devices di sebelah kiri bawah layar

✓ Kemudian pilih Server-PT

✓ Server ini akan kita melayani beberapa macam layanan untuk simulasi pada modul ini



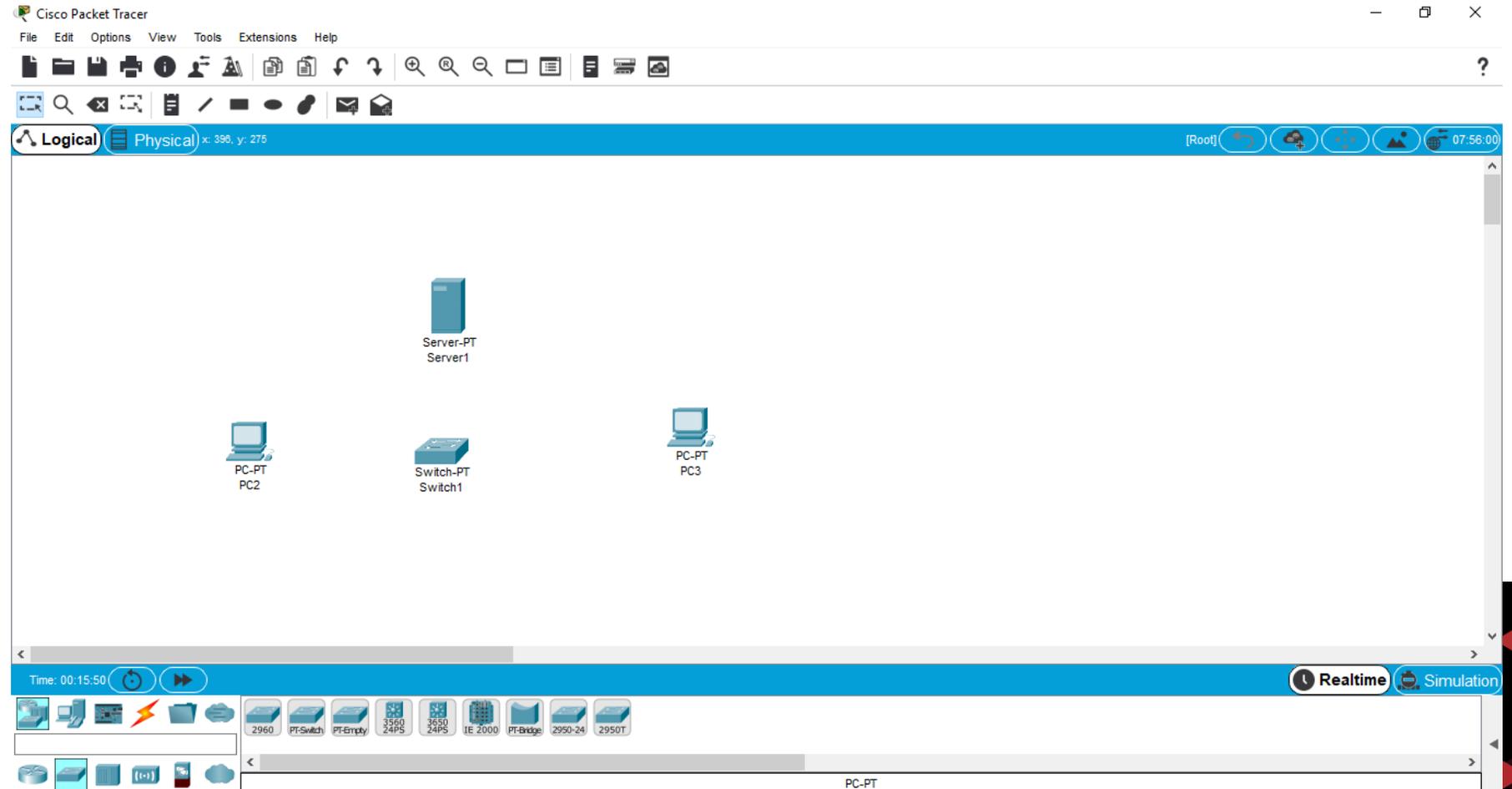
Menambah PC sebagai Client



- ✓ Untuk request layanan ke server, kita memerlukan beberapa buah client pada packet tracer
- ✓ Pilih End devices, kemudian pilih PC-PT

Menambah Switch

- ✓ Kemudian, untuk menghubungkan antara PC Client dengan server, kita dapat menambahkan satu buah perangkat jaringan yaitu switch
- ✓ Klik pada Network devices, kemudian pilih switches, kemudian pilih Switch-PT



Membuat Link Connection

✓ Tambahkan link

connection

menggunakan

Komponen

Connections,

kemudian pilih

Automatically

choose

connection Type

✓ Kemudian tunggu

beberapa saat,

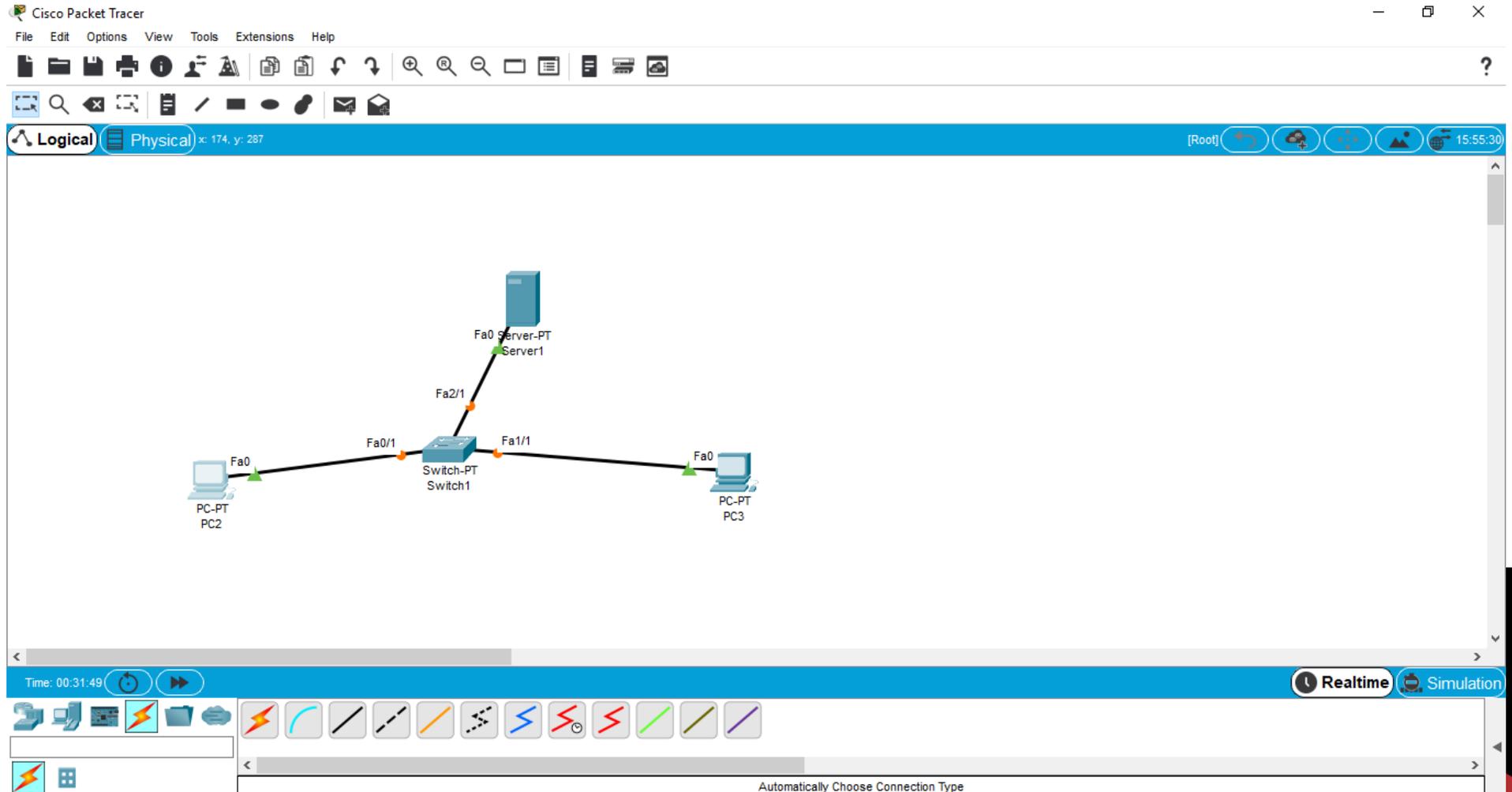
sampai semua titik

yang berwarna

orange berubah

menjadi warna

hijau



Konfigurasi Network Interface Server

The screenshot displays the Cisco Packet Tracer interface. The main workspace shows a network diagram with a central 'Switch-PT Switch1' connected to a 'PC-PT PC2' (Fa0) and a 'Server-PT Server1' (Fa0). The switch has interfaces Fa0/1, Fa2/1, and Fa1/1. The 'Server1' configuration window is open, showing the 'Desktop' tab with various application icons like IP Configuration, Terminal, Command Prompt, Web Browser, VPN, AAA Accounting, Traffic Generator, MIB Browser, and IPv4.

- Double klik pada server
- Pilih Desktop tab
- klik IP Configuration

Konfigurasi Network Interface Server

Pilih Static

pada konfigurasi IP

isi IP address :
192.168.1.2

Subnet mask
255.255.255.0

Default
Gateway :
192.168.1.1

DNS Server
192.168.1.2

The screenshot displays the Cisco Packet Tracer interface. The main workspace shows a network diagram with a central 'Switch-PT Switch1' connected to a 'PC-PT PC2' (Fa0) and a 'Server-PT Server1' (Fa0). The switch has other ports labeled Fa2/1 and Fa1/1. A configuration window for 'Server1' is open, showing the 'IP Configuration' tab. The configuration is set to 'Static' with the following values:

- IP Address: 192.168.1.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- DNS Server: 192.168.1.2

The 'IPv6 Configuration' section is also visible, with 'Static' selected and a Link Local Address of FE80::201:97FF:FE54:1668. The interface includes a menu bar (File, Edit, Options, View, Tools, Extensions, Help), a toolbar, and a status bar at the bottom showing 'Time: 00:37:47' and 'Realtime' simulation mode.

Konfigurasi Network Interface PC Client

➤ Kemudian lakukan hal yang sama untuk konfigurasi network interface pada PC Client,

➤ Pada PC2 : IP Address : 192.168.1.3

➤ Pada PC3 : IP Address : 192.168.1.4

➤ Pada kedua PC

Subnet mask:
255.255.255.0

Default Gateway:
192.168.1.1

DNS Server: 192.168.1.2

The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a PC-PT PC2 connected to a Switch-PT Switch1 via its Fa0 interface. The switch is also connected to a Server-PT Server1 via its Fa2/1 interface. The switch's Fa0/1 and Fa1/1 interfaces are also visible. On the right, the 'PC2' configuration window is open, showing the 'Desktop' tab. The 'IP Configuration' section is active, with 'Static' selected. The fields are filled with: IP Address: 192.168.1.3, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.1.1, and DNS Server: 192.168.1.2. The 'IPv6 Configuration' section is also visible, with 'Static' selected and a Link Local Address of FE80::2E0:F9FF:FE73:BC14. The bottom status bar shows 'Time: 00:42:08' and 'Realtime' mode.



Menguji Konektivitas jaringan

- Setelah server dan client PC sudah terkonfigurasi alamat IPv4 statis nya, maka kemudian kita akan menguji konektivitas antara server dengan semua perangkat yang ada di jaringan tersebut
 - Pada server kita buka command prompt dan ketikkan ping 192.168.1.255 untuk request paket ICMP ke broadcast address (dimana kita akan mendapatkan reply dari semua IP address yang telah terkonfigurasi pada satu broadcast domain address ini)
- 

Menguji Konektivitas jaringan

The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a PC-PT PC2 connected to a Switch-PT Switch1 via Fa0. The Switch1 is connected to a Server-PT Server1 via Fa2/1. The PC2 is connected to the Switch1 via Fa0. The Server1 is connected to the Switch1 via Fa2/1. The Switch1 has Fa1/1 connected to another device.

On the right, a terminal window titled 'Server1' shows the following output:

```
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.1.255

Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=10ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 8, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 1ms

C:\>
```

The interface also shows a status bar at the bottom with 'Time: 00:50:31', 'Realtime' mode selected, and a toolbar with various connection and configuration tools.

Enable Web Service

- ✓ Untuk mengaktifkan web service pada server, double klik pada Server-PT
- ✓ Klik Tab Services
- ✓ Pilih HTTP
- ✓ Kemudian pilih On
- ✓ Untuk bagian HTTPS kita pilih Off

The screenshot displays the Cisco Packet Tracer interface. In the background, a network diagram shows a central Switch-PT (Switch1) connected to three devices: PC-PT PC2, PC-PT PC3, and Server-PT Server1. The connections are labeled with interface names: Fa0/1 for PC2, Fa1/1 for PC3, and Fa2/1 for Server1. The foreground window is titled 'Server1' and is open to the 'Services' tab. The 'SERVICES' list on the left includes HTTP, DHCP, DHCPv6, TFTP, DNS, SYSLOG, AAA, NTP, EMAIL, FTP, IoT, VM Management, and Radius EAP. The 'HTTP' service is selected, and its configuration is shown on the right. The 'HTTP' section has the 'On' radio button selected, while the 'HTTPS' section has the 'Off' radio button selected. Below this, the 'File Manager' table lists five files: copyrights.html, cscoptlogo177x111.jpg, helloworld.html, image.html, and index.html, each with 'edit' and 'delete' options. At the bottom of the window, there are 'New File' and 'Import' buttons.

Enable DNS Service

✓ Untuk mengaktifkan DNS service pada server, double klik pada Server-PT

- ✓ Klik Tab Services
- ✓ Pilih DNS
- ✓ Kemudian pilih On
- ✓ Masukkan DNS elearning.com pada A Record dan Address ke IP server 192.168.1.2
- ✓ Klik Add

The screenshot shows the Cisco Packet Tracer interface. In the background, a network diagram shows a PC-PT (PC2) connected to a Switch via Fa0/0 and Fa0/1. The foreground window is titled 'Server1' and shows the 'Services' configuration page. The 'DNS' service is selected and set to 'On'. Under 'Resource Records', an A Record is added with the name 'elearning.com' and the address '192.168.1.2'. The table below shows the record:

No.	Name	Type	Detail
0	elearning.com	A Record	192.168.1.2

Buttons for 'Add', 'Save', and 'Remove' are visible. The 'DNS Cache' button is at the bottom. The status bar at the bottom indicates 'Realtime' simulation mode.

Enable Email (SMTP) Service

✓ Untuk mengaktifkan SMTP Email service pada server, double klik pada Server-PT

- ✓ Klik Tab Services
- ✓ Pilih Email
- ✓ Kemudian pilih On pada SMTP Services dan Off pada POP3 Services
- ✓ Masukkan Domain Name elearning.com klik set
- ✓ tambahkan user adi dan budi sesuai password yang telah diberikan
- ✓ Klik Add

The screenshot shows the Cisco Packet Tracer interface. In the background, a network diagram features a central 'Switch-PT Switch1' connected to a 'PC-PT PC2' (Fa0), a 'Server-PT Server1' (Fa0), and another device (Fa1/1). The foreground displays the configuration window for 'Server1', specifically the 'Services' tab. The 'EMAIL' service is selected in the left-hand menu. On the right, the 'SMTP Service' is set to 'ON' and 'POP3 Service' is set to 'OFF'. The 'Domain Name' is entered as 'elearning.com'. Under 'User Setup', two users are listed: 'adi' and 'budi'. The 'Change Password' button is visible at the bottom right of the user list.





TCP UDP Exploration Packet



Simulasi Aliran Paket TCP di Jaringan

The screenshot displays the Cisco Packet Tracer interface. The main workspace shows a network diagram with a PC-PT PC2 connected to a Switch-PT Switch1 via Fa0/1. The Switch1 is connected to a Server-PT Server1 via Fa2/1. The interface includes a menu bar (File, Edit, Options, View, Tools, Extensions, Help), a toolbar, and a status bar. A 'PacketTracer7' window is open, showing a checklist of protocols under the 'Misc' tab. The 'TCP' checkbox is checked. The 'Simulation Panel' is also visible, showing an empty 'Event List' table and 'Play Controls' buttons. The 'Simulation' button in the bottom right corner is circled in red.

Vis.	Time(sec)	Last Device	At Device	Type
------	-----------	-------------	-----------	------

Event List Filters - Visible Events	
None.	

Protocol	Protocol	Protocol
<input type="checkbox"/> ACL Filter	<input type="checkbox"/> Bluetooth	<input type="checkbox"/> CAPWAP
<input type="checkbox"/> CDP	<input type="checkbox"/> DTP	<input type="checkbox"/> EAPOL
<input type="checkbox"/> FTP	<input type="checkbox"/> H.323	<input checked="" type="checkbox"/> HTTP
<input type="checkbox"/> HTTPS	<input type="checkbox"/> IPsec	<input type="checkbox"/> ISAKMP
<input type="checkbox"/> IoT	<input type="checkbox"/> IoT TCP	<input type="checkbox"/> LACP
<input type="checkbox"/> LLDP	<input type="checkbox"/> Meraki	<input type="checkbox"/> NETFLOW
<input type="checkbox"/> NTP	<input type="checkbox"/> PAgP	<input type="checkbox"/> POP3
<input type="checkbox"/> PPP	<input type="checkbox"/> PPPoED	<input type="checkbox"/> PTP
<input type="checkbox"/> RADIUS	<input type="checkbox"/> REP	<input type="checkbox"/> RTP
<input type="checkbox"/> SCCP	<input type="checkbox"/> SMTP	<input type="checkbox"/> SNMP
<input type="checkbox"/> SSH	<input type="checkbox"/> STP	<input type="checkbox"/> SYSLOG
<input type="checkbox"/> TACACS	<input checked="" type="checkbox"/> TCP	<input type="checkbox"/> TFTP
<input type="checkbox"/> Telnet	<input type="checkbox"/> UDP	<input type="checkbox"/> USB
<input type="checkbox"/> VTP		

- ✓ Klik pada tab simulation (lingkaran merah)
- ✓ Klik Show All/None untuk menghapus semua checklist filter
- ✓ Edit Filter, Pilih tab Misc, kemudian checklist HTTP dan TCP

Simulasi Aliran Paket TCP di Jaringan

- ✓ Double klik pada salah satu PC (misal PC2)
- ✓ Klik tab Desktop
- ✓ Klik Web Browser
- ✓ Masukkan URL 192.168.1.2 (IP server)
- ✓ Kemudian tekan Enter, maka akan muncul gambar amplop berwarna hijau.

The screenshot displays the Cisco Packet Tracer interface. The main workspace shows a network topology with a PC (PC2) connected to a switch (Switch-PT), which is connected to a server (Server-PT). The PC's web browser is open, showing the URL `http://192.168.1.2`. The simulation panel shows an event list with a TCP packet being sent from PC2 at time 0.000.

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	-	PC2	TCP

HTTP request create connection to Server

- ✓ Sebelum kita play simulation, kita akan melihat terlebih dahulu paket yang akan dikirimkan dari PC2 ke server
- ✓ Double klik pada amplop berwarna hijau di PC2, maka kita akan dapat melihat Jendela PDU Information

The screenshot displays the Cisco Packet Tracer interface. In the center, a network diagram shows a PC-PT PC2 connected to a Switch-PT Switch1 via Fa0/1. The switch is also connected to a Server-PT Server1 via Fa2/1. A green envelope icon on the PC2 indicates an active packet.

Overlaid on the right is the 'PDU Information at Device: PC2' window, showing the following details:

- OSI Model:** Outbound PDU Details
- At Device:** PC2
- Source:** PC2
- Destination:** 192.168.1.2
- In Layers:** Layer7, Layer6, Layer5, Layer4, Layer3, Layer2, Layer1
- Out Layers:**
 - Layer 7:
 - Layer 6:
 - Layer 5:
 - Layer 4: TCP Src Port: 1029, Dst Port: 80
 - Layer 3: IP Header Src. IP: 192.168.1.3, Dest. IP: 192.168.1.2
 - Layer 2: Ethernet II Header 00E0.F973.BC14 >> 0001.9754.1668
 - Layer 1: Port(s): FastEthernet0

Below the layers, a step indicator shows: 1. The HTTP client makes a connection to the server.

The bottom of the window features 'Challenge Me' and navigation buttons: '<< Previous Layer' and 'Next Layer >>'. The Packet Tracer interface also shows a 'Simulation' mode indicator and a system tray at the bottom with the date 6/25/2020 and time 2:44 PM.

Outbound PDU HTTP Request Connection

- ✓ Pada jendela ini kita dapat melihat tab OSI layer dimana berisikan informasi Layer mana saja yang sedang terlibat.
- ✓ Pada gambar di samping terlihat bahwa pada PDU ini OSI layer yang terlibat dalam HTTP Request adalah Out Layer yang aktif dari mulai Layer 1 sampai Layer 4, kemudian layer 7
- ✓ Terlihat Informasi bahwa HTTP Client membuat koneksi ke server terlebih dahulu (sifat paket TCP – connection oriented)

The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a PC-PT PC2 connected to a Switch-PT Switch1 via Fa0/1. The switch is also connected to a Server-PT Server1 via Fa2/1. The PC2 is connected to the switch via Fa0. The PDU Information window is open, showing the following details:

PDU Information at Device: PC2

OSI Model | Outbound PDU Details

At Device: PC2
Source: PC2
Destination: 192.168.1.2

In Layers	Out Layers
Layer7	Layer 7: TCP
Layer6	Layer6
Layer5	Layer5
Layer4	Layer 4: TCP Src Port: 1029, Dst Port: 80
Layer3	Layer 3: IP Header Src. IP: 192.168.1.3, Dest. IP: 192.168.1.2
Layer2	Layer 2: Ethernet II Header 00E0.F973.BC14 >> 0001.9754.1668
Layer1	Layer 1: Port(s): FastEthernet0

1. The HTTP client makes a connection to the server.

Challenge Me | << Previous Layer | Next Layer >>

Inspeksi Outbound PDU HTTP Request Connection

- ✓ Kemudian untuk tab Outbound PDU Details, terdapat PDU Format mulai dari Ethernet, IP, dan TCP
- ✓ Pada Ethernet kita dapat melihat MAC Address Source dan destination
- ✓ Kemudian pada IP kita bisa melihat detail header dari IPv4, Source IP, dan destination IP

The screenshot displays the Cisco Packet Tracer interface. The network topology shows a PC-PT connected to a Switch-PT, which is connected to a Server-PT. The PC-PT is connected to the Switch-PT via Fa0/1, and the Server-PT is connected via Fa2/1. The Switch-PT has Fa1/1 connected to another interface.

The PDU Information at Device: PC2 window is open, showing the Outbound PDU Details. The OSI Model is set to Outbound PDU Details. The PDU Formats section shows the Ethernet II, IP, and TCP headers.

Ethernet II Header:

Field	Value
PREAMBLE	101010...10
DEST ADDR	0001.9754.1668
SRC ADDR	00E0.F973.BC14
TYPE	0x0800
DATA (VARIABLE LENGTH)	(TH)
FCS	0x00000000

IP Header:

Field	Value
VER	4
IHL	
DSCP	0x00
TL	44
ID	0x001b
FLAGS	0x2
FRAG OFFSET	0x000
TTL	128
PRO	0x06
CHKSUM	
SRC IP	192.168.1.3
DST IP	192.168.1.2
OPT	0x00000000
PADDING	0x00
DATA (VARIABLE LENGTH)	

TCP Header:

Field	Value
SOURCE PORT	1030
DESTINATION PORT	80
SEQUENCE NUMBER	0
ACKNOWLEDGEMENT NUMBER	0
OFFSET	0x0
RESERVED	0b000000
FLAGS	0b000010
WINDOW	65535
CHECKSUM	0x0000
URGENT POINTER	0x0000
OPTION	
DATA (VARIABLE LENGTH)	
PADDING	0b000...000

Outbound PDU HTTP Request Connection

- ✓ Kemudian pada TCP kita bisa menemukan port source dan destination, kemudian sequence number dan acknowledge number yang bernilai 0 karena ini adalah paket pertama yang dikirim ke HTTP server
- ✓ Dari beberapa header pada Format PDU , kita dapat mempelajari bahwa HTTP request melibatkan TCP dengan port destination adalah 80 (port HTTP service dari server), kemudian port source bernilai 1032 (port ini dapat berubah-ubah dari sisi PC Client)

PDU Information at Device: PC2

OSI Model [Outbound PDU Details](#)

PDU Formats

DST IP:192.168.1.2	
OPT:0x00000000	PADDING:0x00
DATA (VARIABLE LENGTH)	

TCP

0	4	10	16	24	Bits
SOURCE PORT:1032		DESTINATION PORT:80			
SEQUENCE NUMBER:0					
ACKNOWLEDGEMENT NUMBER:0					
OFFS ET:0x	RESERVED : 0b000000	FLAGS:0b 000010	WINDOW:65535		
CHECKSUM:0x0000			URGENT POINTER:0x0000		
OPTION					
DATA (VARIABLE LENGTH)					PADDING: 0b000 ...000

HTTP Request Connection

- ✓ Untuk memulai simulasi, klik sekali icon play di Play Control sebelah Kanan
- ✓ Tunggu sampai paket sampai ke server, kemudian sampai paket diterima kembali oleh client
- ✓ Jika sudah diterima klik kembali tombol play untuk paused

The screenshot displays the Cisco Packet Tracer interface. The main workspace shows a network topology with a central 'Switch-PT Switch1' connected to three devices: 'PC-PT PC2', 'PC-PT PC3', and 'Fa0 Server-PT Server1'. The connections are labeled with interface names: Fa0/1 for PC2, Fa1/1 for PC3, and Fa2/1 for the server. The Simulation Panel on the right is active, showing an Event List with a single entry: a TCP connection from PC2 at 0.000 seconds. Below the event list, the Play Controls section includes a 'Play (Alt + P)' button. The bottom status bar shows the time as 32:23:09.743 and the simulation mode as Realtime.

Vis.	Time(sec)	Last Device	At Device	Type
<input checked="" type="checkbox"/>	0.000	--	PC2	TCP

HTTP ACK response from server

- ✓ Setelah Paket HTTP Reply dari server telah diterima client PC2 (amplop hijau – checklist hijau - di gambar samping), kemudian kita cek kembali PDU Information dari paket tersebut

PDU Information at Device: PC2

OSI Model Inbound PDU Details Outbound PDU Details

At Device: PC2
Source: PC2
Destination: 192.168.1.2

In Layers

Layer7
Layer6
Layer5
Layer 4: TCP Src Port: 80, Dst Port: 1031
Layer 3: IP Header Src. IP: 192.168.1.2, Dest. IP: 192.168.1.3
Layer 2: Ethernet II Header 0001.9754.1668 >> 00E0.F973.BC14
Layer 1: Port FastEthernet0

Out Layers

Layer7
Layer6
Layer5
Layer 4: TCP Src Port: 1031, Dst Port: 80
Layer 3: IP Header Src. IP: 192.168.1.3, Dest. IP: 192.168.1.2
Layer 2: Ethernet II Header 00E0.F973.BC14 >> 0001.9754.1668
Layer 1: Port(s): FastEthernet0

1. FastEthernet0 receives the frame.

Simulation Panel

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC2	TCP
	0.001	PC2	Switch1	TCP
	0.002	Switch1	Server1	TCP
	0.003	Server1	Switch1	TCP
	0.004	Switch1	PC2	TCP
👁	0.004	--	PC2	HTTP
	0.005	PC2	Switch1	TCP
	0.005	--	PC2	HTTP

Event List Filters - Visible Events
HTTP, TCP

HTTP ACK response from server

PDU Information at Device: PC2

OSI Model Inbound PDU Details Outbound PDU Details

At Device: PC2
Source: PC2
Destination: 192.168.1.2

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer 4: TCP Src Port: 80, Dst Port: 1031	Layer 4: TCP Src Port: 1031, Dst Port: 80
Layer 3: IP Header Src. IP: 192.168.1.2, Dest. IP: 192.168.1.3	Layer 3: IP Header Src. IP: 192.168.1.3, Dest. IP: 192.168.1.2
Layer 2: Ethernet II Header 0001.9754.1668 >> 00E0.F973.BC14	Layer 2: Ethernet II Header 00E0.F973.BC14 >> 0001.9754.1668
Layer 1: Port FastEthernet0	Layer 1: Port(s): FastEthernet0

1. FastEthernet0 receives the frame.

Challenge Me << Previous Layer Next Layer >>

- ✓ Setelah Paket HTTP Reply dari server telah diterima client PC2 (amplop hijau – checklist hijau - di gambar samping), kemudian kita cek kembali PDU Information dari paket tersebut
- ✓ Pada Tab OSI Model terlihat info FastEthernet0 receives the frame. Menandakan bahwa interface jaringan FastEthernet0 menerima frame dari HTTP server
- ✓ Kemudian kita bisa melihat juga bahwa pada saat menerima PDU ini (In Layers), PC2 juga mengirimkan kembali paket selanjutnya pada Out Layers

HTTP ACK response from server

PDU Information at Device: PC2

OSI Model Inbound PDU Details Outbound PDU Details

PDU Formats

DST IP:192.168.1.3	
OPT:0x00000000	PADDING:0x00
DATA (VARIABLE LENGTH)	

TCP

0 4 10 16 24 Bits			
SOURCE PORT:80		DESTINATION PORT:1032	
SEQUENCE NUMBER:0			
ACKNOWLEDGEMENT NUMBER:1			
OFFS ET:0x	RESERVED : 0b000000	FLAGS:0b 010010	WINDOW:16384
CHECKSUM:0x0000		URGENT POINTER:0x0000	
OPTION			
DATA (VARIABLE LENGTH)		PADDING: 0b000 ...000	

- ✓ Kemudian selanjutnya kita akan melihat detail Inbound PDU Details dari frame yang diterima
- ✓ Perbedaan yang terlihat yaitu pada TCP, dimana Acknowledge Number menjadi angka 1 dimana ini adalah angka penanda hasil response ACK dari server
- ✓ Dikarenakan ini adalah PDU Inbound, maka pada bagian Source Port menggunakan port 80 (layanan HTTP dari server) dan destination port 1032 (port dari client sebelumnya pada saat melakukan request ke server)

HTTP ACK response from server

PDU Information at Device: PC2

OSI Model Inbound PDU Details **Outbound PDU Details**

PDU Formats

DST IP:192.168.1.2			
OPT:0x00000000	PADDING:0x00		
DATA (VARIABLE LENGTH)			
TCP			
0 4 10 16 24 Bits			
SOURCE PORT:1032	DESTINATION PORT:80		
SEQUENCE NUMBER:1			
ACKNOWLEDGEMENT NUMBER:1			
OFFS ET:0x	RESERVED : 0b000000	FLAGS:0b 010000	WINDOW:65535
CHECKSUM:0x0000		URGENT POINTER:0x0000	
OPTION			
DATA (VARIABLE LENGTH)		PADDING: 0b000 ...000	

- ✓ Kemudian kita akan melihat Outbound PDU details selanjutnya untuk HTTP request ini
- ✓ Outbound PDU ini menandakan bahwa server telah menerima ACK, maka client PC2 mengirimkan PDU HTTP request pada Outbound PDU Details ini
- ✓ Pada header TCP, kita perhatikan bahwa sequence number ini berubah dari angka 0 sebelumnya menjadi nomor 1
- ✓ Kemudian pada acknowledge number tetap di angka 1 (merujuk pada inbound PDU details di PDU ini)

Next Sequence, is HTTP Request

Kemudian, PC2 Client akan melanjutkan outbound PDU request HTTP ke server (setelah pada PDU yang diterima sebelumnya terdapat informasi action outbound untuk memproses PDU request HTTP ke server)

The screenshot displays the Cisco Packet Tracer interface. The main window shows a network diagram with a PC (PC2) connected to a switch (Switch1) via Fa0/1. A PDU Information window is open, showing the following details:

PDU Information at Device: PC2

At Device: PC2
Source: PC2
Destination: HTTP CLIENT

OSI Model

In Layers	Out Layers
Layer7	Layer7:
Layer6	Layer6
Layer5	Layer5
Layer4	Layer 4: TCP Src Port: 1032, Dst Port: 80
Layer3	Layer 3: IP Header Src. IP: 192.168.1.3, Dst. IP: 192.168.1.2
Layer2	Layer 2: Ethernet II Header 00E0.F973.BC14 >> 0001.9754.1668
Layer1	Layer 1: Port(s):

1. The HTTP client sends a HTTP request to the server.

Simulation Panel

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC2	TCP
	0.001	PC2	Switch1	TCP
	0.002	Switch1	Server1	TCP
	0.003	Server1	Switch1	TCP
	0.004	Switch1	PC2	TCP
	0.004	--	PC2	HTTP

Event List Filters - Visible Events: HTTP, TCP

Next Sequence, is HTTP Request

Gambar di samping adalah detail dari outbound PDU HTTP request. Terlihat pada TCP sequence number = 1 (merujuk pada paket outbound PDU detail dari ack server sebelumnya)

Pada Outbound PDU ini, muncul header HTTP Request yang berisi HTTP Data: Accept Language: en-US Accept */*

PDU Information at Device: PC2

OSI Model **Outbound PDU Details**

PDU Formats

DATA (VARIABLE LENGTH)	
<u>TCP</u>	
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100 104 108 112 116 120 124 128 132 136 140 144 148 152 156 160 164 168 172 176 180 184 188 192 196 200 204 208 212 216 220 224 228 232 236 240 244 248 252 256 Bits	
SOURCE PORT:1032	
DESTINATION PORT:80	
SEQUENCE NUMBER:1	
ACKNOWLEDGEMENT NUMBER:1	
OFFS ET:0x	RESERVED : 0b000000
FLAGS:0b 011000	WINDOW:65535
CHECKSUM:0x0000	
URGENT POINTER:0x0000	
OPTION	
DATA (VARIABLE LENGTH)	
PADDING: 0b000 ...000	
<u>HTTP REQUEST</u>	
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100 104 108 112 116 120 124 128 132 136 140 144 148 152 156 160 164 168 172 176 180 184 188 192 196 200 204 208 212 216 220 224 228 232 236 240 244 248 252 256 Bytes	
HTTP Data:Accept-Language: en-us Accept: */*	

Next acknowledge, is HTTP Response

Setelah diteruskan simulasi HTTP Request sebelumnya, kemudian server akan mengirimkan HTTP response ke PC2 Client

Berikut detail dari Inbound PC2 Client, dimana sequence number adalah tetap 1 (karena sebelumnya sequence 1 ini yg mendapat response dari HTTP server)

Yang berubah di sini adalah acknowledge number dari server, yang telah berubah dari Acknowledge Number : 1 menjadi 101

PDU Information at Device: PC2

OSI Model Inbound PDU Details

PDU Formats

DATA (VARIABLE LENGTH)

TCP

0 | 4 | 8 | 10 | 16 | 24 | Bits

SOURCE PORT:80 DESTINATION PORT:1032

SEQUENCE NUMBER:1

ACKNOWLEDGEMENT NUMBER:101

OFFS ET:0x RESERVED : 0b000000 FLAGS:0b 011000 WINDOW:16384

CHECKSUM:0x0000 URGENT POINTER:0x0000

OPTION

DATA (VARIABLE LENGTH) PADDING: 0b000 ...000

HTTP RESPONSE

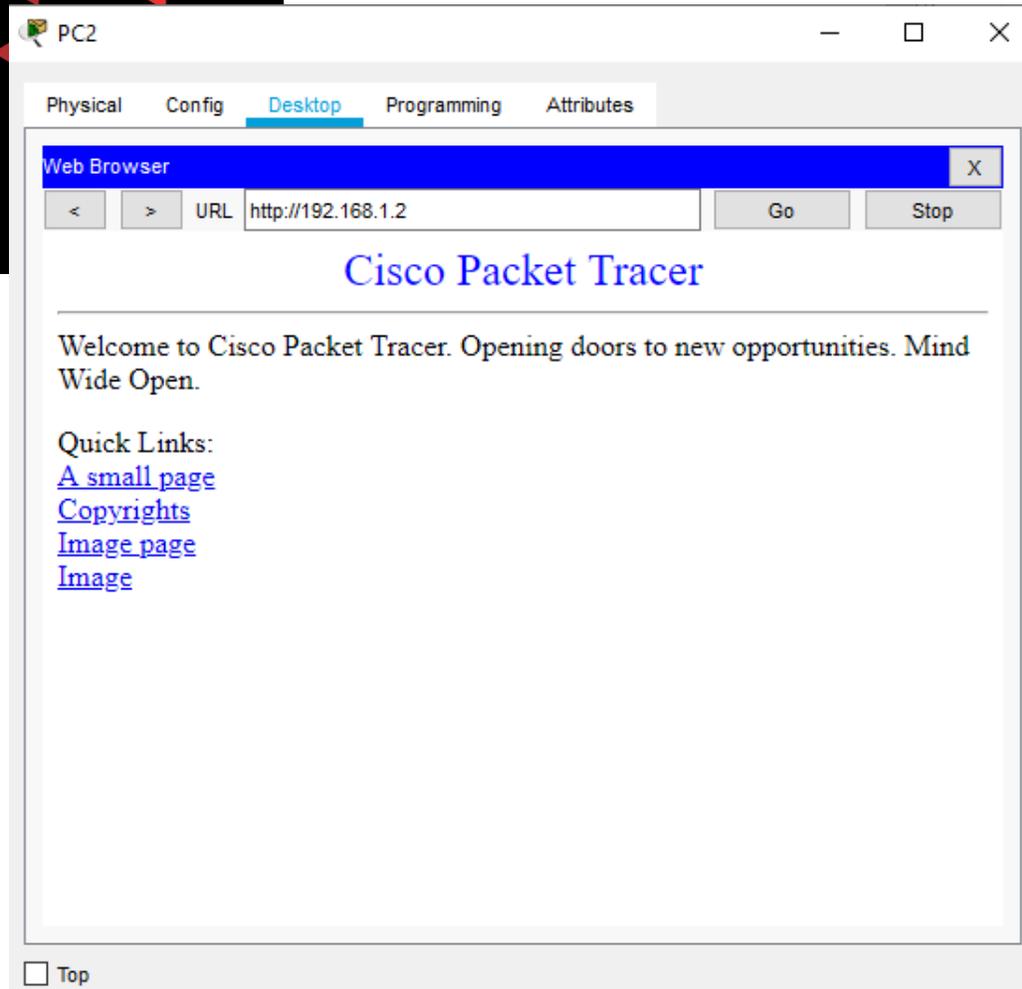
0 | 4 | 8 | 16 | Bytes

HTTP Data:Connection: close
Content-Length: 369



Next acknowledge, is HTTP Response

- ✓ Pada Inbound PDU ini, data dari webserver sudah diterima oleh client PC2.
- ✓ Dengan kata lain, browser di sisi client sudah muncul data tampilan dari webserver



Simulasi Aliran Paket DNS di Jaringan

➤ Simulasi aliran paket DNS ini adalah untuk memberikan kita gambaran mengenai salah satu contoh eksplorasi header UDP

➤ Kali ini kita menggunakan PC3 sebagai client

➤ Buka Command Prompt pada PC3, ketikkan query DNS yaitu nslookup elearning.com

The screenshot displays the Cisco Packet Tracer interface. The network topology includes a central switch (Sw itc) connected to a server (Server-PT Server1) and a PC (PC-PT PC3). The PC's command prompt is open, showing the command 'nslookup elearning.com'. The simulation panel on the right shows an event list with a DNS event at 0.000 seconds.

Vis.	Time(sec)	Last Device	At Device	Type
<input checked="" type="checkbox"/>	0.000	--	PC3	DNS

Simulasi Aliran Paket DNS di Jaringan

Simulation Panel

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC3	DNS

OSI Model

Outbound PDU Details

At Device: PC3
Source: PC3
Destination: 192.168.1.2

In Layers	Out Layers
Layer7	Layer 7: DNS
Layer6	Layer6
Layer5	Layer5
Layer4	Layer 4: UDP Src Port: 1026, Dst Port: 53
Layer3	Layer 3: IP Header Src. IP: 192.168.1.4, Dest. IP: 192.168.1.2
Layer2	Layer 2: Ethernet II Header 0004.9AD8.5B28 >> 0001.9754.1668
Layer1	Layer 1: Port(s): FastEthernet0

1. The DNS client sends a DNS query to the DNS server.

Sesuai setting pada konfigurasi IP di PC3, bahwa alamat DNS berada di server 192.168.1.2

Oleh karena itu, perintah DNS query dari PC3 akan mengirimkan PDU ke server 192.168.1.2 dari PC3 (192.168.1.4)

Simulasi Aliran Paket DNS di Jaringan

Berikut adalah detail dari Outbound PDU query DNS

Mirip pada request HTTP, header Ethernet di sini juga memuat format yang sama dimana terdapat source MAC address (PC3) dan destination MAC address (server)

Pada header IP juga terlihat source IP PC3 (192.168.1.4) dan destination IP Server (192.168.1.2)

The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a Server-PT connected to a Switch-PT, which is connected to PC-PT. The main window shows the 'PDU Information at Device: PC3' window, displaying the 'Outbound PDU Details' for an Ethernet II frame. The frame structure is as follows:

Ethernet II		Bytes	
PREAMBLE: 101010..10	DEST ADDR: 0001.9754.1668		
SRC ADDR: 0004.9A41.6175	TYP E: 0x	DATA (VARIABLE LENGTH)	FCS: 0x00000000

IP				Bits			
VER: 4	IHL	DSCP: 0x00	TL: 57				
ID: 0x0004		FLA GS: 0	FRAG OFFSET: 0x000				
TTL: 128	PRO: 0x11	CHKSUM					
SRC IP: 192.168.1.4							
DST IP: 192.168.1.2							
OPT: 0x00000000		PADDING: 0x00					
DATA (VARIABLE LENGTH)							

The right side of the interface shows a capture window with a table of captured packets:

Last Device	At Device	Type
--	PC3	DNS

Below the table, there are playback controls and a list of visible events including Bluetooth, CAPWAP, CDP, DHCP, DNS, DTP, EAPOL, EIGRP, HTTP, HTTPS, ICMP, IPsec, ISAKMP, IoT, LACP, LLDP, NTP, OSPF, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, NMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, and VTP.

Simulasi Aliran Paket DNS di Jaringan

Bagian yang berbeda dari PDU HTTP dengan DNS query ini

adalah bagian ini, yaitu jika HTTP menggunakan protocol TCP, pada DNS menggunakan UDP

Source Port 1025 (berbeda di setiap client), destination port 53 (DNS service)

Kemudian terdapat juga header DNS message dan DNS query ke NAME: elearning.com

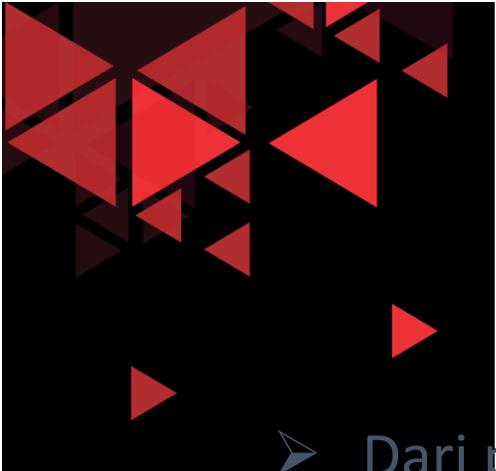
The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a Server-PT connected to a Switch-PT, which is connected to a PC-PT. The PDU Information window is open, showing the following details:

PDU Information at Device: PC3

OSI Model: Outbound PDU Details

PDU Formats:

- UDP**
 - 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 | 256 | 264 | 272 | 280 | 288 | 296 | 304 | 312 | 320 | 328 | 336 | 344 | 352 | 360 | 368 | 376 | 384 | 392 | 400 | 408 | 416 | 424 | 432 | 440 | 448 | 456 | 464 | 472 | 480 | 488 | 496 | 504 | 512 | 520 | 528 | 536 | 544 | 552 | 560 | 568 | 576 | 584 | 592 | 600 | 608 | 616 | 624 | 632 | 640 | 648 | 656 | 664 | 672 | 680 | 688 | 696 | 704 | 712 | 720 | 728 | 736 | 744 | 752 | 760 | 768 | 776 | 784 | 792 | 800 | 808 | 816 | 824 | 832 | 840 | 848 | 856 | 864 | 872 | 880 | 888 | 896 | 904 | 912 | 920 | 928 | 936 | 944 | 952 | 960 | 968 | 976 | 984 | 992 | 1000 | Bits
 - SOURCE PORT:1025
 - DESTINATION PORT:53
 - LENGTH:0x0025
 - CHECKSUM:0
 - DATA (VARIABLE LENGTH)
- DNS Message**
 - 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 | 256 | 264 | 272 | 280 | 288 | 296 | 304 | 312 | 320 | 328 | 336 | 344 | 352 | 360 | 368 | 376 | 384 | 392 | 400 | 408 | 416 | 424 | 432 | 440 | 448 | 456 | 464 | 472 | 480 | 488 | 496 | 504 | 512 | 520 | 528 | 536 | 544 | 552 | 560 | 568 | 576 | 584 | 592 | 600 | 608 | 616 | 624 | 632 | 640 | 648 | 656 | 664 | 672 | 680 | 688 | 696 | 704 | 712 | 720 | 728 | 736 | 744 | 752 | 760 | 768 | 776 | 784 | 792 | 800 | 808 | 816 | 824 | 832 | 840 | 848 | 856 | 864 | 872 | 880 | 888 | 896 | 904 | 912 | 920 | 928 | 936 | 944 | 952 | 960 | 968 | 976 | 984 | 992 | 1000 | Bits
 - QDCOUNT: 1
 - ANCOUNT: 0
 - NSCOUNT: 0
 - ARCOUNT: 0
- DNS Query**
 - 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 | 256 | 264 | 272 | 280 | 288 | 296 | 304 | 312 | 320 | 328 | 336 | 344 | 352 | 360 | 368 | 376 | 384 | 392 | 400 | 408 | 416 | 424 | 432 | 440 | 448 | 456 | 464 | 472 | 480 | 488 | 496 | 504 | 512 | 520 | 528 | 536 | 544 | 552 | 560 | 568 | 576 | 584 | 592 | 600 | 608 | 616 | 624 | 632 | 640 | 648 | 656 | 664 | 672 | 680 | 688 | 696 | 704 | 712 | 720 | 728 | 736 | 744 | 752 | 760 | 768 | 776 | 784 | 792 | 800 | 808 | 816 | 824 | 832 | 840 | 848 | 856 | 864 | 872 | 880 | 888 | 896 | 904 | 912 | 920 | 928 | 936 | 944 | 952 | 960 | 968 | 976 | 984 | 992 | 1000 | Bits
 - NAME:elearning.com
 - TYPE:4
 - CLASS:1
 - TTL:86400
 - LENGTH:0



Simulasi Aliran Paket DNS di Jaringan

- Dari paket pertama yang dikirim oleh PC3, dapat kita simpulkan bahwa layanan DNS menggunakan protocol UDP dimana pada PDU outbound pertama dari PC3 ini tidak terdapat paket untuk membuat connection request terlebih dahulu
 - Ini yang menandakan bahwa layanan DNS ini bersifat unreliable dikarenakan menggunakan protocol transport UDP pada PDU yang dikirimkan ke server
- 

Simulasi Aliran Paket DNS di Jaringan

Setelah PDU mendapat respon dari server, maka akan muncul jawaban di command prompt PC3 bahwa elearning.com berada pada IP 192.168.1.2

Sampai sini proses aliran paket DNS sudah selesai

The screenshot shows the Cisco Packet Tracer interface. On the left, a network diagram shows a Server-PT (Server1) connected to a Switch-PT (Switch1), which is connected to a PC-PT (PC3). The PC3 window is open, showing the Command Prompt with the following output:

```
Packet Tracer PC Command Line 1.0
C:\>nslookup elearning.com

Server: [192.168.1.2]
Address: 192.168.1.2

Non-authoritative answer:
Name:   elearning.com
Address: 192.168.1.2

C:\>
```

The Event List panel on the right shows the following events:

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC3	DNS
	0.001	PC3	Switch1	DNS
	0.002	Switch1	Server1	DNS
	0.003	Server1	Switch1	DNS
👁	0.004	Switch1	PC3	DNS

The Event List Filters section shows the following visible events: ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP.

Simulasi Aliran Paket DNS di Jaringan

- Berikut Detail dari PDU Inbound hasil response dari server pada PC3
- Terlihat UDP source Port dari server yaitu port 53 (DNS service)
- Destination port 1025 (port dari client sebelumnya saat mengirim query ke server)
- IP Source dari server (192.168.1.2) dan destination IP adalah PC3 192.168.1.4

PDU Information at Device: PC3

OSI Model Inbound PDU Details

At Device: PC3
Source: PC3
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7: DNS	Layer7
Layer6	Layer6
Layer5	Layer5
Layer 4: UDP Src Port: 53, Dst Port: 1025	Layer4
Layer 3: IP Header Src. IP: 192.168.1.2, Dest. IP: 192.168.1.4	Layer3
Layer 2: Ethernet II Header 0001.9754.1668 >> 0004.9A41.6175	Layer2
Layer 1: Port FastEthernet0	Layer1

1. FastEthernet0 receives the frame.

Challenge Me << Previous Layer Next Layer >>

Simulasi Aliran Paket DNS di Jaringan

- Di samping ini adalah detail dari Inbound PDU yang diterima oleh PC3 hasil response dari DNS server
- Terlihat di bawah DNS query terdapat DNS Answer pada PDU ini
- DNS answer ini adalah response langsung dari DNS query yang direquest ke server sebelumnya pada PDU outbound PC3
- DNS answer ini menunjukkan bahwa NAME: elearning.com pada IP: 192.168.1.2

PDU Information at Device: PC3

OSI Model Inbound PDU Details

PDU Formats

LENGTH:4	IP:192.168.1.2
----------	----------------

DNS Query

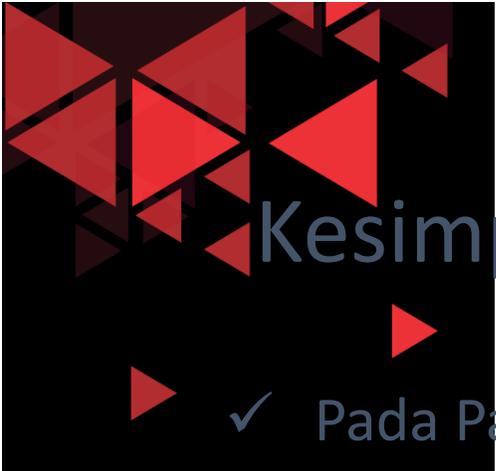
0 | 8 | 16 | 24 | Bits

NAME:elearning.com	
TYPE:4	CLASS:1
TTL:86400	
LENGTH:0	

DNS Answer

0 | 8 | 16 | 24 | Bits

NAME:elearning.com	
TYPE:4	CLASS:1
TTL:86400	
LENGTH:4	IP:192.168.1.2



Kesimpulan

- ✓ Pada Packet Tracer, kita dapat mensimulasikan aliran PDU dari client ke server
 - ✓ PDU yang keluar maupun diterima oleh semua perangkat di packet tracer dapat kita lihat secara detail semua format header protocol masing-masing di setiap layer OSI
 - ✓ Pada HTTP request terbukti menggunakan protocol TCP dimana protocol ini sebelum mengirimkan request HTTP akan mengirimkan request connection terlebih dahulu. Oleh karena itu TCP ini bersifat reliable atau juga disebut connection oriented
 - ✓ Pada DNS request/query terbukti menggunakan protocol UDP dimana protocol ini langsung mengirimkan PDU query ke server DNS tanpa ada request connection terlebih dahulu. Oleh karena itu UDP terbukti bersifat unreliable atau juga disebut connectionless
- 