

# ARQUITECTURA Y SISTEMAS OPERATIVOS

## Trabajo Práctico: Explorando los Modelos OSI y TCP/IP

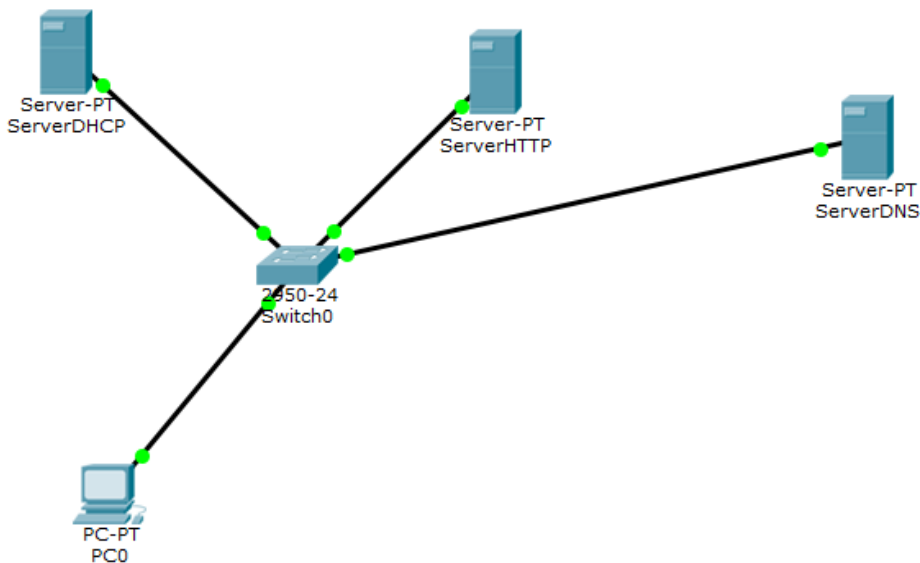
Semana II – Sussini Patricio

### Consigna:

#### 1. Tareas:

##### Parte 1: Configuración de la Red

###### 1- Diseño de la red: topología



###### 2 - Configuración de Dispositivos:

- Configuro el servidor DHCP:

ServerDHCP

Physical Config Services Desktop Custom Interface

**SERVICES**

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP

**DHCP**

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 192.168.1.1

DNS Server: 192.168.1.2

Start IP Address: 192.168.1.100

Subnet Mask: 255.255.0.0

Maximum number of Users: 512

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP
server...	0.0.0.0	0.0.0.0	169.254.0.0	255.255.0.0	512	0.0.0.0

- Configuro el servidor DNS:

Primero con su IP y luego su servicio DNS con los datos provistos:

The screenshot shows the 'IP Configuration' window in the ServerDNS application. The 'Interface' is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' option is selected. The 'IP Address' is '192.168.1.2', the 'Subnet Mask' is '255.255.255.0', and the 'Default Gateway' and 'DNS Server' fields are empty.

The screenshot shows the 'Services' window in the ServerDNS application. The 'DNS' service is selected in the left sidebar. The 'DNS Service' is turned 'On'. Under 'Resource Records', a record is added with 'Name' 'ejemplo.com', 'Type' 'A Record', and 'Address' '192.168.1.3'. Below this is a table with columns 'No.', 'Name', 'Type', and 'Detail'.

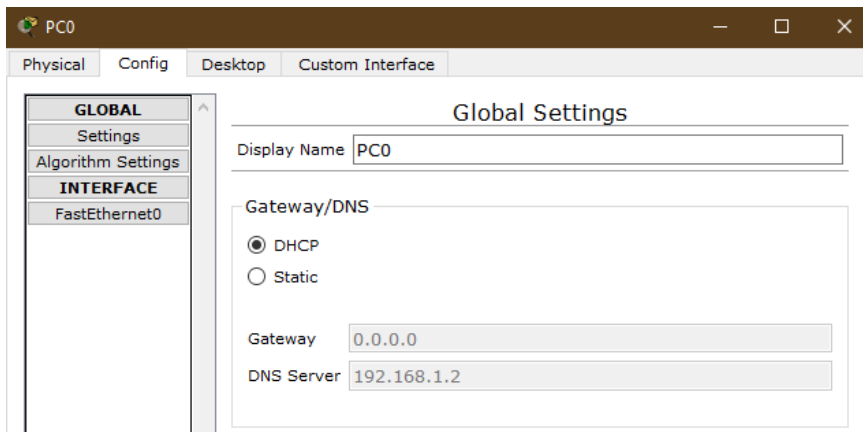
- Configuro el servidor HTTP:

The screenshot shows the 'IP Configuration' window in the ServerHTTP application. The 'Interface' is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' option is selected. The 'IP Address' is '192.168.1.3', the 'Subnet Mask' is '255.255.255.0', the 'Default Gateway' is '192.168.1.3', and the 'DNS Server' is '192.168.1.2'.

The screenshot shows the 'Services' window in the ServerHTTP application. The 'HTTP' service is selected in the left sidebar. The 'HTTP' service is turned 'On' and the 'HTTPS' service is turned 'Off'. Below this is a 'File Manager' table with columns 'File Name', 'Edit', and 'Delete'.

	File Name	Edit	Delete
1	copyrights.html	(edit)	(delete)
2	cscoptlogo177x...		(delete)
3	helloworld.html	(edit)	(delete)
4	image.html	(edit)	(delete)
5	index.html	(edit)	(delete)

- Configuro el Gateway en la computadora para obtener direcciones ip automaticamente (DHCP)



## Parte 2: Verificación de la Red

### 1- Pruebas iniciales:

Pings de la PC0 a los servers:

```
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=2ms TTL=128
Reply from 192.168.1.1: bytes=32 time=4ms TTL=128
Reply from 192.168.1.1: bytes=32 time=0ms TTL=128
Reply from 192.168.1.1: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 2ms
```

```
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

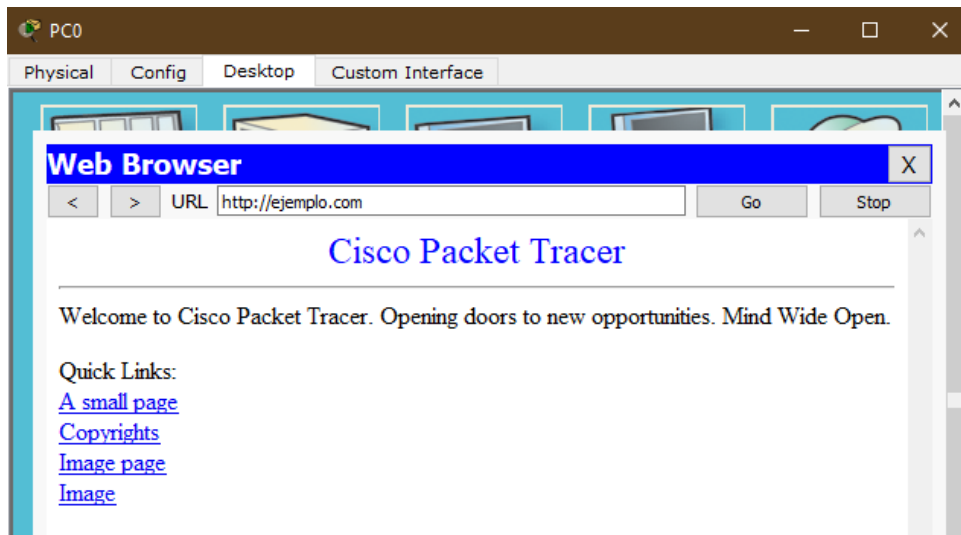
```
PC>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=1ms TTL=128

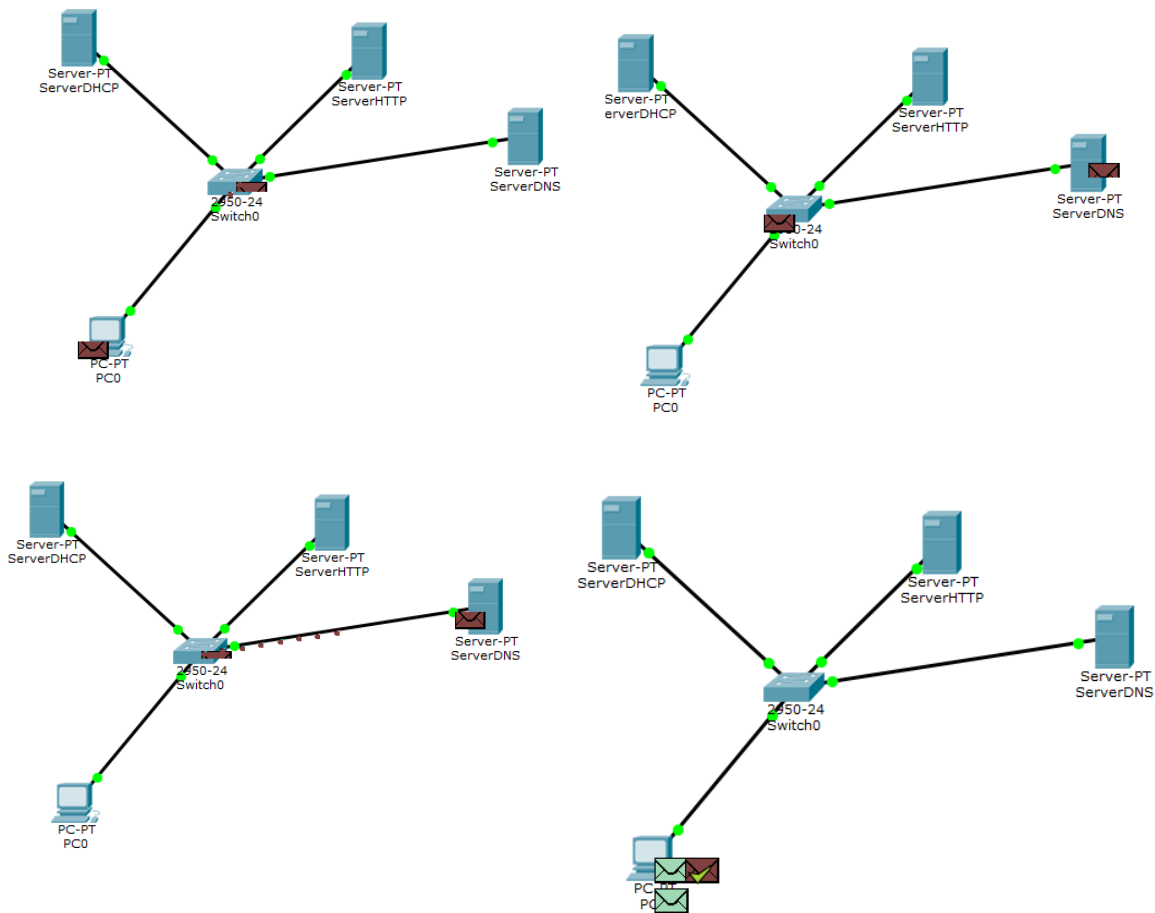
Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

## 2- Prueba del DNS:

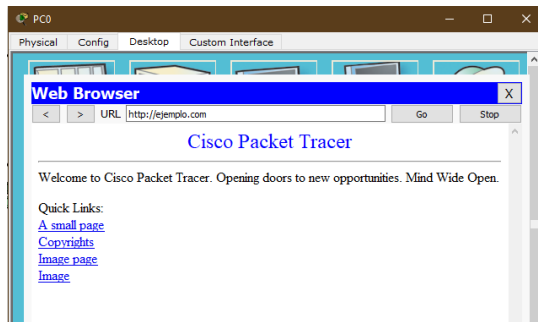


## 3- Modo Simulation:

Genero trafico con una request a ejemplo.com:



Y como podemos observar, se accede al sitio.



**PDU Information at Device: PC0**

OSI Model | Outbound PDU Details

At Device: PC0  
Source: PC0  
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7:	Layer 7: DNS
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4:	Layer 4: UDP Src Port: 1045, Dst Port: 53
Layer 3:	Layer 3: IP Header Src. IP: 192.168.1.1, Dst. IP: 192.168.1.2
Layer 2:	Layer 2: Ethernet II Header 0010.1197.3235 >> 000C.8507.0B29
Layer 1:	Layer 1: Port(s): FastEthernet0

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

**PDU Information at Device: ServerDNS**

OSI Model | Inbound PDU Details | Outbound PDU Details

At Device: ServerDNS  
Source: PC0  
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7: DNS	Layer 7: DNS
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4: UDP Src Port: 1045, Dst Port: 53	Layer 4: UDP Src Port: 53, Dst Port: 1045
Layer 3: IP Header Src. IP: 192.168.1.1, Dst. IP: 192.168.1.2	Layer 3: IP Header Src. IP: 192.168.1.2, Dst. IP: 192.168.1.1
Layer 2: Ethernet II Header 0010.1197.3235 >> 000C.8507.0B29	Layer 2: Ethernet II Header 000C.8507.0B29 >> 0010.1197.3235
Layer 1: Port FastEthernet0	Layer 1: Port(s): FastEthernet0

1. The DNS server receives a DNS query.  
2. The name queried resolved locally

**PDU Information at Device: Switch0**

OSI Model | Inbound PDU Details | Outbound PDU Details

At Device: Switch0  
Source: PC0  
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7:	Layer 7:
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4:	Layer 4:
Layer 3:	Layer 3:
Layer 2: Ethernet II Header 0010.1197.3235 >> 000C.8507.0B29	Layer 2: Ethernet II Header 0010.1197.3235 >> 000C.8507.0B29
Layer 1: Port FastEthernet0/1	Layer 1: Port(s): FastEthernet0/2

1. FastEthernet0/1 receives the frame.

**PDU Information at Device: Switch0**

OSI Model | Inbound PDU Details | Outbound PDU Details

At Device: Switch0  
Source: PC0  
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7:	Layer 7:
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4:	Layer 4:
Layer 3:	Layer 3:
Layer 2: Ethernet II Header 000C.8507.0B29 >> 0010.1197.3235	Layer 2: Ethernet II Header 000C.8507.0B29 >> 0010.1197.3235
Layer 1: Port FastEthernet0/2	Layer 1: Port(s): FastEthernet0/1

1. FastEthernet0/2 receives the frame.

**PDU Information at Device: PC0**

OSI Model | Inbound PDU Details

At Device: PC0  
Source: PC0  
Destination: 192.168.1.2

In Layers	Out Layers
Layer 7: DNS	Layer 7:
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4: UDP Src Port: 53, Dst Port: 1045	Layer 4:
Layer 3: IP Header Src. IP: 192.168.1.2, Dst. IP: 192.168.1.1	Layer 3:
Layer 2: Ethernet II Header 000C.8507.0B29 >> 0010.1197.3235	Layer 2:
Layer 1: Port FastEthernet0	Layer 1:

1. FastEthernet0 receives the frame.

**PDU Information at Device: PC0**

OSI Model

At Device: PC0  
Source: PC0  
Destination: 192.168.1.3

In Layers	Out Layers
Layer 7:	Layer 7:
Layer 6:	Layer 6:
Layer 5:	Layer 5:
Layer 4:	Layer 4:
Layer 3:	Layer 3:
Layer 2:	Layer 2:
Layer 1:	Layer 1:

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

## 2- Preguntas de Análisis:

A. ¿Cuál es la función de las capas 2 y 3 del modelo OSI en esta red? ¿A qué capas del modelo TCP/IP corresponden?

- En esta red la función de la capa 2 corresponde al envío de paquetes de la PC0 al switch usando la MAC destino del servidor.
- El switch guarda esa MAC para reenviar el paquete correctamente.
- La capa 3 maneja los paquetes desde la PC0 hasta el servidor HTTP en base a su IP
- El servidor DNS responde con la IP de su dominio.

Corresponden a la capa 2 Acceso a Red y manejo de MAC, Switches, LAN

Corresponden a la capa 3 Internet y manejo de IP y rutas de direcciones.

B. ¿Por qué es importante el protocolo TCP para el servidor HTTP y UDP para el servidor DNS?

- HTTP usa TCP porque necesita: Conexión confiable, Control de errores, Orden de paquetes y Establecimiento de conexión. El TCP asegura que los datos lleguen completos y ordenadamente.
- DNS usa UDP porque necesita: Baja latencia, Simplicidad y eficiencia y Reintento si falla. El UDP es más rápido que el TCP porque no necesita conexión previa y su tráfico es pequeño.

C. ¿Qué sucede si el servidor DNS no está correctamente configurado?

- Sucede que si el servidor DNS no está correctamente configurado no se resuelven los nombres, sale error de DNS pero de todos modos se puede seguir accediendo por IP.

## 3. Resultados Esperados:

Las respuestas se encuentran en los pasos anteriores.