

# Redes de Computadores – RECO

## Introducción a Routers y protocolos ICMP y ARP

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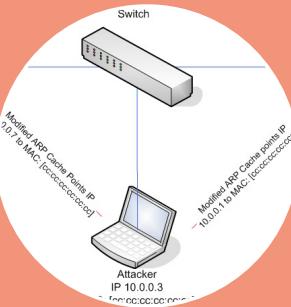
# AGENDA



Routers



Protocolo  
ICMP



Protocolo  
ARP



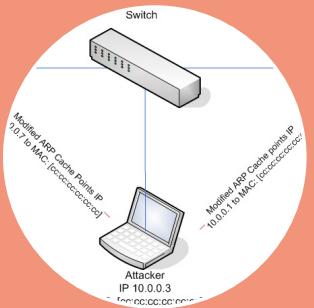
# AGENDA



Routers



Protocolo  
ICMP

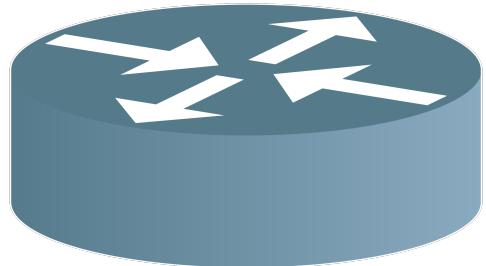


Protocolo  
ARP

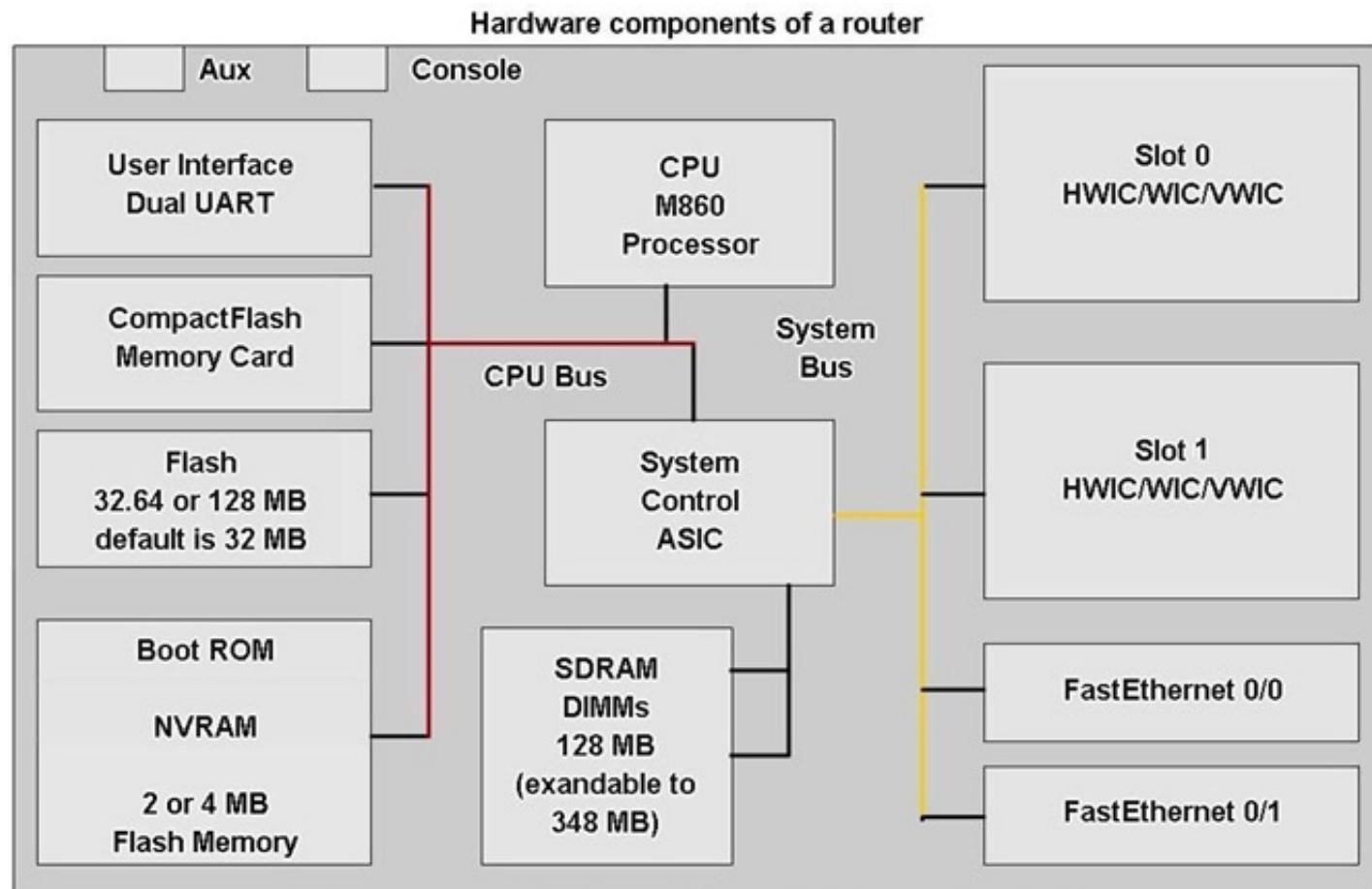


# ROUTERS

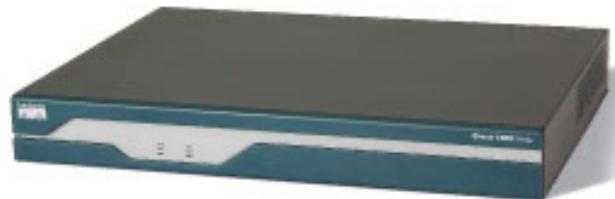
- Arranque del router
- Archivos de configuración
- Niveles de privilegios del IOS
- Comandos



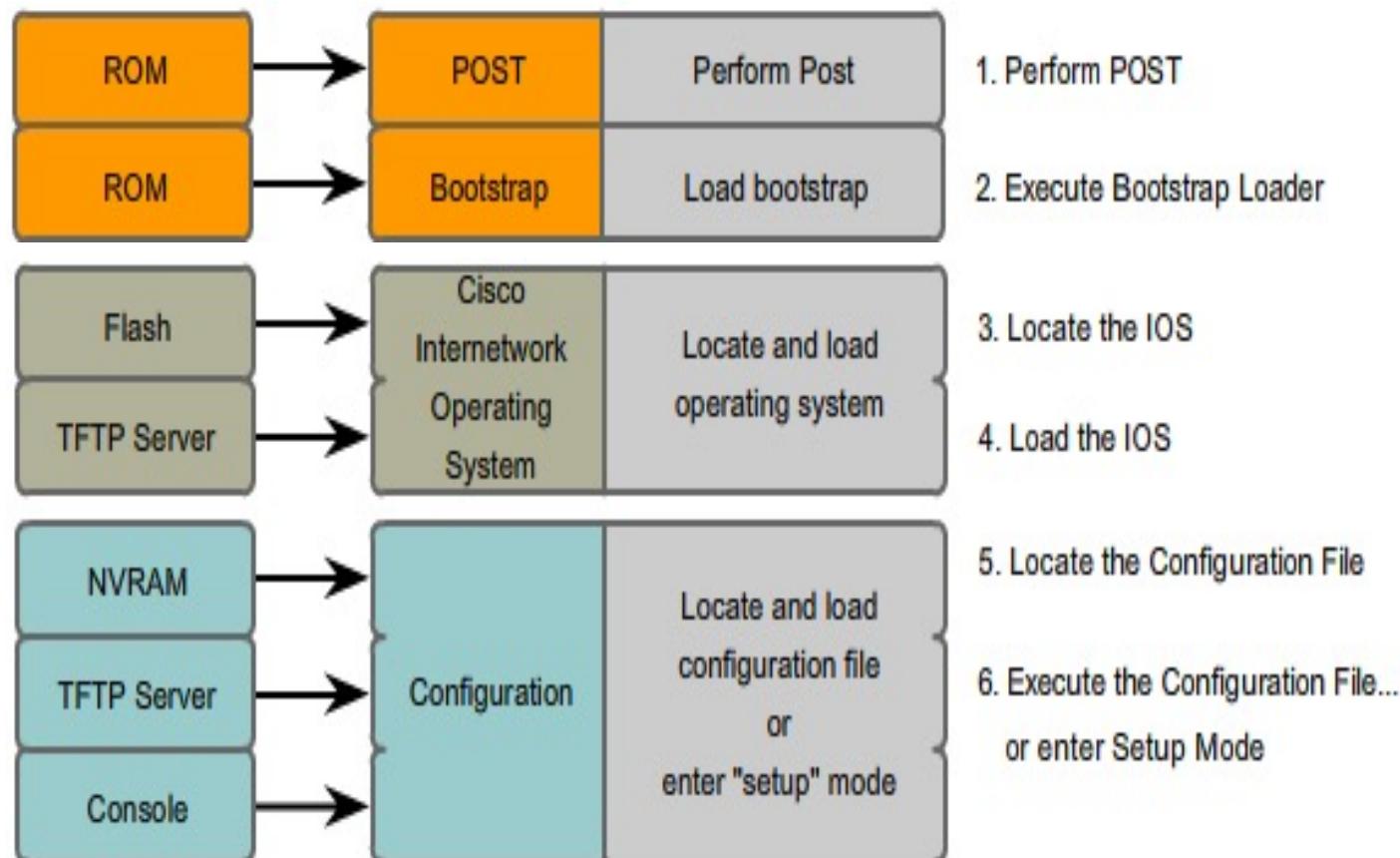
# COMPONENTES DE UN ROUTER



# COMPONENTES DE UN ROUTER

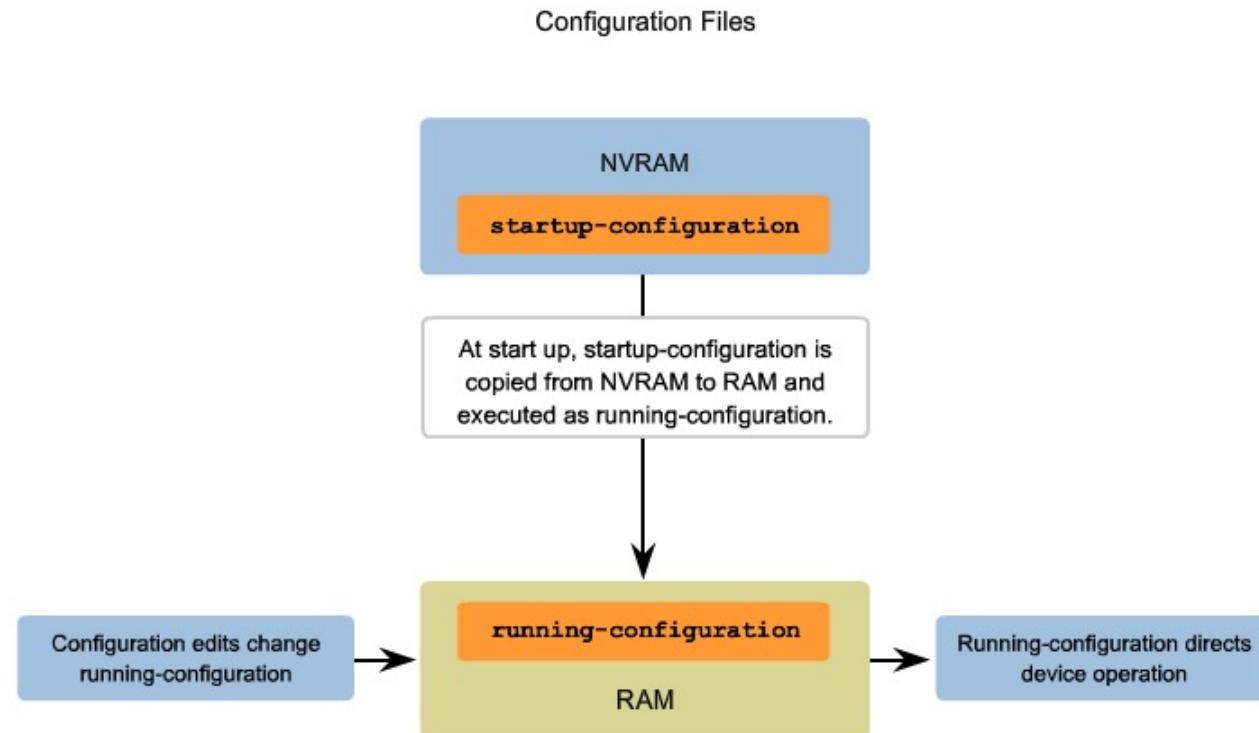


# ARRANQUE DEL ROUTER





# ARCHIVOS DE CONFIGURACIÓN



Fuente: CCNA2 Exploration

# NIVELES DE PRIVILEGIOS DEL IOS

## IOS Mode Hierarchical Structure

```
User EXEC Command-Router>
ping
show (limited)
enable
etc...
```

```
Privileged EXEC Commands-Router#
all User EXEC Commands
debug commands
reload
configure
etc..
```

```
Global Configuration Commands-Router(config)#
hostname
enable secret
ip route
```

```
interface ethernet
    serial
    bri
    etc.
```

```
Interface Commands-Router(config-if)#
    ip address
    ipx address1
    encapsulation
    shutdown/ no shutdown
    etc..
```

```
router      rip
            ospf
            eigrp
            etc..
```

```
Routing Engine Commands-Router(config-
router)#
    network
    version
    auto summary
    etc...
```

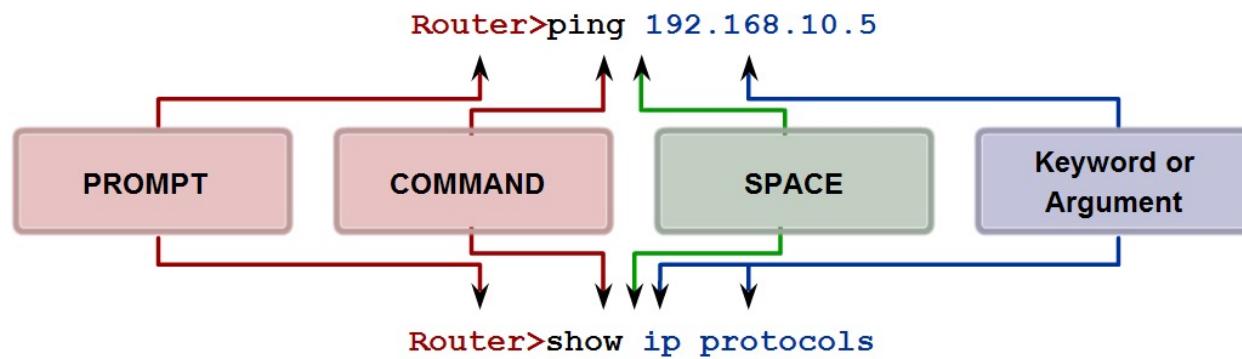
```
line        vty
            console
            etc..
```

```
Line Commands-Router(config-line)#
    password
    login
    modem commands
    etc..
```



# ESTRUCTURA DE LOS COMANDOS DEL IOS

## Basic IOS Command Structure



**Prompt commands** are followed by a space and then the keyword or arguments.

Fuente: CCNA2 Exploration



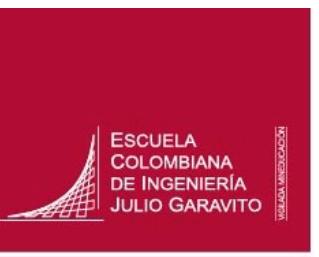
# CONFIGURACIÓN BÁSICA



- Nombre del router
- Banner (Aviso antes de ingresar al router)
- Passwords
- Configuración de las interfaces

## Importante

- Verificar configuración y funcionamiento
- Grabar la configuración



# COMANDOS BÁSICOS

## Basic Router Configuration Command Syntax

Naming the router	Router(config)#hostname name
Setting Passwords	Router(config)#enable secret password Router(config)#line console 0 Router(config-line)#password password Router(config-line)#login Router(config)#line vty 0 4 Router(config-line)#password password Router(config-line)#login
Configuring a message-of-the-day banner	Router(config)#banner motd # message #

Fuente: CCNA2 Exploration



# COMANDOS BÁSICOS



## Basic Router Configuration Command Syntax

Configuring an interface	<code>Router(config)#interface type number</code> <code>Router(config-if)#ip address address mask</code> <code>Router(config-if)#description description</code> <code>Router(config-if)#no shutdown</code>
Saving changes on a router	<code>Router#copy running-config startup-config</code>
Examining the output of <code>show</code> commands	<code>Router#show running-config</code> <code>Router#show ip route</code> <code>Router#show ip interface brief</code> <code>Router#show interfaces</code>

Fuente: CCNA2 Exploration



# COMANDOS BÁSICOS

➤ Borrar la configuración del router

```
# Erase startup-config  
# Reload
```

➤ Buscar comandos disponibles en cualquier modo

```
# ?
```

➤ No revisar configuración remota

```
# no ip domain-lookup      (no dns. En modo config)
```

➤ Grabar la configuración

```
# copy running-config startup-config
```

➤ Sincronizar la línea de comandos y los mensajes del router

```
# line console 0 | VTY 0 4
```

```
# loggin synchronous          (los mensajes de consola no estorben el comando)
```



# OTROS COMANDOS

Comandos para revisar configuración

```
# show ip interface brief  
# show controllers interface  
# debug ip route  
# Show running-config|  
# Show startup-config  
# Show interface interface slot/puerto  
# debug ip route  
# undebug ip route | all
```

# ALGUNAS PRECISIONES

## Conexiones Serials

- Cable V.35
- Conexión router a la WAN
- Requiere sincronización
- DTE – Data Terminal Equipment
- DCE – Data Communication Equipment



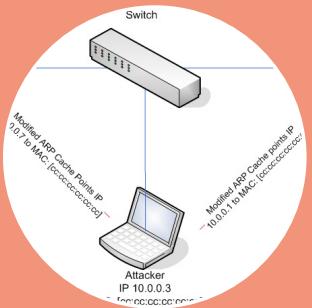
# AGENDA



Routers



Protocolo  
ICMP



Protocolo  
ARP





# INTERNET PROTOCOL (IP) ICMP





# INTERNET PROTOCOL (IP)

## ICMP



- Internet Control Protocol
- Proporciona información de control sobre la subred
- RFC 792, 1885
- Se utiliza el paquete IP básico y los primeros bytes de datos son el mensaje ICMP
- Dependiendo de lo que digan los primeros bits del mensaje ICMP, se leen los demás bits de datos



ICMP Type	Code	Description
0	0	echo reply (to ping)
3	0	destination network unreachable
3	1	destination host unreachable
3	2	destination protocol unreachable
3	3	destination port unreachable
3	6	destination network unknown
3	7	destination host unknown
4	0	source quench (congestion control)
8	0	echo request
9	0	router advertisement
10	0	router discovery
11	0	TTL expired
12	0	IP header bad

**Figure 4.23** ♦ ICMP message types

0                  8                  16                  31

<http://ditec.um.es/iaso/docs/tut-tcpip/3376c24.html>

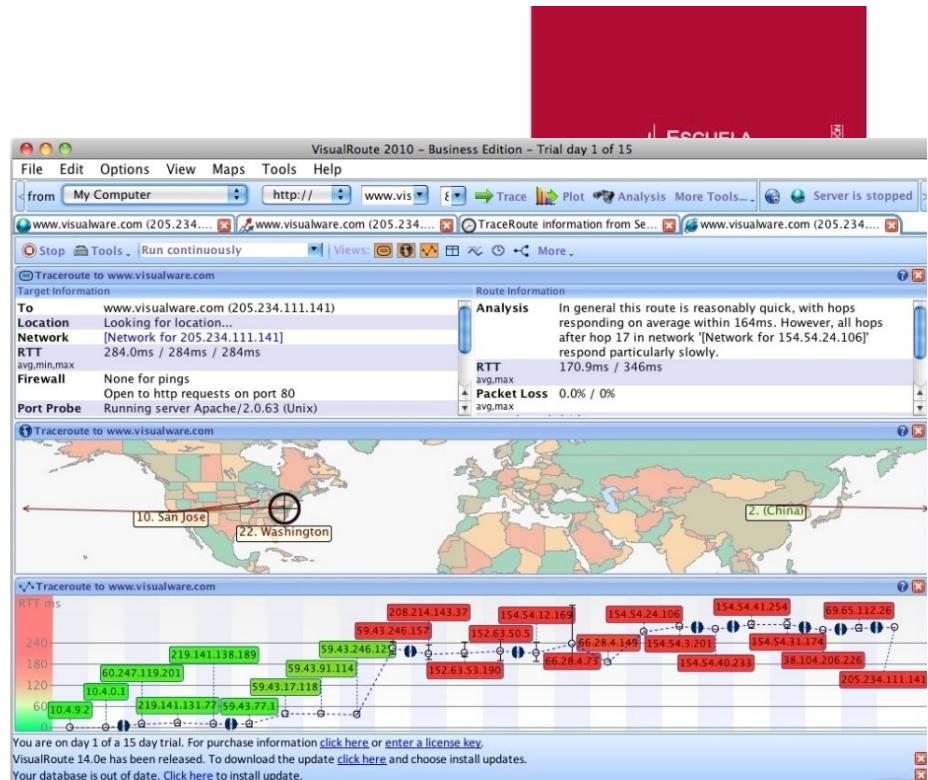
Type	Code	Checksum
ICMP data (depending on the type of message)	.....	

# INTERNET PROTOCOL (IP) ICMP

## Ping

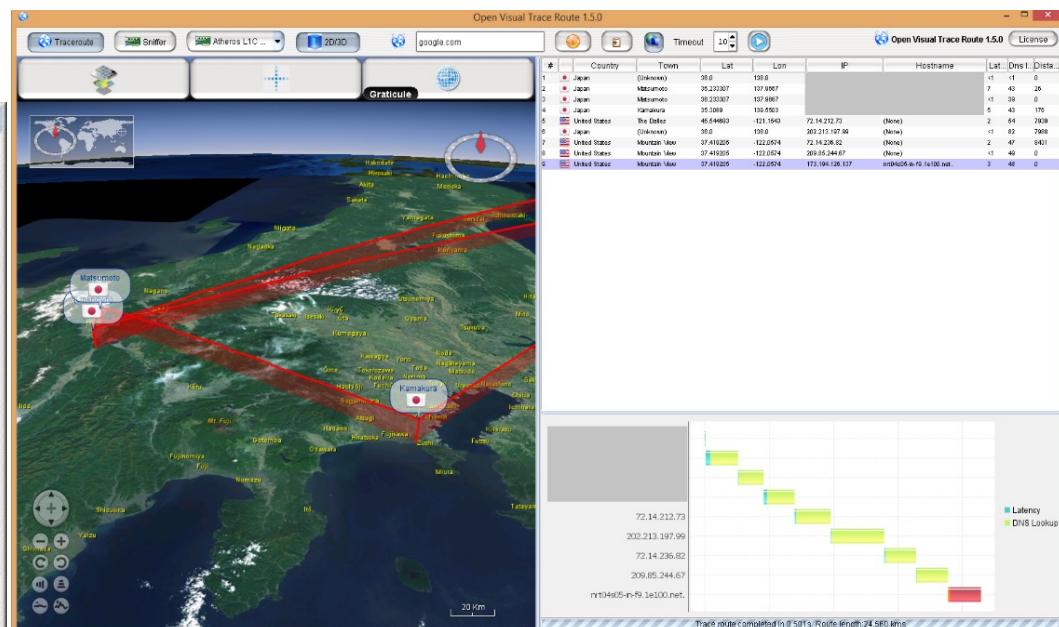
## Tracert – traceroute

- Visual Trace Route Tool.
  - <http://www.sarangworld.com/TRACEROUTE/>
  - <http://sourceforge.net/projects/openvisualtrace/>
  - <http://www.yougetsignal.com/tools/visual-tracert/>
  - <http://www.monitis.com/traceroute/>
  - <http://visualroute.visualware.com/>



```
C:\ Command Prompt
C:\>tracert mediacollege.com
Tracing route to mediacollege.com [66.246.3.197]
over a maximum of 30 hops:
1 <10 ms <10 ms <10 ms 192.168.1.1
2 240 ms 421 ms 70 ms 219-88-164-1.jetstream.xtra.co.nz [219.88.164.1]
3 20 ms 30 ms 30 ms 210.55.205.123
4 * * * Request timed out.
5 30 ms 30 ms 40 ms 202.50.245.197
6 30 ms 40 ms 40 ms g2-0-3.tkbr3.global-gateway.net.nz [202.37.245.140]
7 30 ms 30 ms 40 ms so-1-2-1-0.akbr3.global-gateway.net.nz [202.50.116.161]
8 160 ms 161 ms 160 ms p1-3.sjbr1.global-gateway.net.nz [202.50.116.178]
9 160 ms 171 ms 160 ms so-1-3-0-0.pabr3.global-gateway.net.nz [202.37.245.230]
10 160 ms 161 ms 170 ms paol-br1-g2-1-101.gnaps.net [198.32.176.165]
11 180 ms 181 ms 180 ms lax1-br1-p2-1.gnaps.net [199.232.44.51]
12 170 ms 170 ms 171 ms lax1-br1-ge-0-1-0.gnaps.net [199.232.44.50]
13 240 ms 241 ms 240 ms nyc-n20-ge2-2-0.gnaps.net [199.232.44.21]
14 240 ms 251 ms 250 ms ash-n20-ge1-0-0.gnaps.net [199.232.131.361]
15 241 ms 248 ms 250 ms 0503.ge-0-0-0.gbr1.ash.nac.net [207.99.39.157]
16 251 ms 268 ms 250 ms 0.so-2-2-0.gbr2.nwr.nac.net [209.123.11.29]
17 250 ms 269 ms 261 ms 0.so-0-3-0.gbr1.oct.nac.net [209.123.11.233]
18 250 ms 269 ms 261 ms 209.123.182.243
19 250 ms 269 ms 261 ms sol.yourhost.co.nz [66.246.3.197]

Trace complete.
C:\>
```



# INTERNET PROTOCOL (IP) ADMINISTRACIÓN DE LA SUBRED

Verificar el estado

Informar si hay problemas

Mirar rutas



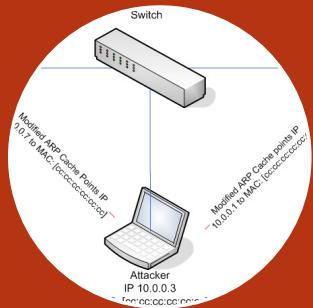
# AGENDA



Routers



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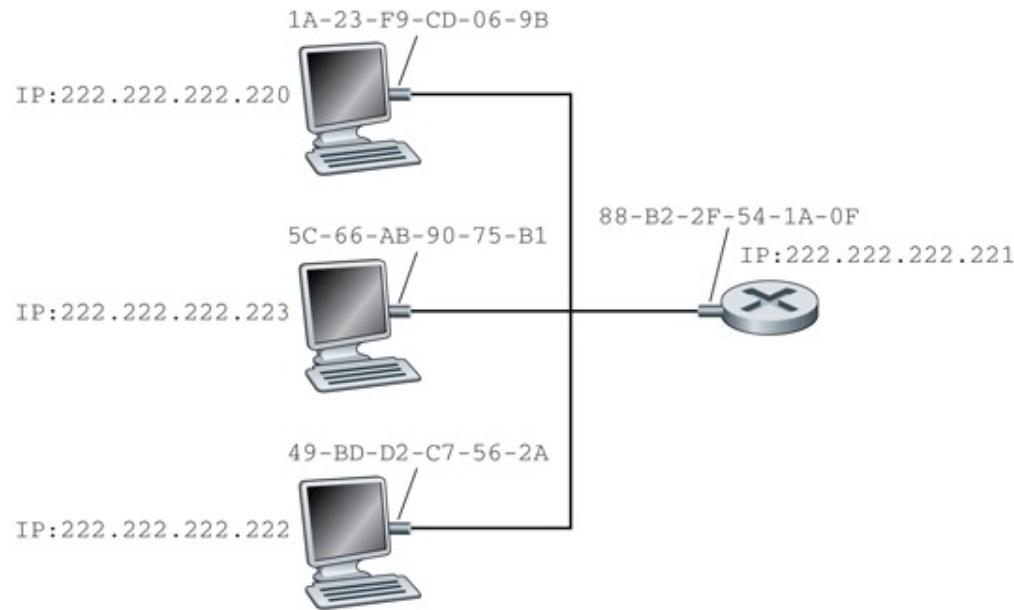


Protocolo  
ARP



# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

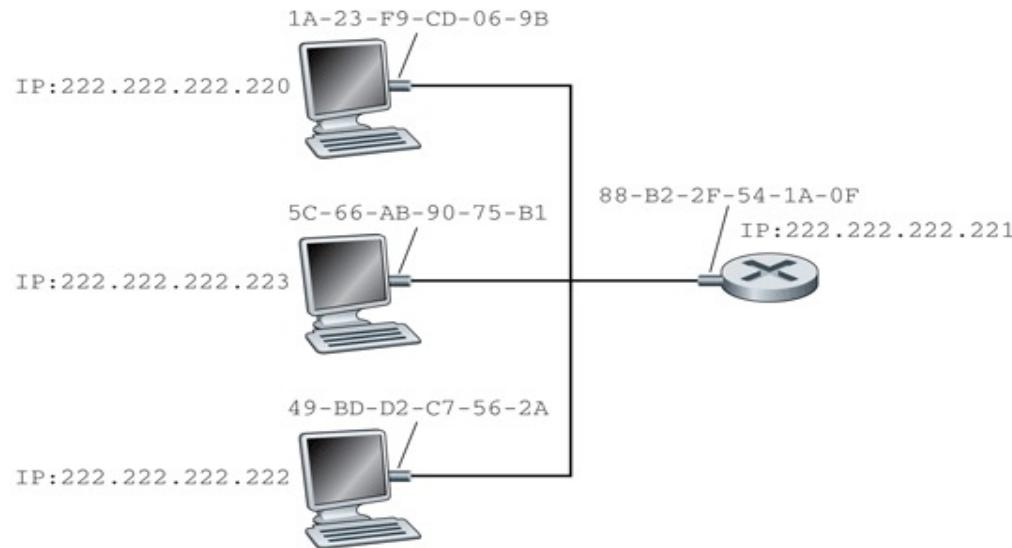
## Direcciones MAC y Direcciones IP



**Figure 5.17** ♦ Each node on a LAN has an IP address, and each node's adapter has a MAC address.

# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

## Address Resolution Protocol - ARP



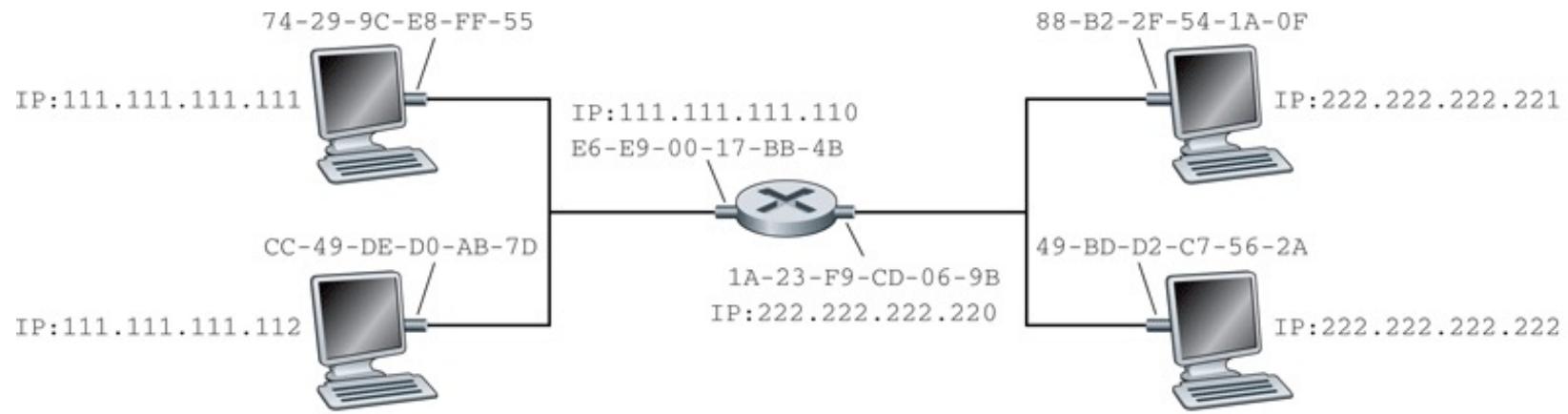
**Figure 5.17** ♦ Each node on a LAN has an IP address, and each node's adapter has a MAC address.

IP Address	MAC Address	TTL
222.222.222.221	88-B2-2F-54-1A-0F	13:45:00
222.222.222.223	5C-66-AB-90-75-B1	13:52:00

**Figure 5.18** ♦ A possible ARP table in node 222.222.222.220

# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

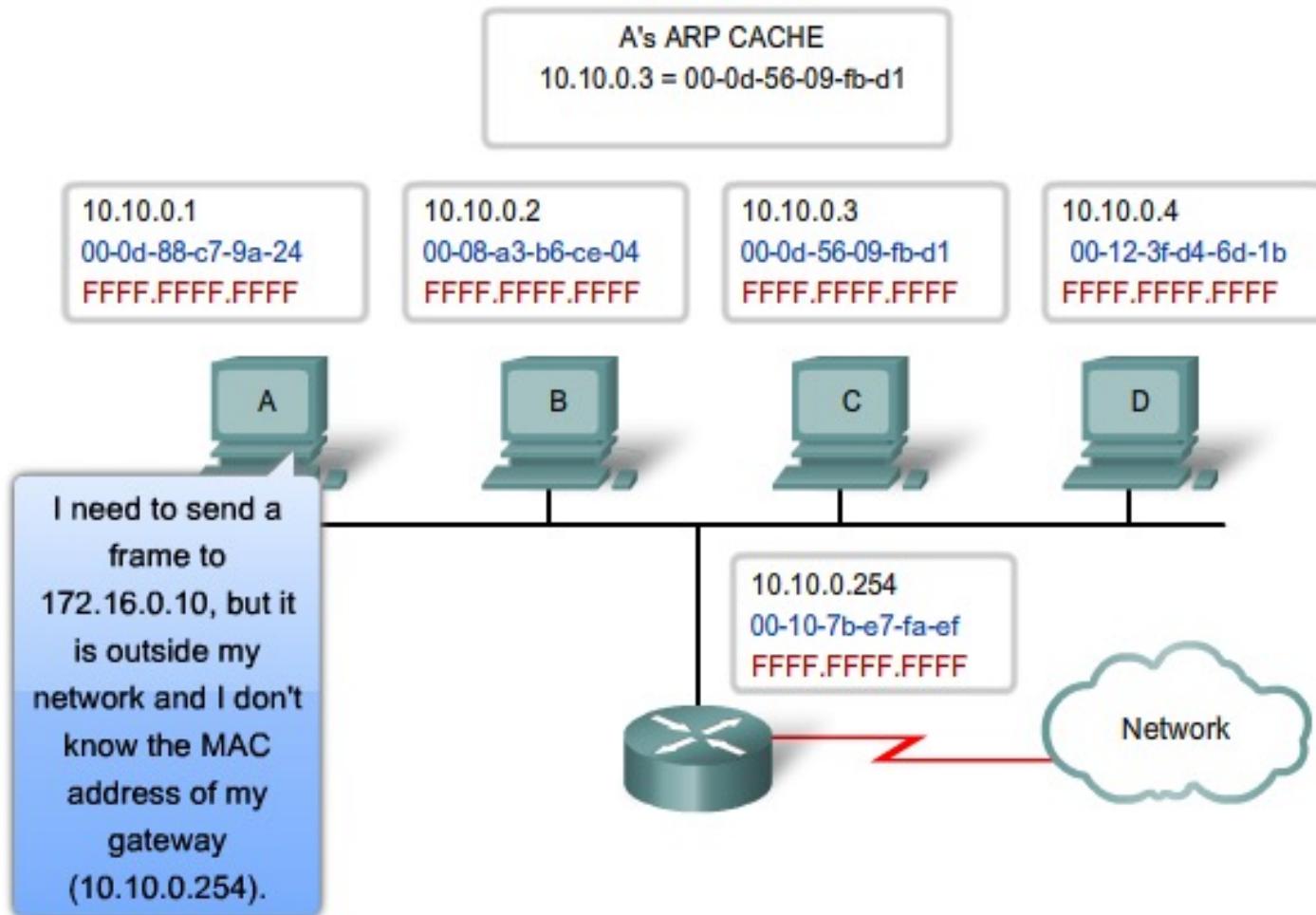
## Address Resolution Protocol - ARP



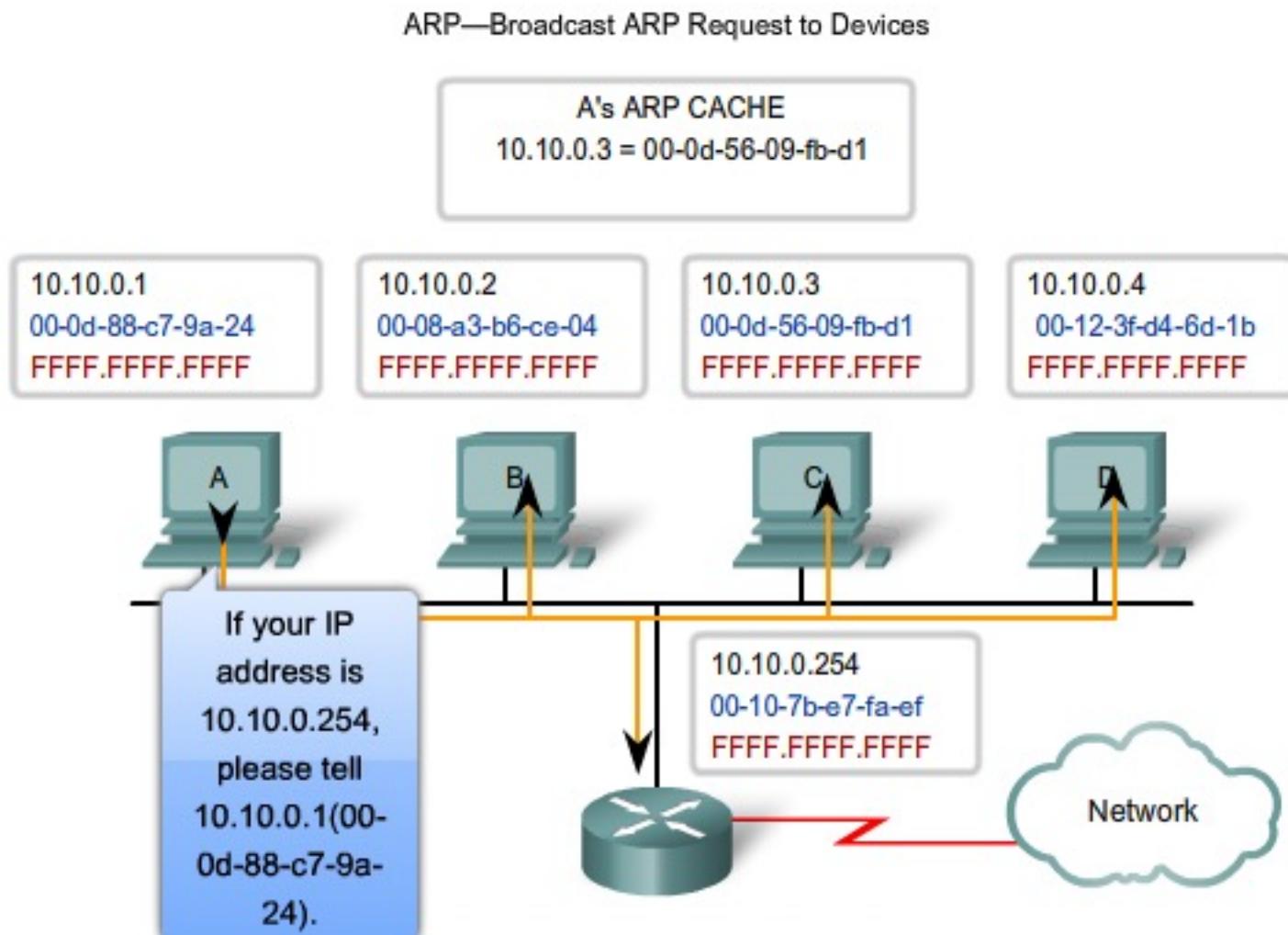
**Figure 5.19** ♦ Two subnets interconnected by a router

# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

ARP—No ARP Entry for the Gateway

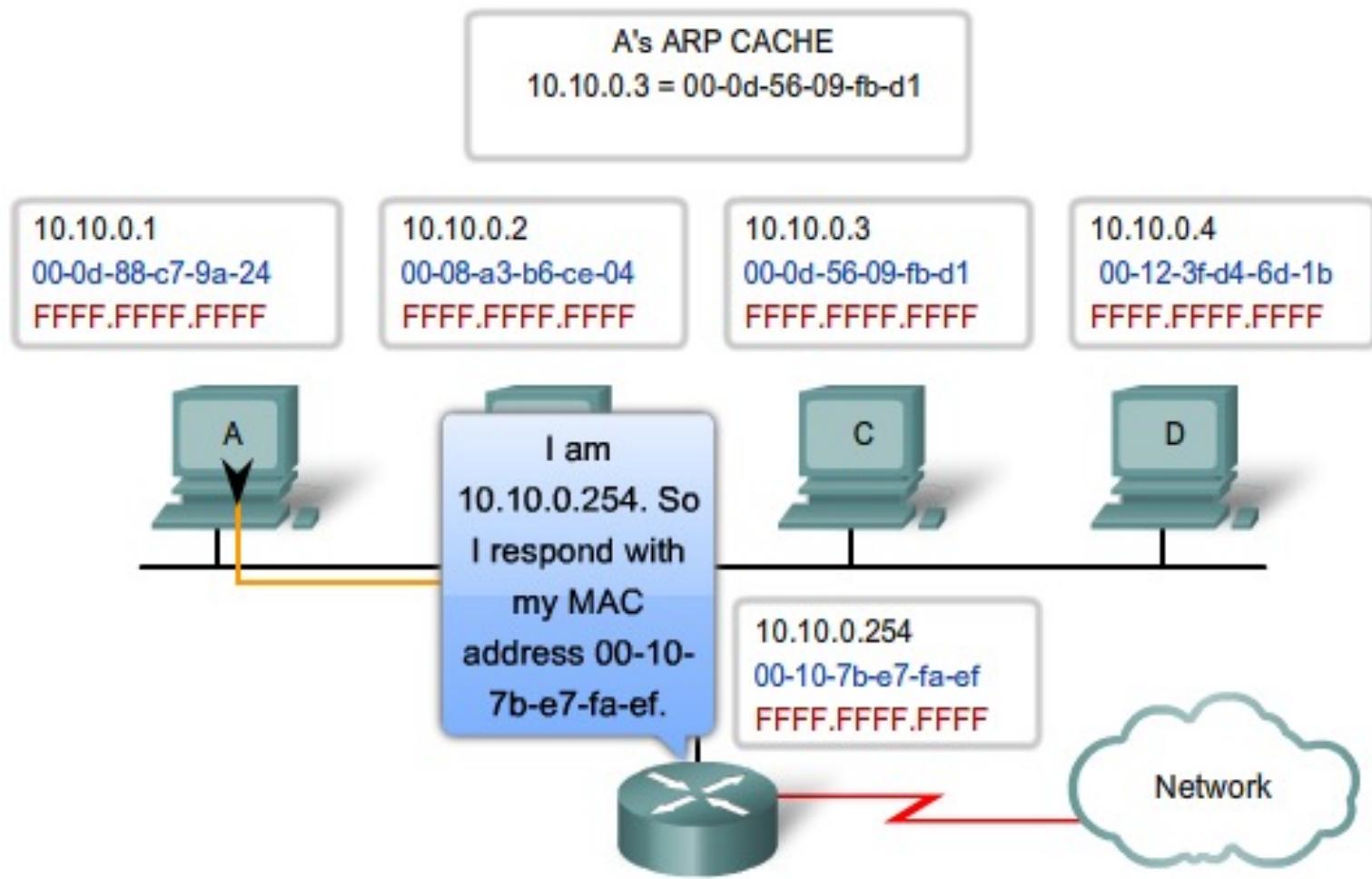


# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED



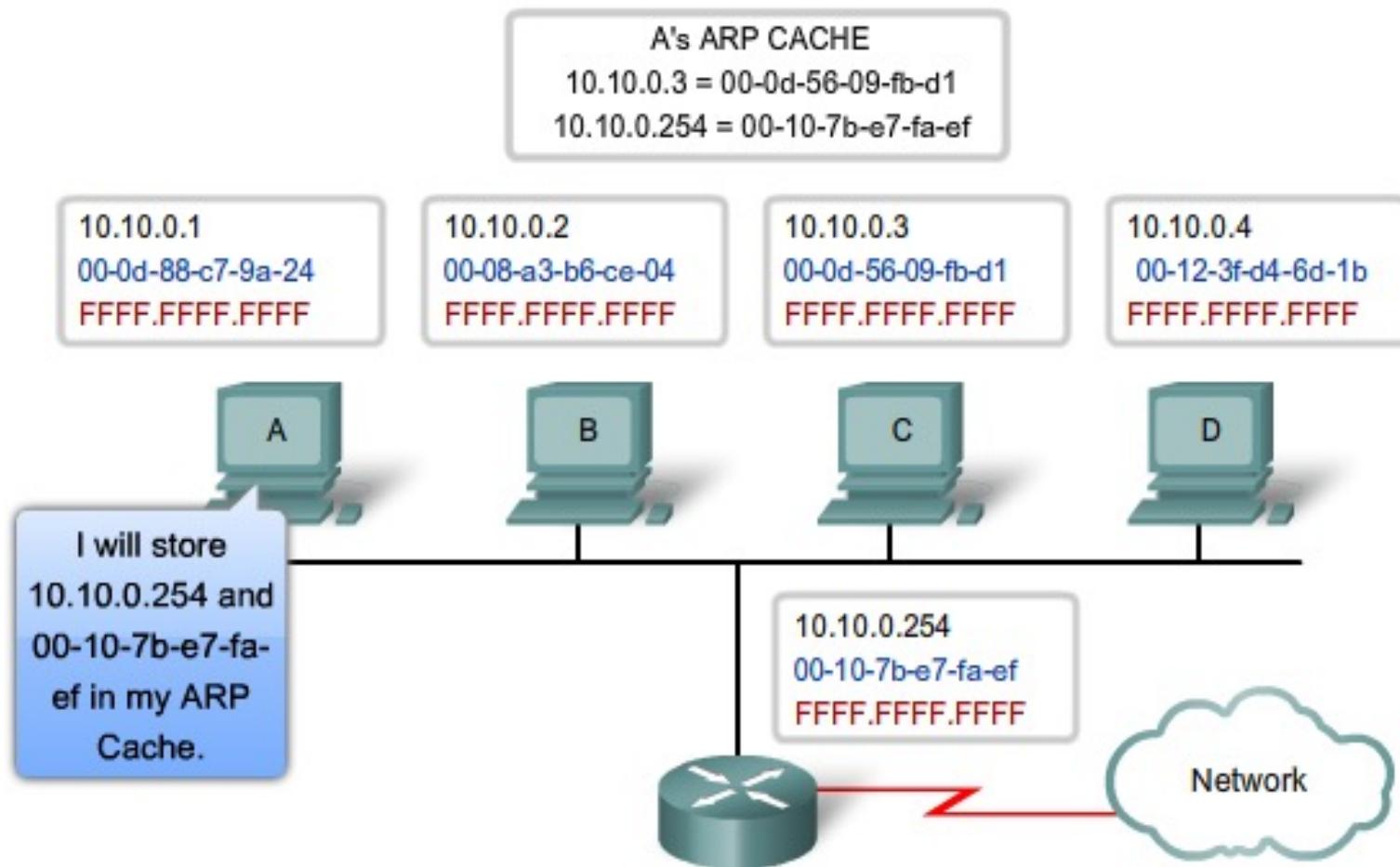
# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

ARP—Reply with MAC Address of Gateway



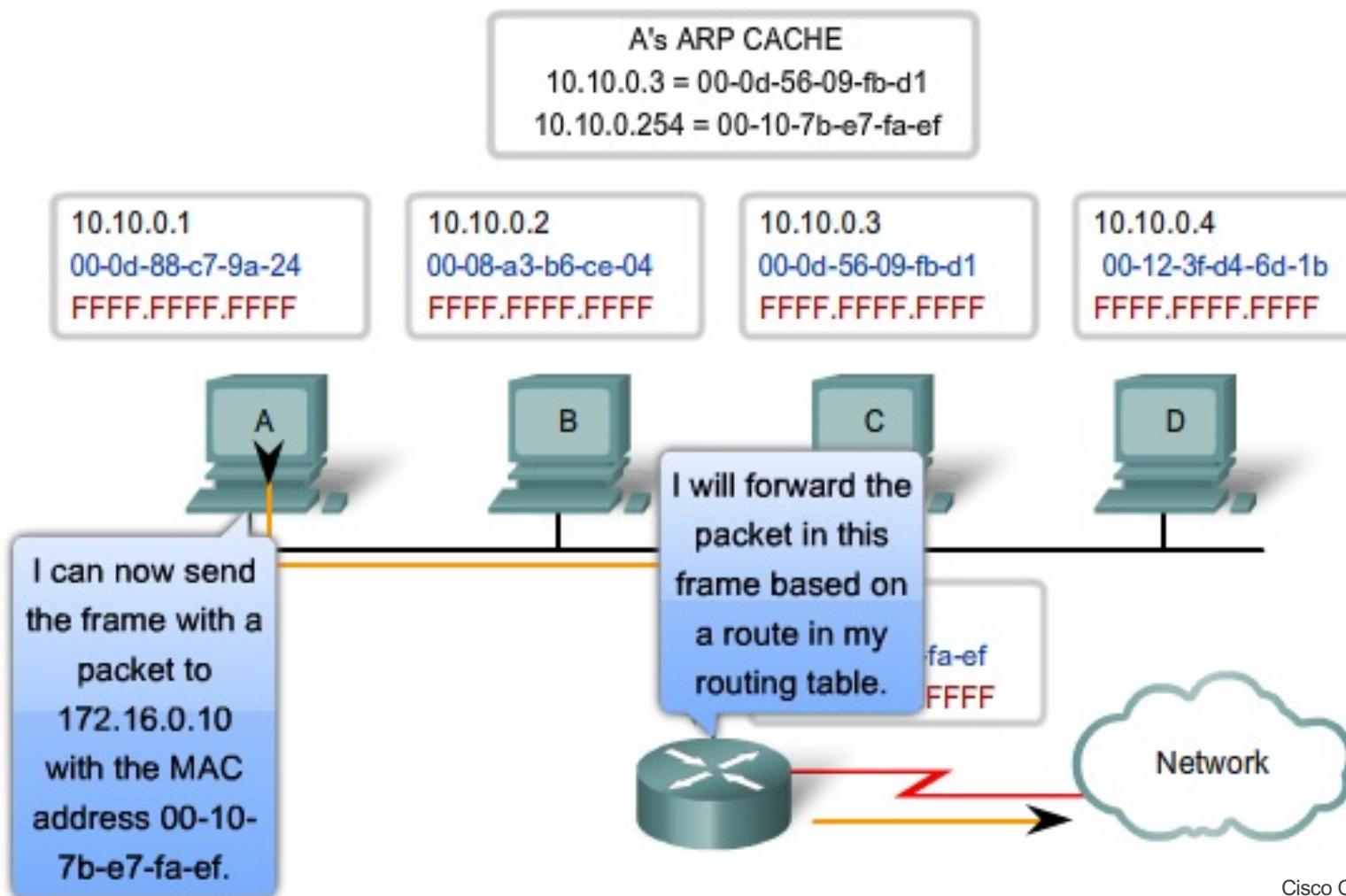
# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

The ARP Process—IP and MAC Addresses Stored in ARP Cache



# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

The ARP Process—ARP Entry Enables Frame to be Sent





# PREGUNTAS





*gracias*