



# Redes de Computadores — RECO

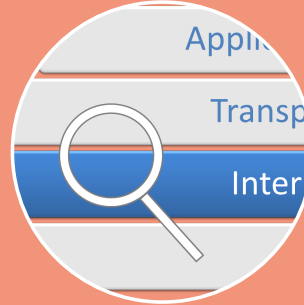
## Introducción a Routers y protocolos ICMP y ARP

*Ing. Claudia Patricia Santiago Cely*

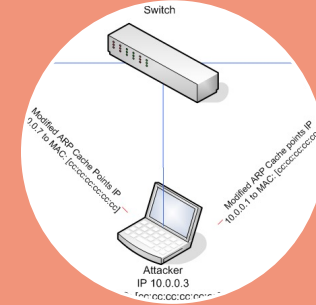
# AGENDA



Routers



Protocolo  
ICMP



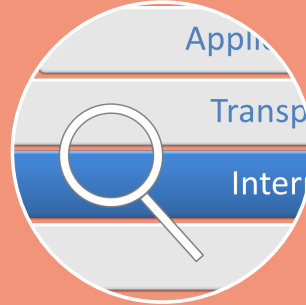
Protocolo  
ARP



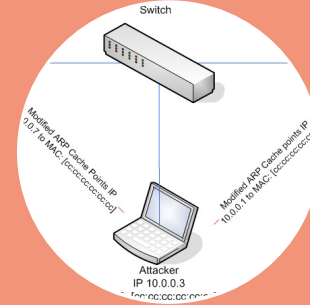
# AGENDA



## Routers



## Protocolo ICMP

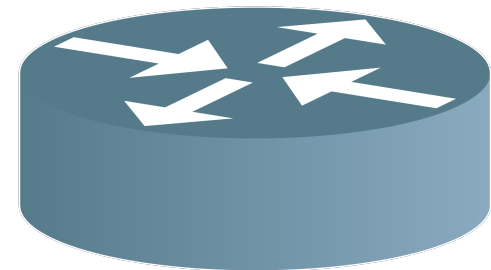


## Protocolo ARP



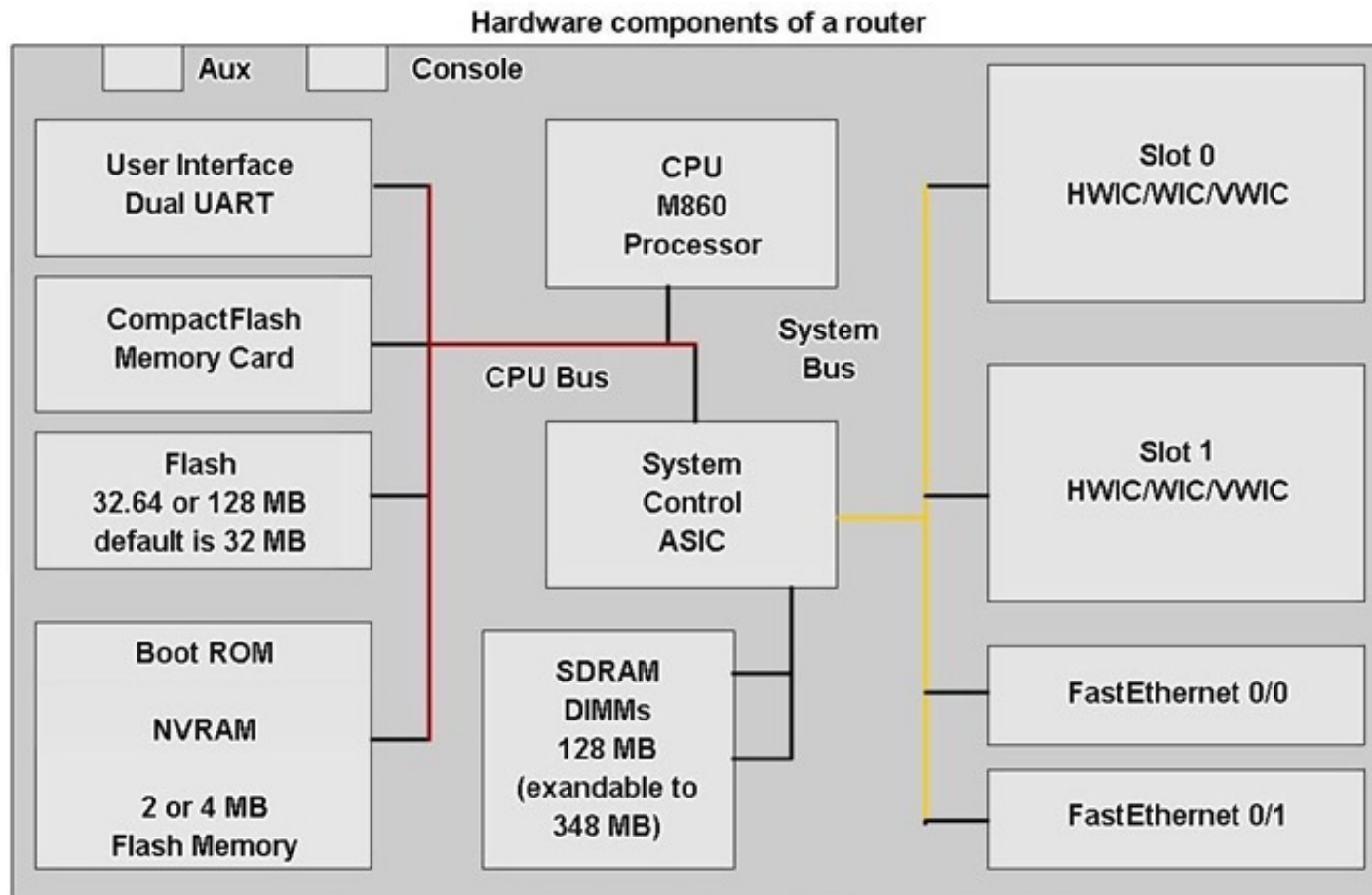
# ROUTERS

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

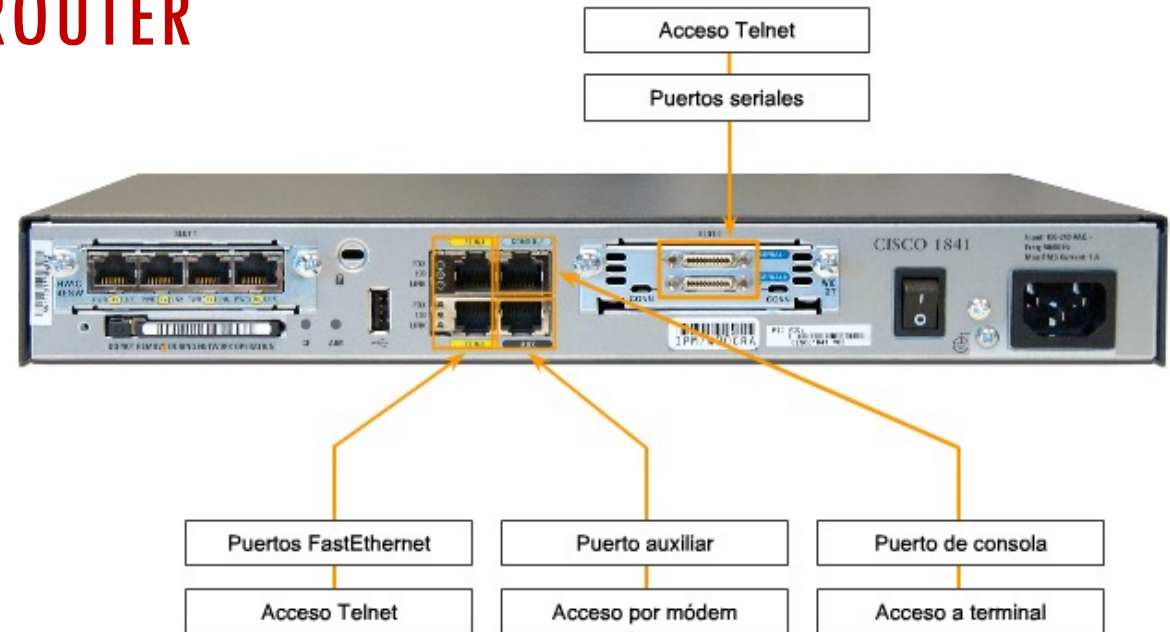




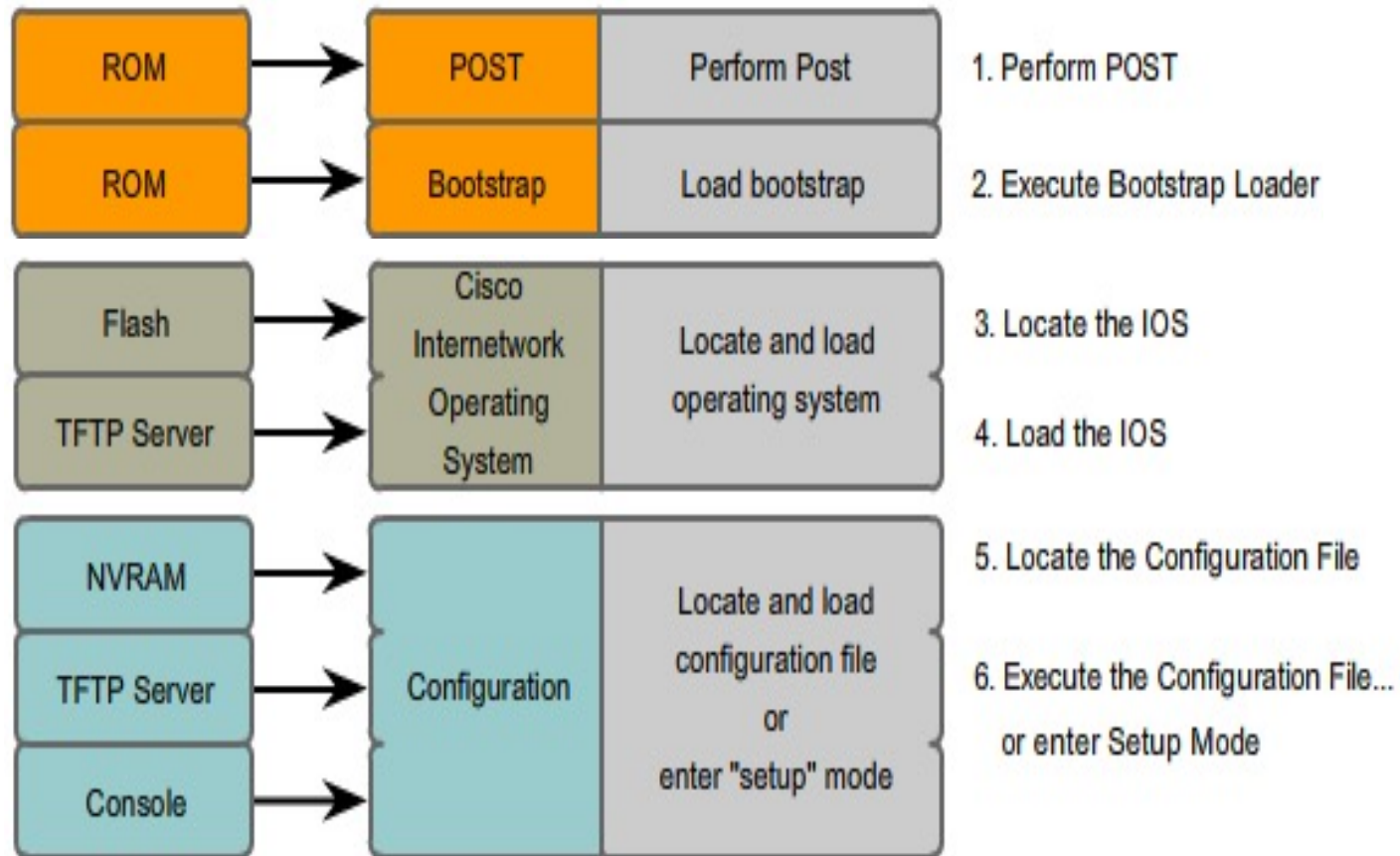
# COMPONENTES DE UN ROUTER



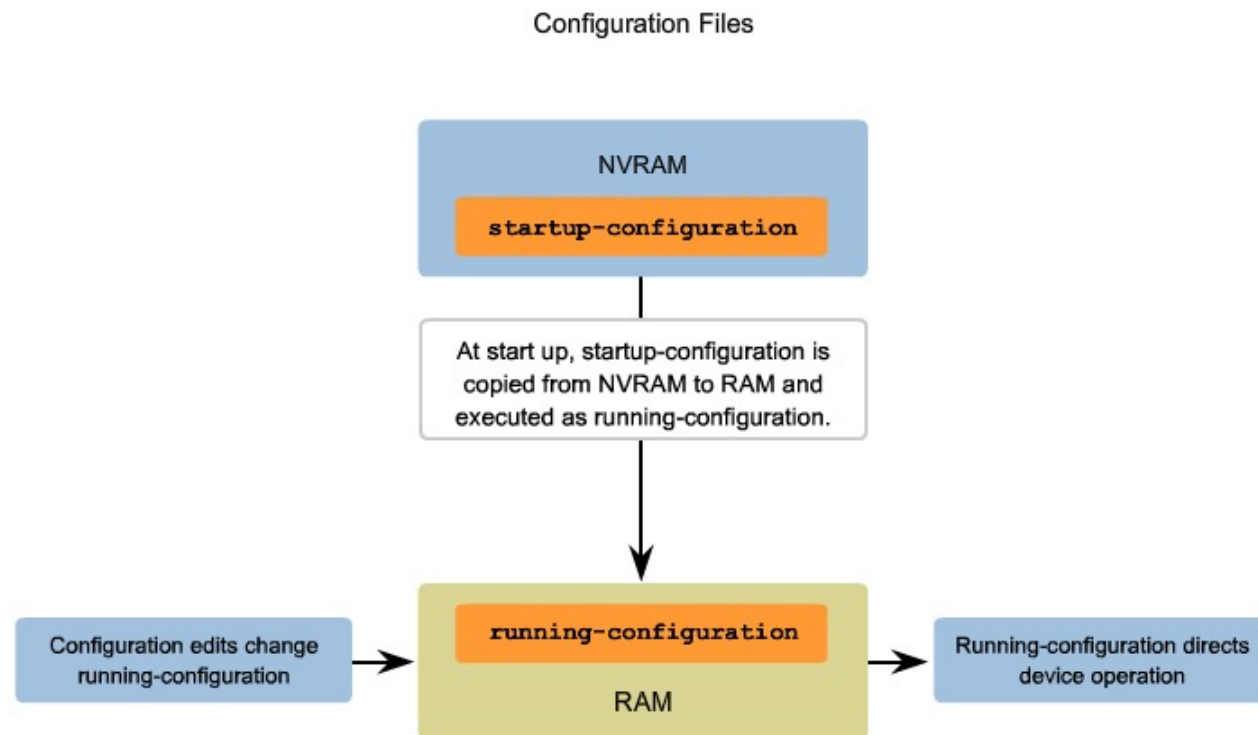
# COMPONENTES DE UN ROUTER



# 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.

router rip  
ospf  
eig rp  
etc..

line vty  
console  
etc.

Interface Commands-Router(config-if)#

ip address  
ipx address1  
encapsulation  
shutdown/ no shutdown  
etc..

Routing Engine Commands-Router(config-router)#

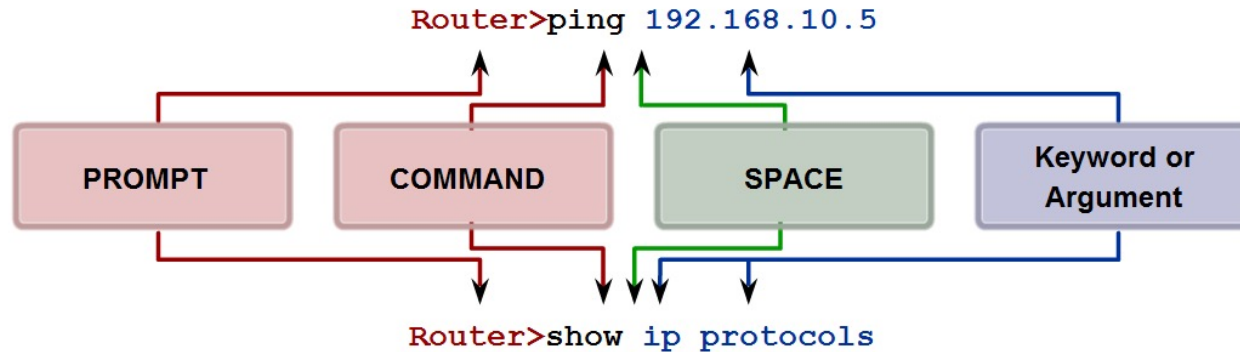
network  
version  
auto summary  
etc...

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.

# 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 <i>name</i>
Setting Passwords	Router(config)#enable secret <i>password</i>
	Router(config)#line console 0
	Router(config-line)#password <i>password</i>
	Router(config-line)#login
	Router(config)#line vty 0 4
	Router(config-line)#password <i>password</i>
	Router(config-line)#login
Configuring a message-of-the-day banner	Router(config)#banner motd # <i>message</i> #



# COMANDOS BÁSICOS

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

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

# login 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
```

# Conexiones Seriales

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

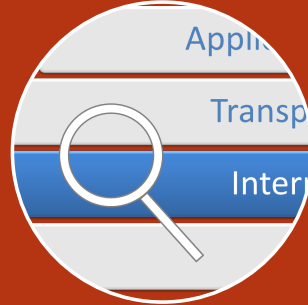




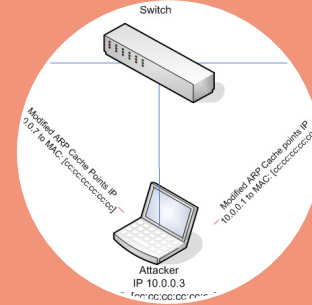
# AGENDA



Routers



Protocolo  
ICMP



Protocolo  
ARP



# INTERNET PROTOCOL (IP) ICMP

APLICACIÓN	
TCP	
IP	ICMP
ENLACE	
FISICO	

# 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

# INTERNET PROTOCOL (IP)

## ICMP

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

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

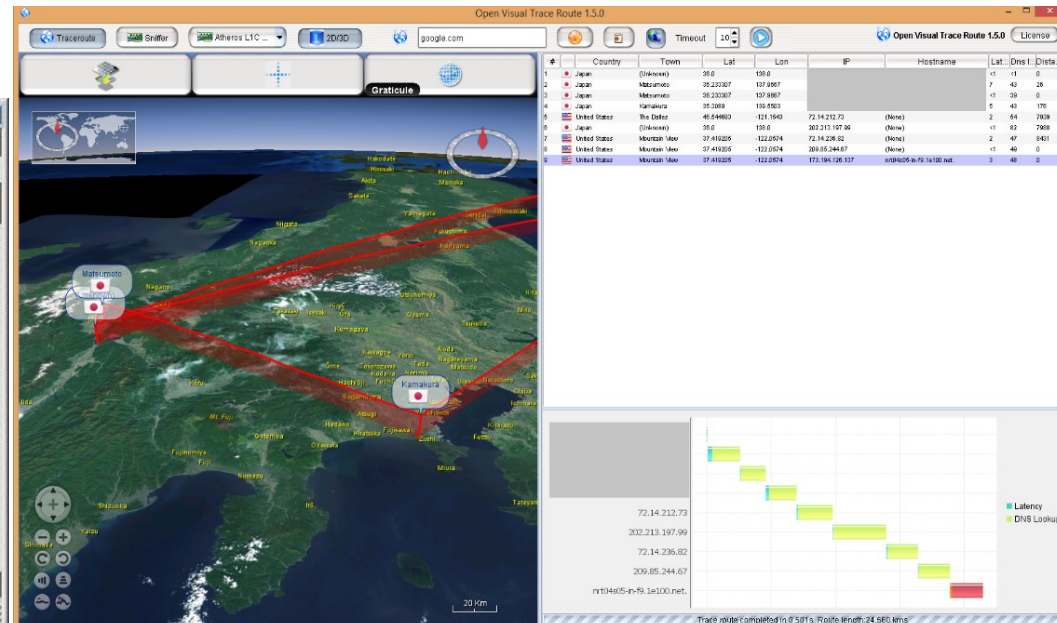
0	8	16	31
Type	Code	Checksum	
ICMP data (depending on the type of message)			
.....			



## Ping

## Tracert – traceroute

- 
- VisualRoute 2010 - Business Edition - Trial day 1 of 15
- File Edit Options View Maps Tools Help
- from My Computer http:// www.vis Trace Plot Analysis More Tools... Server is stopped
- www.visualware.com (205.234.111.141) www.visualware.com (205.234.111.141) TraceRoute information from Se... www.visualware.com (205.234.111.141)
- Stop Tools Run continuously Views
- Traceroute to www.visualware.com
- Target Information
- To www.visualware.com (205.234.111.141)
- Location Looking for location...
- Network [Network for 205.234.111.141]
- RTT 284.0ms / 284ms / 284ms
- avg,min,max
- Firewall None for pings
- Open to http requests on port 80
- Port Probe Running server Apache/2.0.63 (Unix)
- Route Information
- Analysis In general this route is reasonably quick, with hops responding on average within 164ms. However, all hops after hop 17 in network "[Network for 154.54.24.106]" respond particularly slowly.
- RTT 170.9ms / 346ms
- avg,max
- Packet Loss 0.0% / 0%
- avg,max
- Traceroute to www.visualware.com
- Map
10. San Jose 22. Washington 2. (China)
- Traceroute to www.visualware.com
- RTT ms
- 240 180 120 60 0
- 10.4 9.2 60.247.119.201 219.141.138.189 59.43.246.125 59.43.91.114 59.43.17.116 208.214.143.37 59.43.246.152 152.63.50.8 154.54.12.169 65.284.149 66.284.75 154.54.24.106 154.54.31.174 154.54.41.234 154.54.40.233 18.104.206.226 89.65.112.26 205.234.111.141
- You are on day 1 of a 15 day trial. For purchase information [click here](#) or [enter a license key](#).
- VisualRoute 14.0e has been released. To download the update [click here](#) and choose install updates.
- Your database is out of date. [Click here](#) to install update.



# INTERNET PROTOCOL (IP) ADMINISTRACIÓN DE LA SUBRED

Verificar el estado

Informar si hay problemas

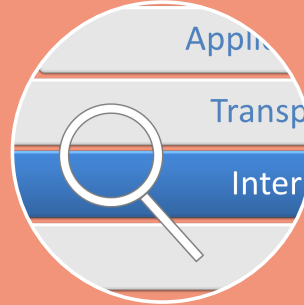
Mirar rutas



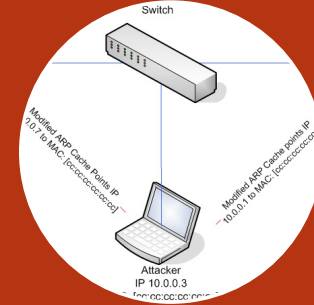
# AGENDA



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Protocolo  
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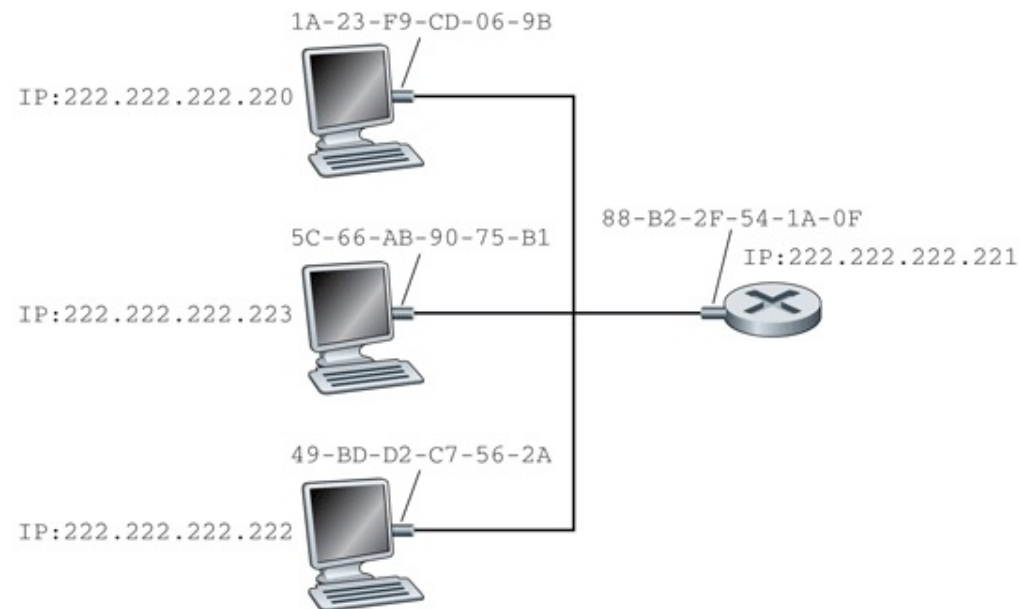


Protocolo  
ARP



# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

## Direcciones MAC y Direcciones IP

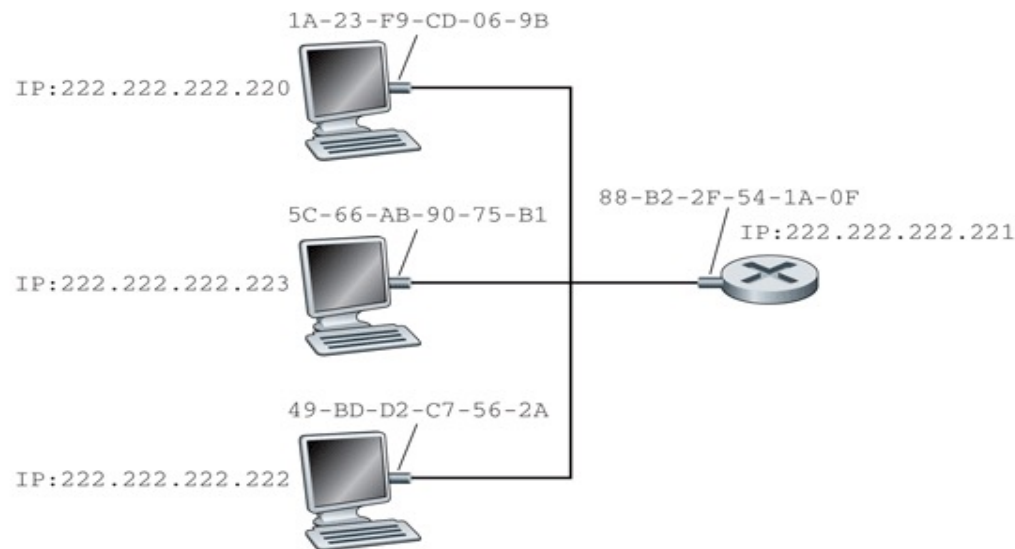


**Figure 5.17** ♦ Each node on a LAN has an IP address, and each node's adapter has a MAC address.



# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

## Address Resolution Protocol - ARP



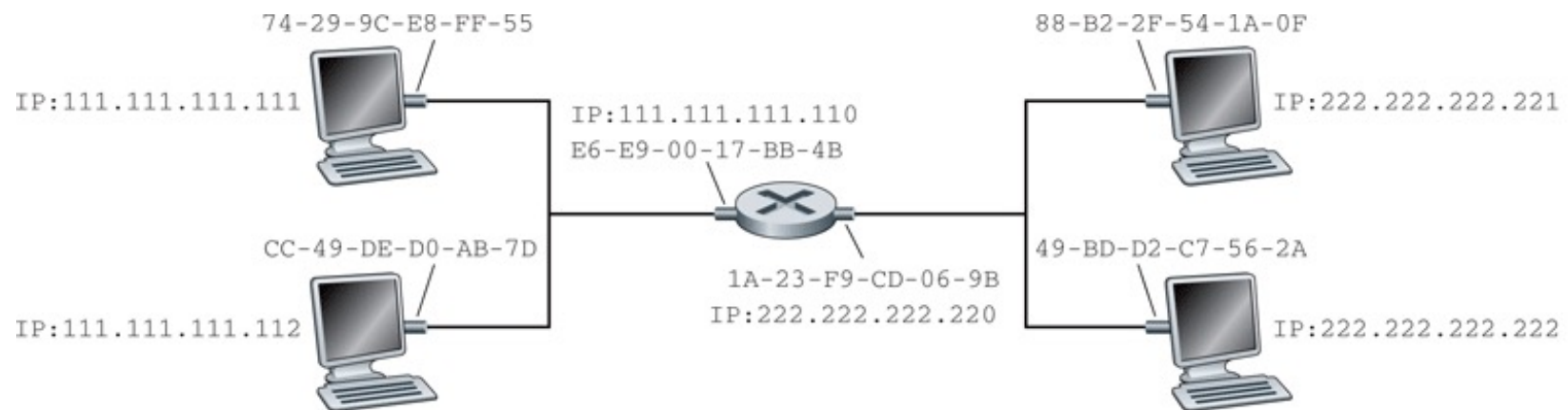
**Figure 5.17** ♦ Each node on a LAN has an IP address, and each node's adapter has a MAC address.

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

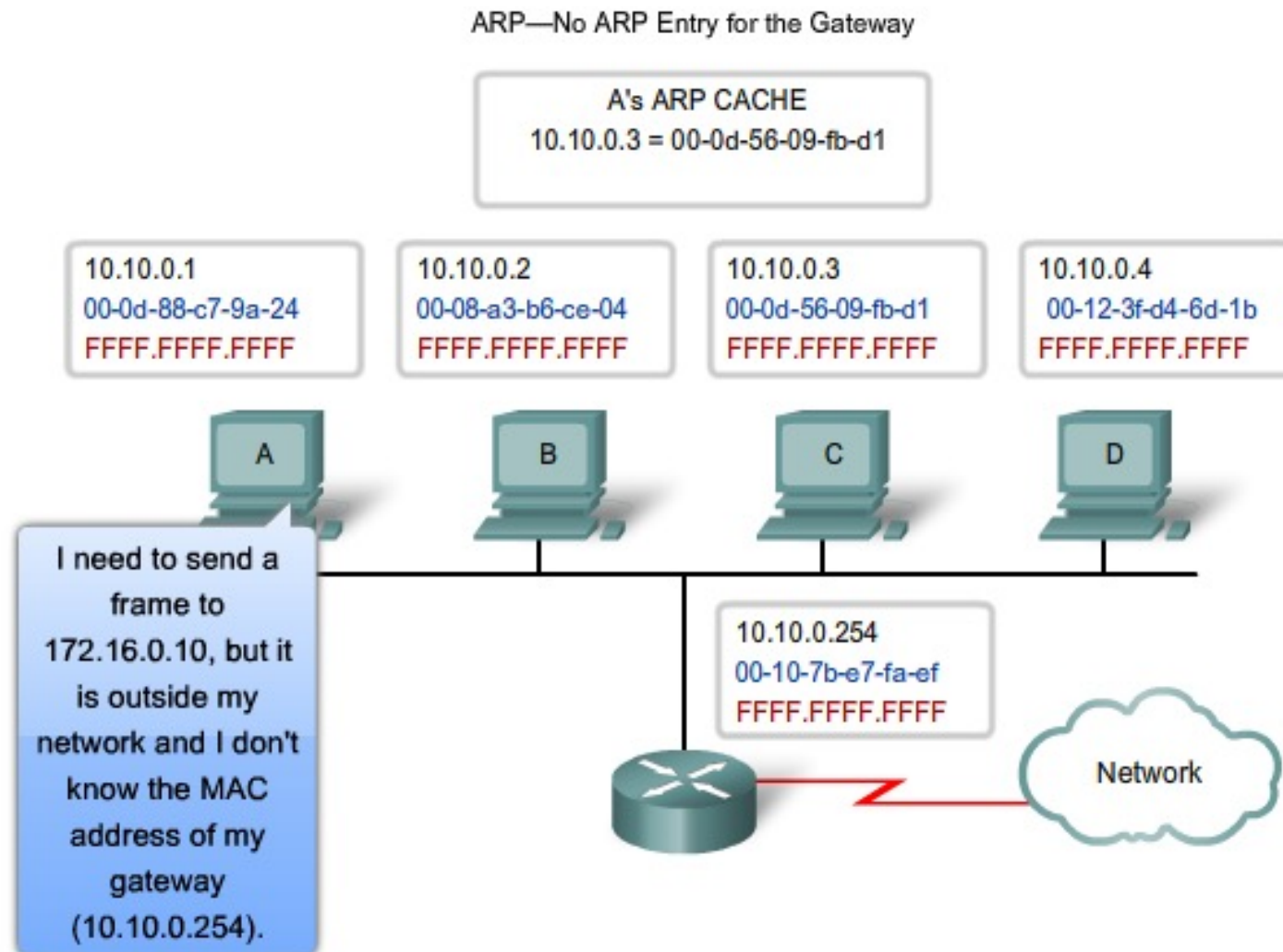
# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

## Address Resolution Protocol - ARP



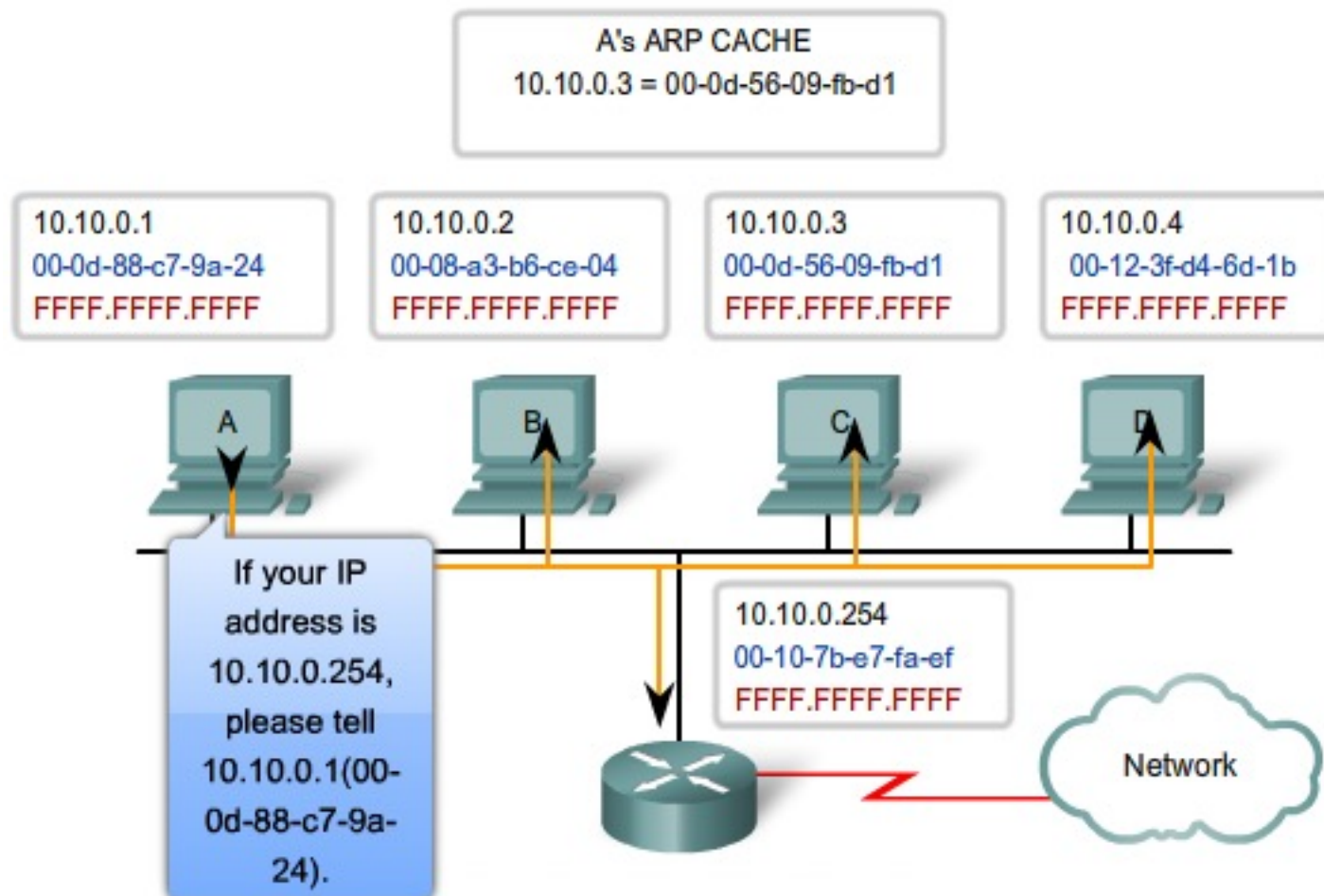
**Figure 5.19** ♦ Two subnets interconnected by a router

# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED



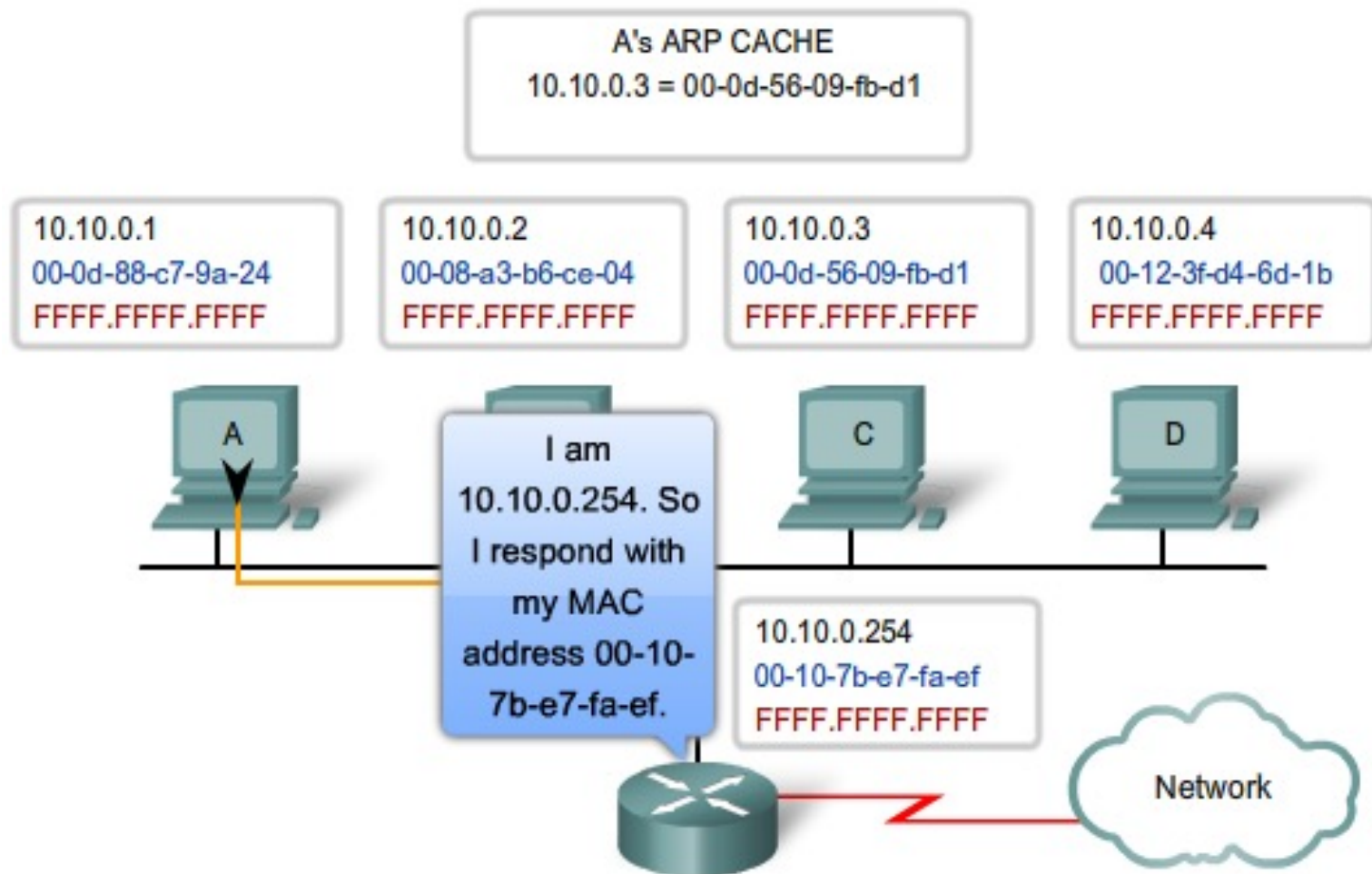
# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

ARP—Broadcast ARP Request to Devices



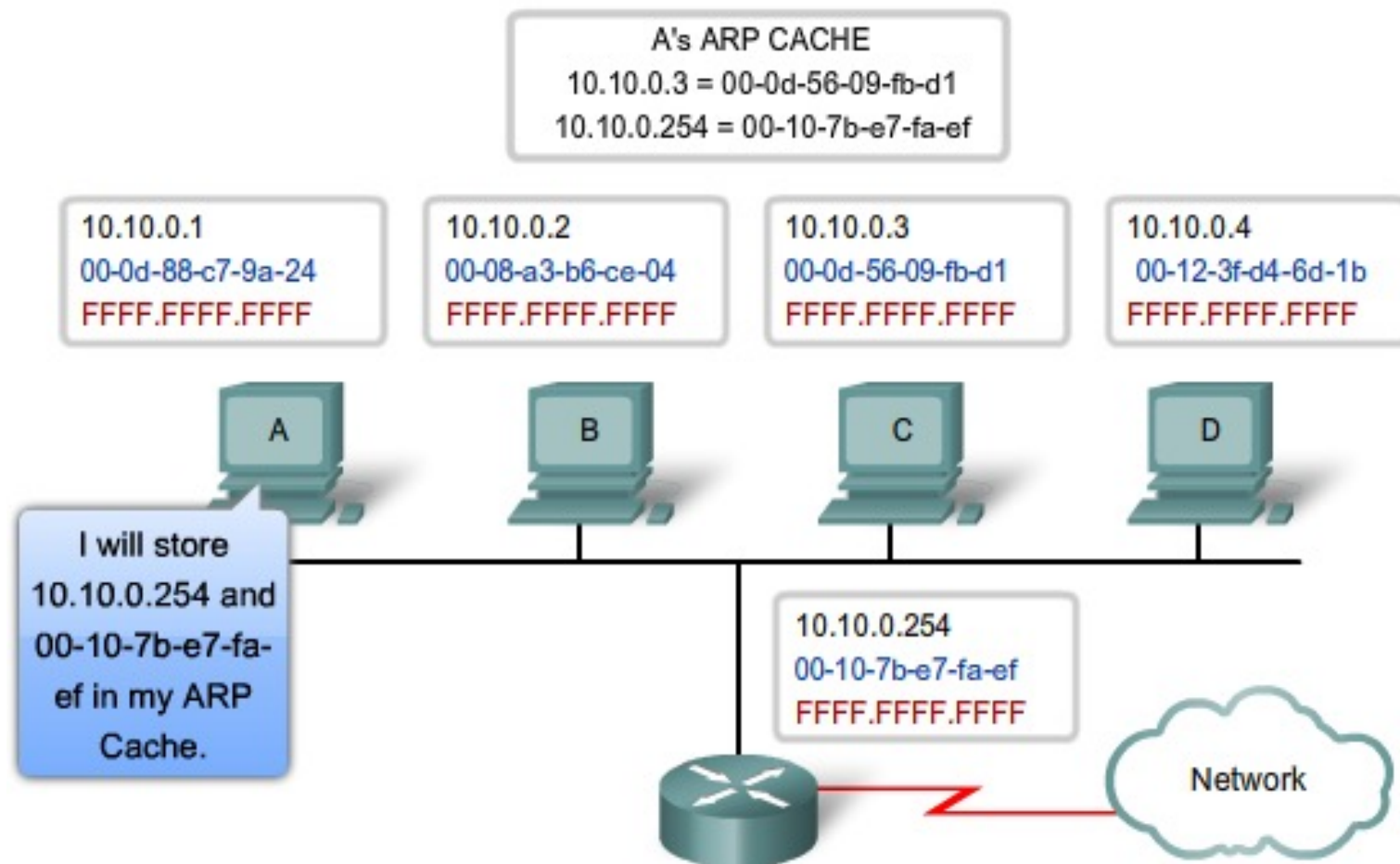
# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

ARP—Reply with MAC Address of Gateway



# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

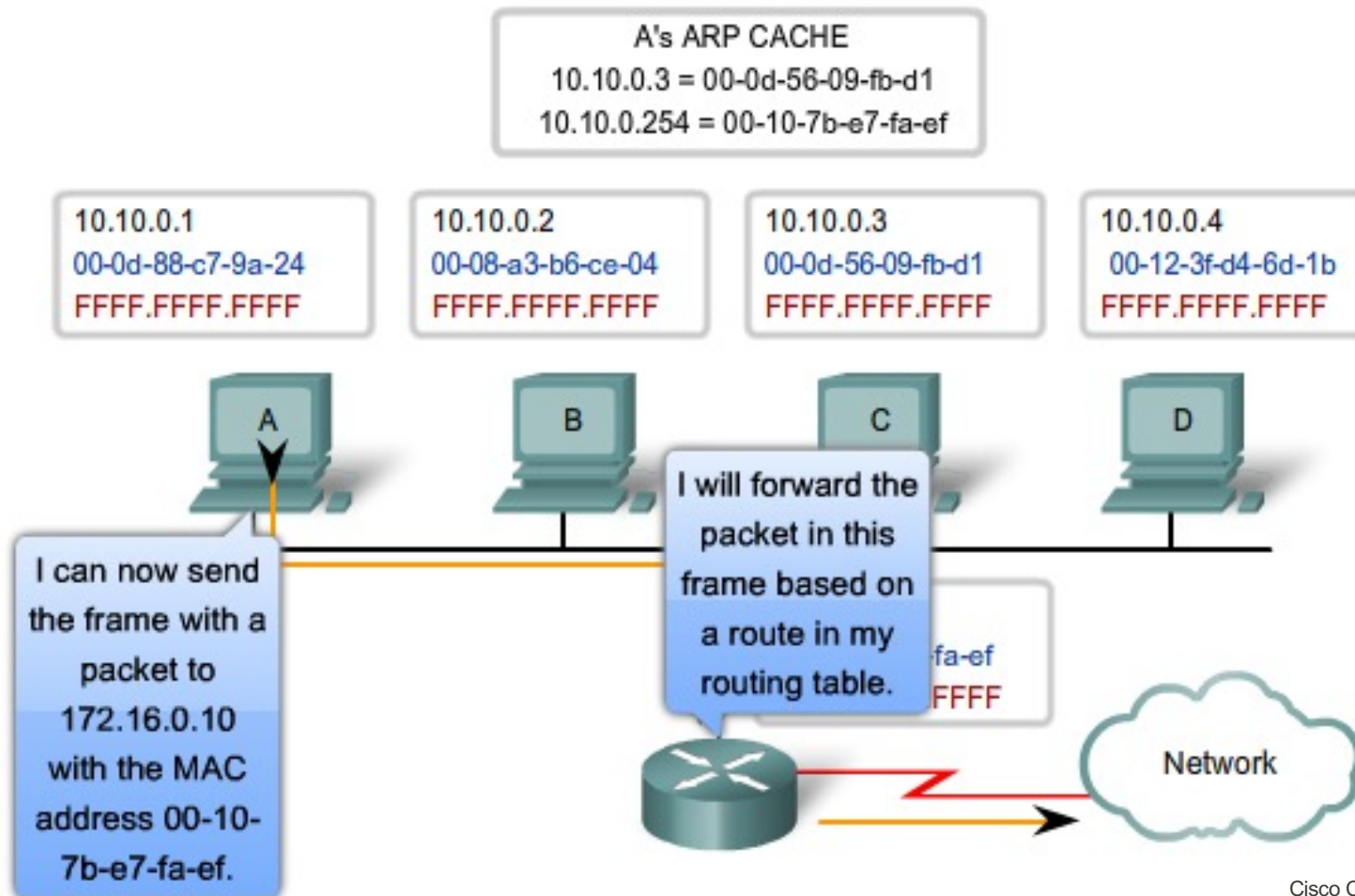
The ARP Process—IP and MAC Addresses Stored in ARP Cache





# RELACIÓN DIRECCIONES DE NIVEL DE ENLACE Y RED

The ARP Process—ARP Entry Enables Frame to be Sent



# PREGUNTAS



*gracias*