



Ingeniería en sistemas computacionales

Redes y conectividad

VLSM

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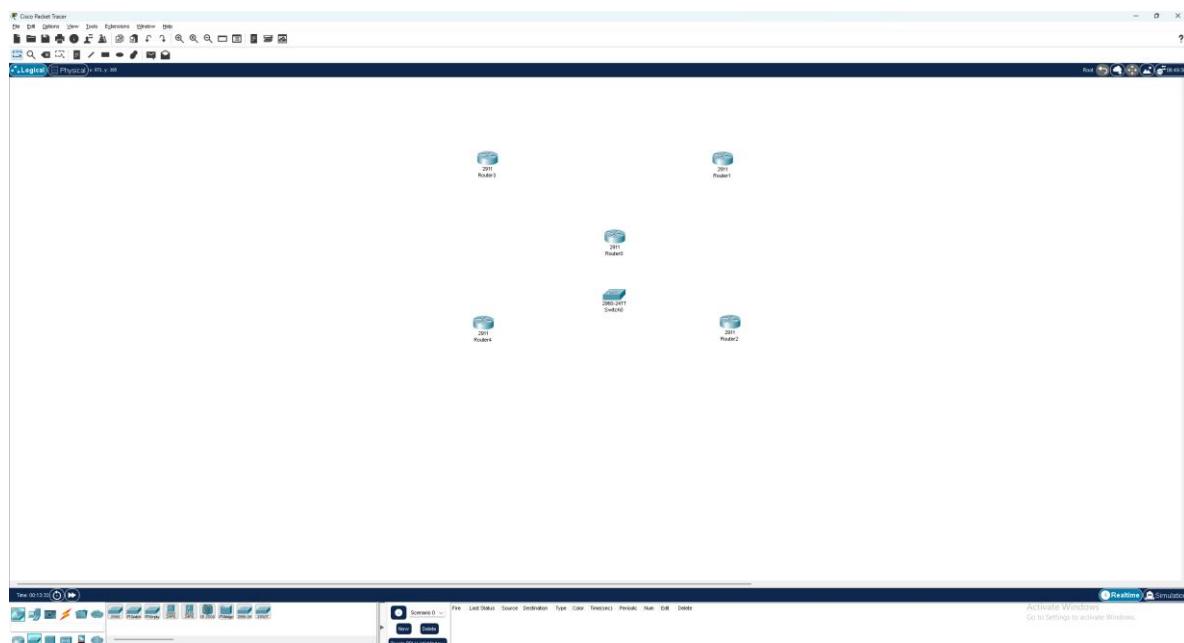
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## Introducción

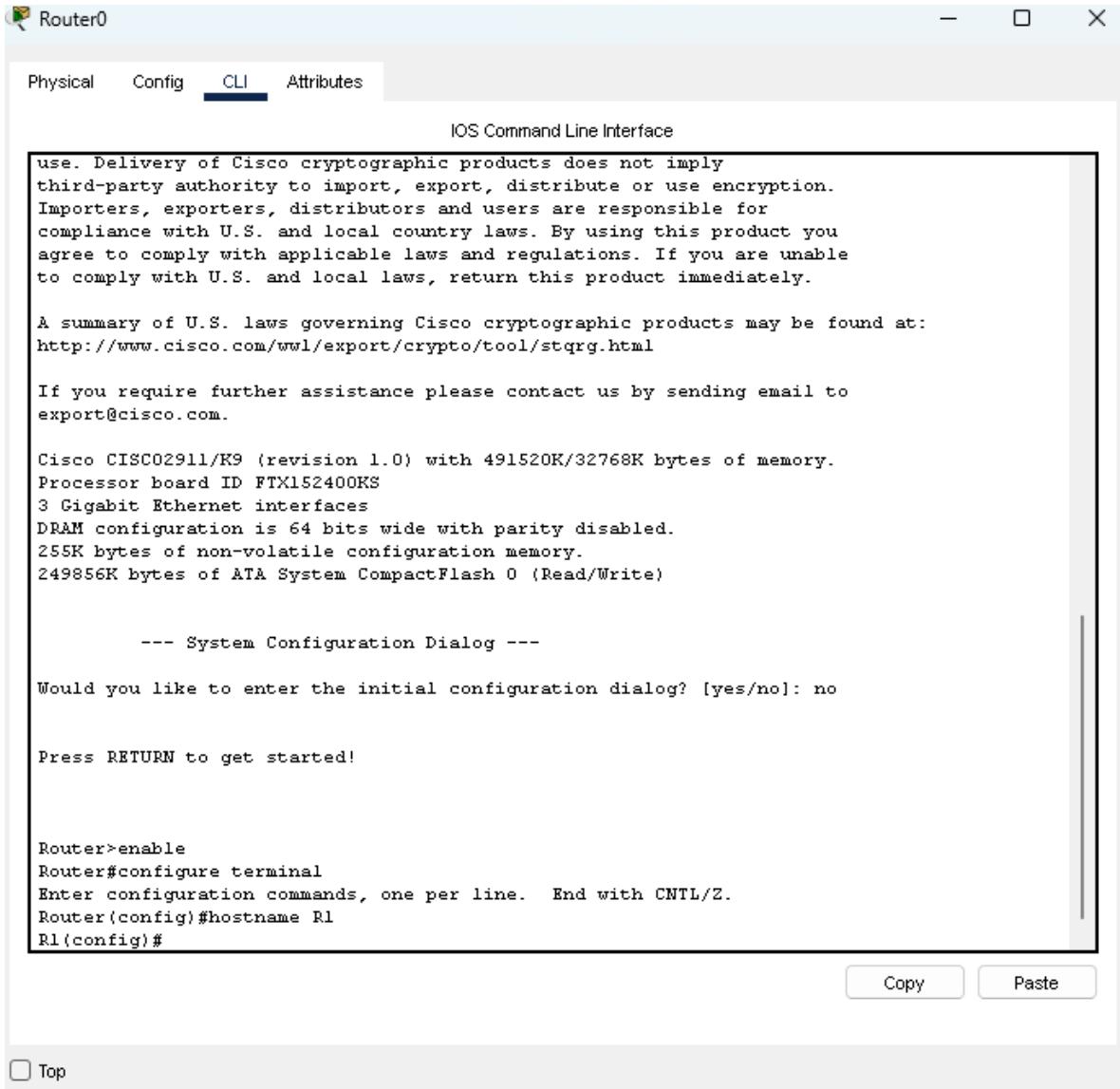
En esta práctica se desarrolló un esquema de direccionamiento IP utilizando **VLSM** (**Variable Length Subnet Mask**) para optimizar el uso del espacio de direcciones dentro de la red 192.168.12.0/24. El objetivo fue dividir la red principal en subredes que cumplieran con los requerimientos específicos de diferentes áreas de una organización: Mercadeo, Ventas y Administrativos, además de los enlaces entre enrutadores.

Posteriormente, se configuraron **VLANs** (Redes de Área Local Virtuales) para segmentar el tráfico dentro del switch y se implementó el **enrutamiento inter-VLAN** en el router principal, permitiendo la comunicación entre las distintas redes. Todo el proceso se realizó mediante el simulador **Cisco Packet Tracer**, aplicando configuraciones de interfaz, encapsulamiento Dot1Q y asignación de IPs según el esquema diseñado.

## Actividad Packet tracer



Primero hacemos nuestra topología poniendo un router principal, después otros 4 routers secundarios y un switch



The screenshot shows a Cisco Router configuration window titled "Router0". The "CLI" tab is selected. The window displays the IOS Command Line Interface. It includes a legal notice about Cisco cryptographic products, a summary of U.S. laws, contact information, system configuration details, a configuration dialog prompt, and a command-line history. At the bottom right are "Copy" and "Paste" buttons, and a "Top" link.

```
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

--- System Configuration Dialog ---

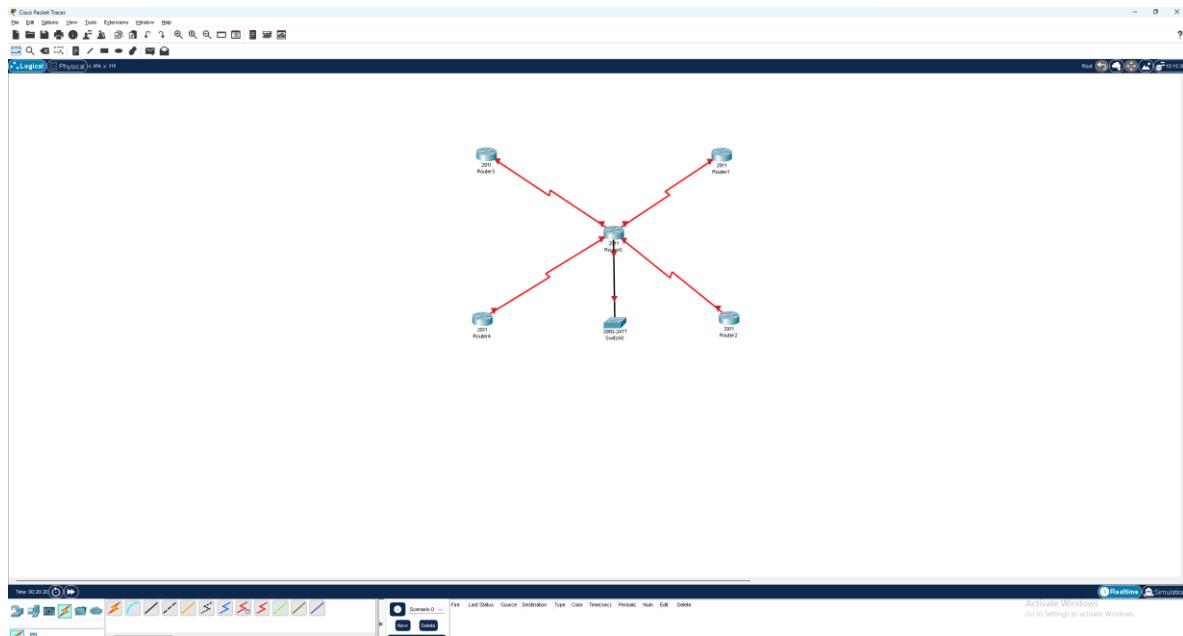
Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#

 Top
```

Configuramos los routers poniendole su respectivo nombre



Conectamos todos los componentes usando cables seriales y un cable de cobre

The screenshot shows a Cisco Router's Command Line Interface (CLI) window titled "Router0". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the IOS Command Line Interface. The user has entered several commands:

```
Router#interface Se 0/3/0
^
* Invalid input detected at '^' marker.

Router#interface Se0/3/0
^
* Invalid input detected at '^' marker.

Router#interface Serial0/3/1
^
* Invalid input detected at '^' marker.

Router#
Router#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0  unassigned      YES unset administratively down down
GigabitEthernet0/1  unassigned      YES unset administratively down down
GigabitEthernet0/2  unassigned      YES unset administratively down down
Serial0/2/0         unassigned      YES unset administratively down down
Serial0/2/1         unassigned      YES unset administratively down down
Serial0/3/0         unassigned      YES unset administratively down down
Serial0/3/1         unassigned      YES unset administratively down down
Vlan1              unassigned      YES unset administratively down down
Router#con
Router#conf
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial0/3/1
Router(config-if)#ip address 192.168.10.1 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
Router(config-if)#exit
Router(config)#[
```

Below the command window, there are "Copy" and "Paste" buttons. At the bottom left, there is a checkbox labeled "Top".

Configuramos las direcciones ip de cada router

Router5

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>enable
Router#config
Router#config
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)# interface Serial0/3/1
R1(config-if)#ip address 192.168.12.1 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
R1(config-if)#exit
R1(config)#interface Serial0/3/0
R1(config-if)#ip address 192.168.12.5 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

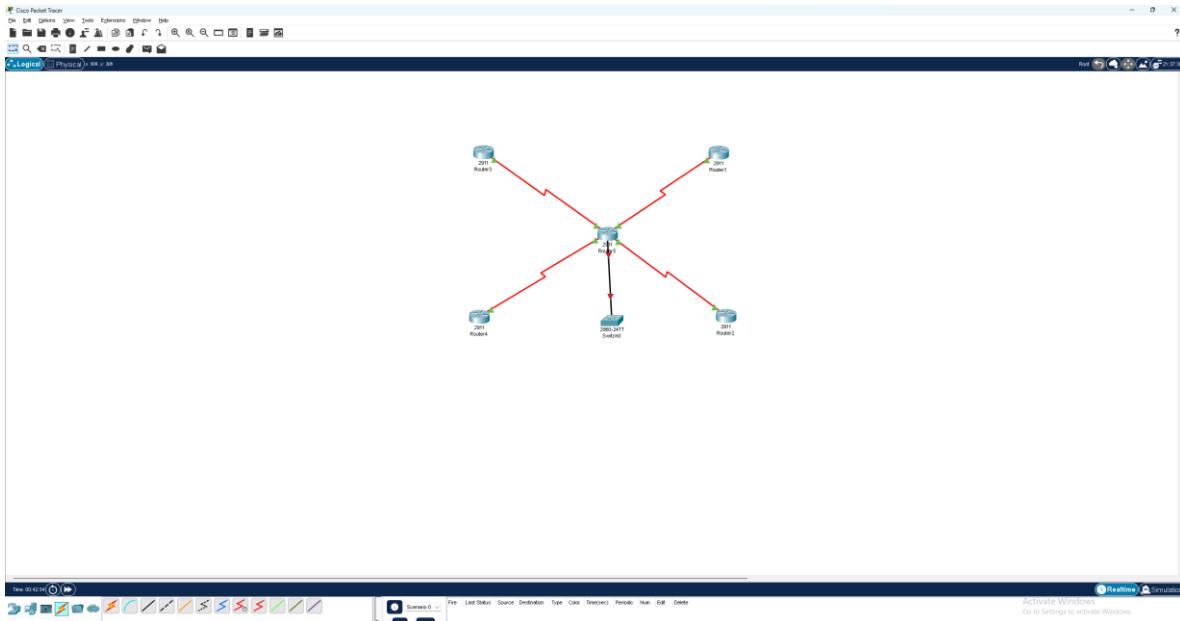
*LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
R1(config-if)#exit
R1(config)#interface Serial0/2/0
R1(config-if)#ip address 192.168.12.9 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial0/2/0, changed state to down
R1(config-if)#exit
R1(config)#interface Serial0/2/1
R1(config-if)#ip address 192.168.12.13 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

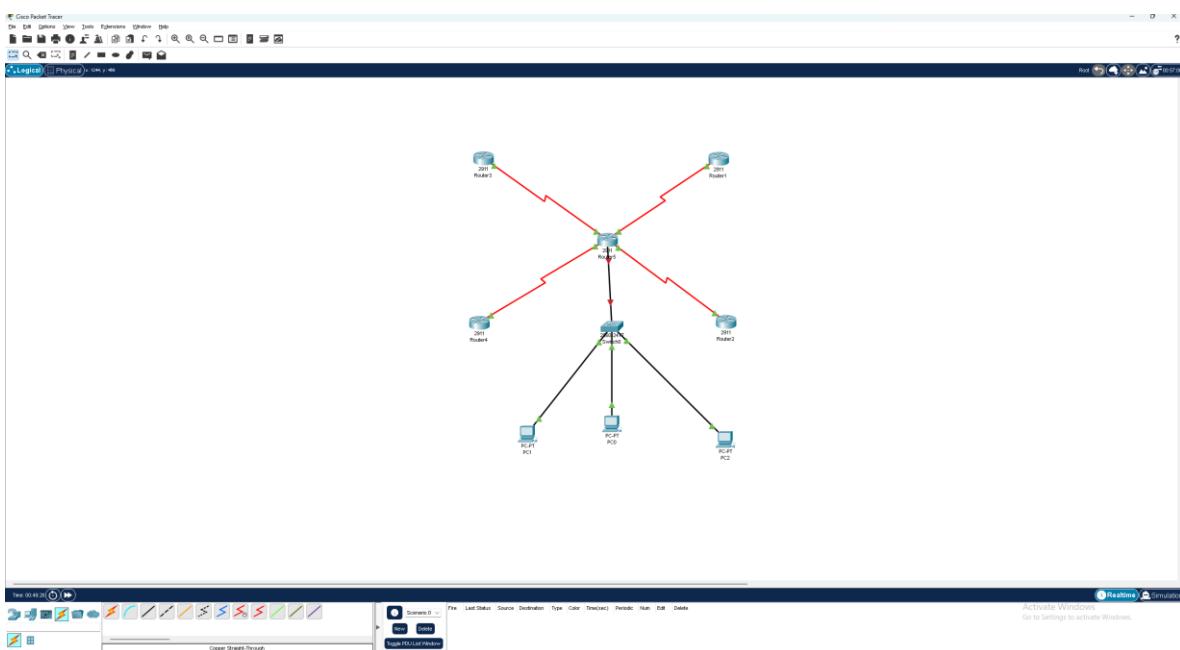
*LINK-5-CHANGED: Interface Serial0/2/1, changed state to down
R1(config-if)#

```

Top



Todos los routers están bien conectados y configurados



Agregamos 3 pcs a la topología, una para cada vlan que vamos a crear

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Press RETURN to get started!

Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#vlan 10
S1(config-vlan)#name Mercadeo
S1(config-vlan)#exit
S1(config)#vlan 20
S1(config-vlan)#name Ventas
S1(config-vlan)#exit
S1(config)#vlan 30
S1(config-vlan)#name Administrativos
S1(config-vlan)#exit
S1(config)#interface Giga
S1(config)#interface GigabitEthernet 0/1
S1(config-if)#switchport mode trunk
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#
*LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
*LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
*LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
```

Copy

Paste

Top

Hacemos la creación de las vlan dentro de la configuración del switch

Switch0

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
*LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

S1(config)#interface fas
S1(config)#interface fastEthernet 0/2
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 10
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#interface fa
S1(config)#interface fastEthernet 0/3
S1(config-if)#switchport mode access
S1(config-if)#swi
S1(config-if)#switchport access vlan 20
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#interface fa
S1(config)#interface fastEthernet 0/4
S1(config-if)#swit
S1(config-if)#switchport mode access
S1(config-if)#sw
S1(config-if)#switchport access vlan 30
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#end
S1#
*SYS-5-CONFIG_I: Configured from console by console
write
Building configuration...
[OK]
S1#
```

Top

[Copy](#) [Paste](#)

Conectamos cada vlan a cada pc

## **Conclusión**

La implementación de VLSM permitió un uso eficiente del espacio de direcciones IP, garantizando que cada departamento tuviera el número de hosts adecuado sin desperdiciar direcciones. Además, la configuración de VLANs y subinterfaces en el router demostró la importancia de la segmentación lógica para mejorar el rendimiento, la seguridad y la administración de una red. Con la práctica, se comprendió de forma aplicada cómo se combinan los conceptos de **direcccionamiento jerárquico, VLANs y enrutamiento inter-VLAN** para construir redes escalables y funcionales dentro de un entorno empresarial simulado.

## **Referencias bibliográficas**

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- Tanenbaum, A. S., & Wetherall, D. J. (2011). *Computer Networks* (5th ed.). Pearson Education.