Elaborato Laboratorio Reti di Telecomunicazioni

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Configurazione di una Rete con VLAN e Routing Inter-VLAN.

Contents

1 Configurazione dei pc

- **Configurazione PC1A**
  ip 192.168.1.2 255.255.255.0 192.168.1.1
- **Configurazione PC2A**
  ip 192.168.1.3 255.255.255.0 192.168.1.1
- **Configurazione PC1B**
  ip 192.168.2.2 255.255.255.0 192.168.2.1
- **Configurazione PC2B**
  ip 192.168.2.3 255.255.255.0 192.168.2.1
- **Configurazione PC1C**
  ip 192.168.3.2 255.255.255.0 192.168.3.1
- **Configurazione PC2C**
  ip 192.168.3.2 255.255.255.0 192.168.4.1
- **Configurazione PC1D**
  ip 192.168.4.2 255.255.255.0 192.168.4.1
- **Configurazione PC2D**
  ip 192.168.4.3 255.255.255.0 192.168.4.1

Dove il primo indirizzo ipv4 è l'ip della macchina, il secondo è la sua subnet mask mentre il terzo indica il default gateway della rete di appartenenza.

2 Configurazione interfacce router

- **Configurazione interfaccia gig0/2 router 1**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/2
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up
```

- **Configurazione interfaccia gig0/2 router 2**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/2
Router(config-if)#ip address 192.168.10.2 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up
```

Spiegazione comandi:

en (enable) → ci permette di passare da livello user a priveleged
conf t (configure terminal) → per passare dal livello priveleged a global

int gig0/2 (interface gig0/2) → per selezionare l'interfaccia
ip address {ip interfaccia} {subnet interfaccia} → per assegnare l'indirizzo ip all'interfaccia
no shut (no shutdown) → accende l'interfaccia

3 Creazione VLAN su switch

- **Switch 1**

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name vlanA
Switch(config-vlan)#exit
Switch(config)#int range fa0/1-12
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 3
Switch(config-vlan)#name vlanB
Switch(config-vlan)#exit
Switch(config)#interface range fa0/13-24
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gig0/1, Gig0/2
2    vlanA                             active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
3    vlanB                             active    Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0
```

- **Switch 2**

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name vlanC
Switch(config-vlan)#exit
Switch(config)#interface range fa0/1-12
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 3
Switch(config-vlan)#name vlanD
Switch(config-vlan)#exit
Switch(config)#interface range fa0/13-24
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gig0/1, Gig0/2
2    vlanC                             active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
3    vlanD                             active    Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
```

Spiegazione comandi:
vlan n (dove n è il numero della vlan che si sta creando) → crea una nuova vlan, n parte da 2 in quanto la vlan 1 già esiste ed è la vlan di default.
name nomeVlan (nomeVlan è il nome che si sta dando alla vlan) → assegna un nome alla vlan.
int range fa/01-12 → permette di selezionare contemporaneamente più interfacce dello switch.
switchport access vlan n → assegna il range precedentemente selezionato alla vlan n.

Questi comandi vengono fatti 2 volte per ogni switch, in modo da creare rispettivamente 2 vlan per switch.

4 Configurazione Router on a stick

Router on a stick è una tecnica che permette di utilizzare una sola interfaccia fisica del router per gestire le comunicazione delle varie VLAN.

- **Router 1**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#int gig0/0.2
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#int gig0/0.3
Router(config-subif)#encapsulation dot1Q 3
```

- **Router 2**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#int gig0/0.2
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#int gig0/0.3
Router(config-subif)#encapsulation dot1Q 3
```

Una volta fatto ciò, bisogna configurare le subinterfacce create con il comando del tipo 'int gig0/0.2' che crea una subinterfaccia numerata 2 dell'interfaccia gig0/0.

Indirizzamento ip subinterfacce

- **Router 1**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/0.2
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int gig0/0.3
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#
```

- **Router 2**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/0.2
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int gig0/0.3
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#
```

5 Configurazione modalità trunk per Switch

- **Switch 1**

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int gig0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan add 2
Switch(config-if)#switchport trunk allowed vlan add 3
```

- **Switch 2**

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int gig0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan add 2
Switch(config-if)#switchport trunk allowed vlan add 3
```

Spiegazione comandi:

int gig0/1 → seleziona l'interfaccia dello switch che ci interessa
switchport mode trunk → configura l'interfaccia come interfaccia trunk
switchport trunk allowed vlan add n (dove n è il numero della vlan) → permette ai pacchetti della VLAN specificata di passare attraverso l'interfaccia trunk
L'ultimo comando va ripetuto per tutte le vlan.

6 Configurazione protocollo RIP nei router

- **Router 1**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.1.0
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.10.0
Router(config-router)#no auto-summary
```

- **Router 2**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.10.0
Router(config-router)#network 192.168.3.0
Router(config-router)#network 192.168.4.0
Router(config-router)#no auto-summary
```

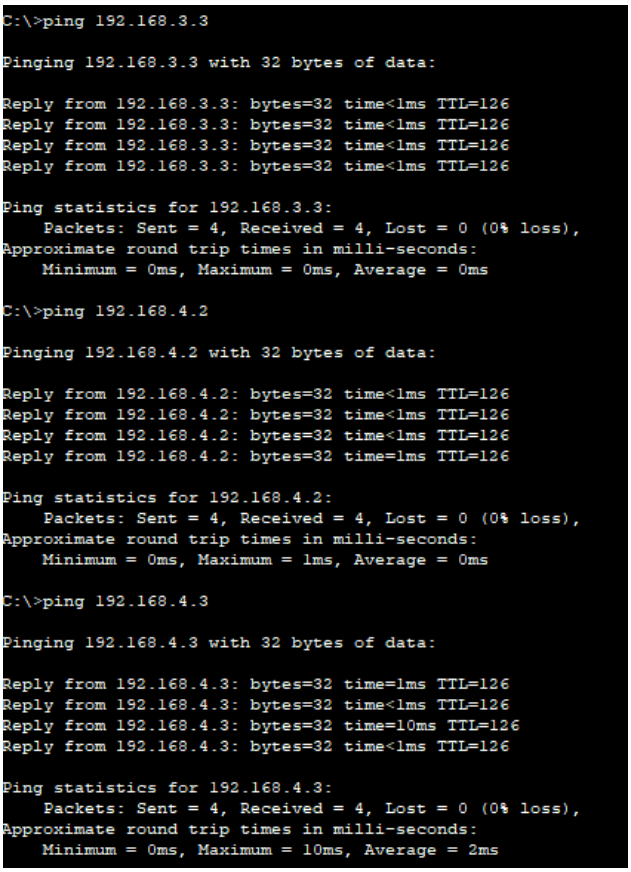
Spiegazione comandi:

router rip → indica che stiamo configurando il protocollo rip nel router
version 2 → specifica la versione del protocollo
network {ip di rete} → comando da eseguire per ogni rete con cui il router è collegato
no auto-summary → disabilita il riassunto automatico delle rotte

7 Cattura del traffico di rete

Per verificare il corretto configuramento dei pc e dei dispositivi, provare a pingare con il comando 'ping + ip del destinatario' e verificare se otteniamo dei reply. Di seguito le immagini dei ping che vanno da un pc della vlanA a tutti gli altri pc (appartenenti alle altre VLAN).

```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

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

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time<1ms TTL=127
Reply from 192.168.2.3: bytes=32 time<1ms TTL=127
Reply from 192.168.2.3: bytes=32 time<1ms TTL=127
Reply from 192.168.2.3: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=18ms TTL=126
Reply from 192.168.3.2: bytes=32 time=1ms TTL=126
Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 18ms, Average = 5ms
```



Note[1] [2]

[1]Dopo aver configurato i dispositivi (switch e router), utilizzare il comando 'wr' per salvare la configurazione.
[2]Software utilizzato per la simulazione: Cisco Packet Tracer