

Esercitazione di Reti di Calcolatori

Installazione Del Software

<https://www.netacad.com/courses/packet-tracer>

Sign in > Resources > Download Packet Tracer

Windows Desktop Version 7.2 English

64 Bit Download

32 Bit Download

Linux Desktop Version 7.2 English

64 Bit Download

Mobile

iOS Version 3.0 English

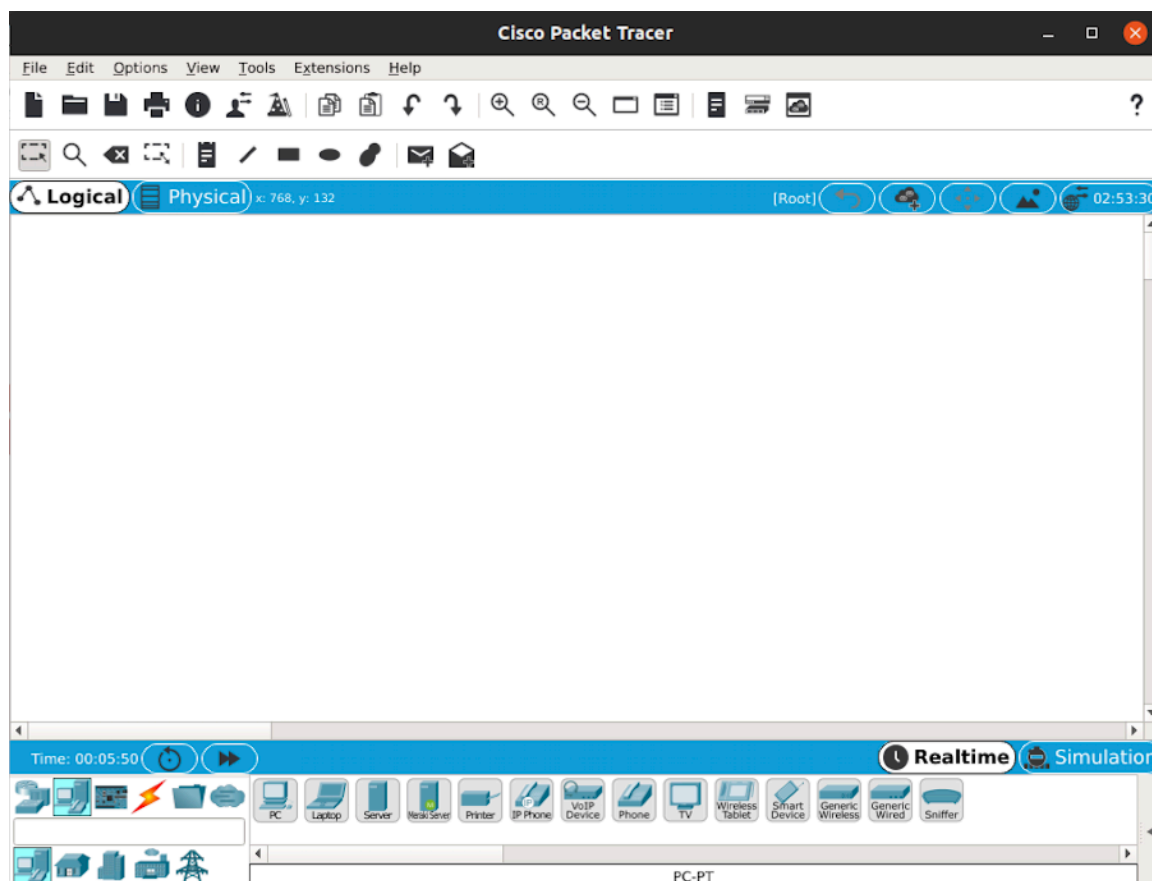


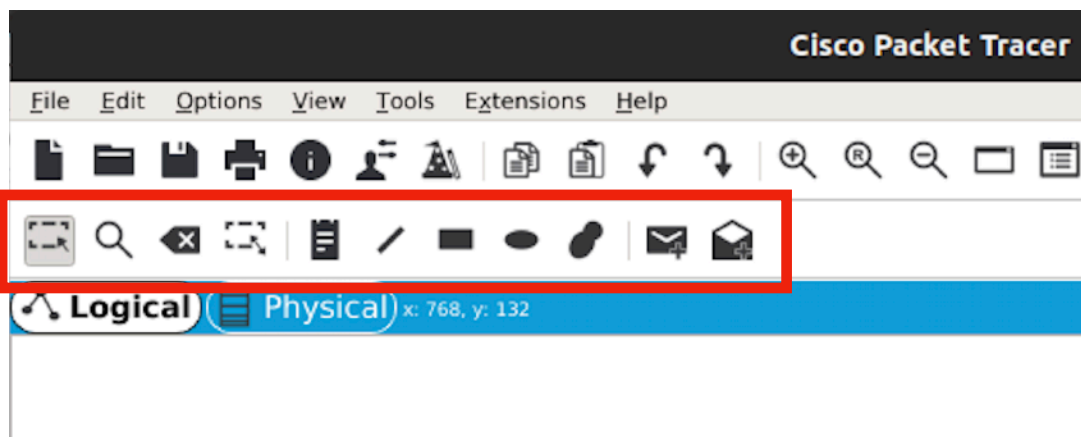
Android Version 3.0 English



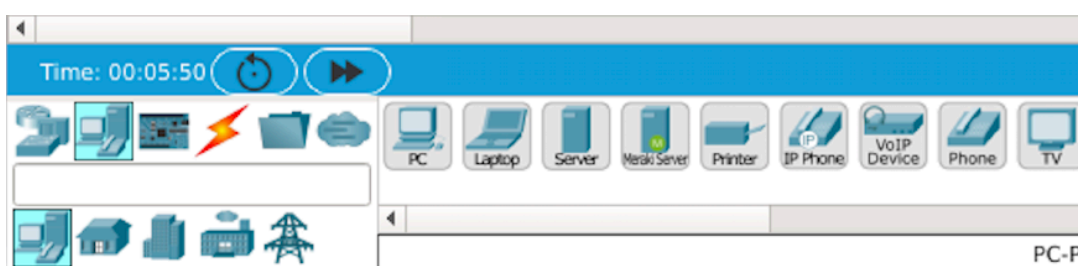
Packet Tracer Interface

Ecco l'interfaccia principale di packet tracer.

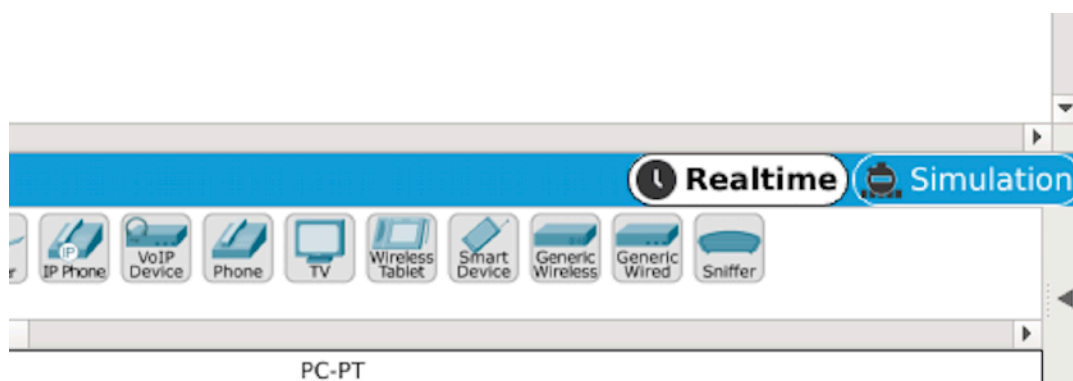




In alto a sinistra sono posizionati tutti i tool utili per selezionare/cancellare elementi della rete, inserire note o forme, simulare l'invio di un pacchetto.



In basso a sinistra, si trovano gli elementi disponibili tra Router Switch, PC, cavi etc.



Importante notare la presenza del tab *Realtime* selezionato accanto al tab *Simulation*.

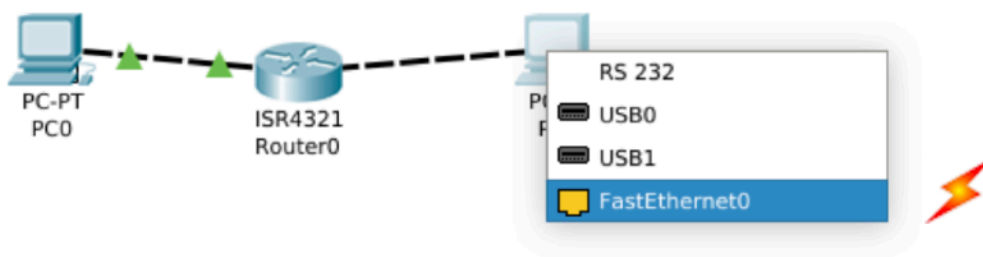
Problem Statement 1

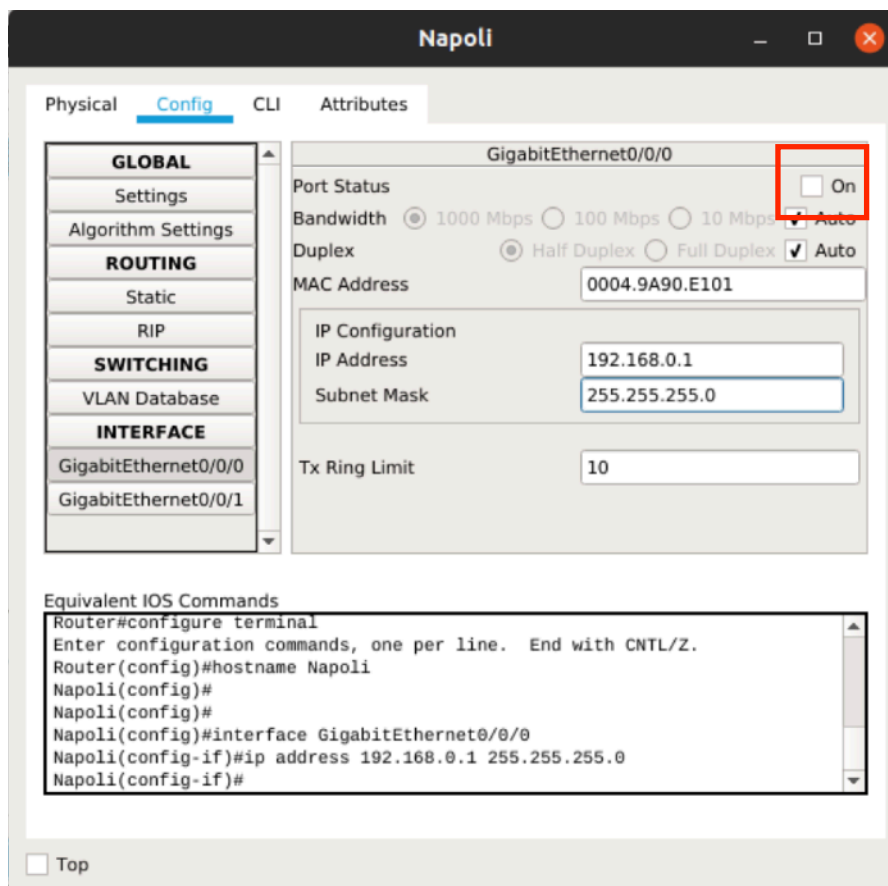
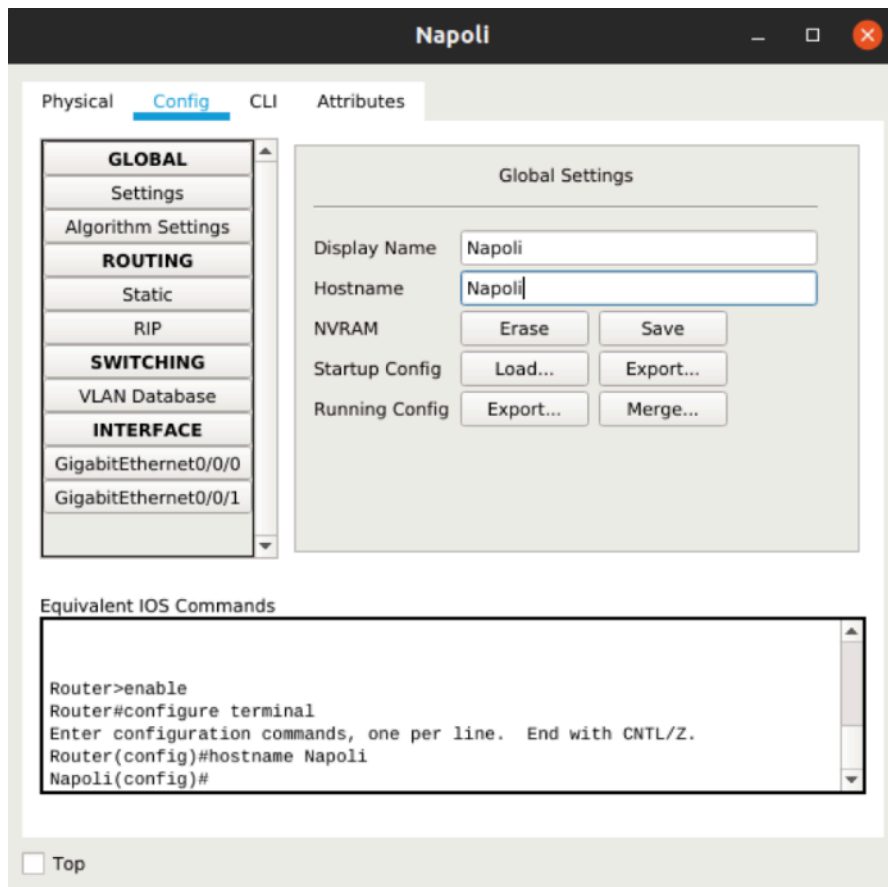
Connettere due PC tramite un Router ed effettuare un ping.

- 1) Selezionare dalle palette degli elementi due PC e un Router.



- 2) Connettere gli elementi con il cavo corretto/usare la connessione automatica sulle interfacce fast ethernet.





3) Configurazione del Router:

- 1) Apro il pannello del Router (doppio click sul Router) e accedo al tab *config*, controllo che sia acceso.
- 2) Nel tab *config* cambio il nome del Router.
- 3) Qui si possono inserire i comandi per configurare il Router, gli stessi si possono inserire sia da console che da interfaccia grafica. Alcuni comandi tipici sono *enable*, *hostname* e *no shutdown*
- 4) Configuro le interfacce del Router da CLI o da interfaccia grafica

Da CLI ho per l' interfaccia fastEthernet 0/0 :

Interface fastEthernet 0/0

IP Address 192.168.0.1

Subnet Mask 255.255.255.0

no shutdown

Per fastEthernet 0/1 nel pannello config e seleziono fastEthernet 0/1:

Inseriamo come IP address:

IP Address 10.0.0.1

Subnet Mask 255.0.0.0

no shutdown

Per controllare apro la console e digito *ip interface brief*

3) Configurazione dei computer:

A. Passiamo al PC0 con doppio click il *Desktop* configuro

IP Address 192.168.0.2

Subnet Mask 255.255.255.0

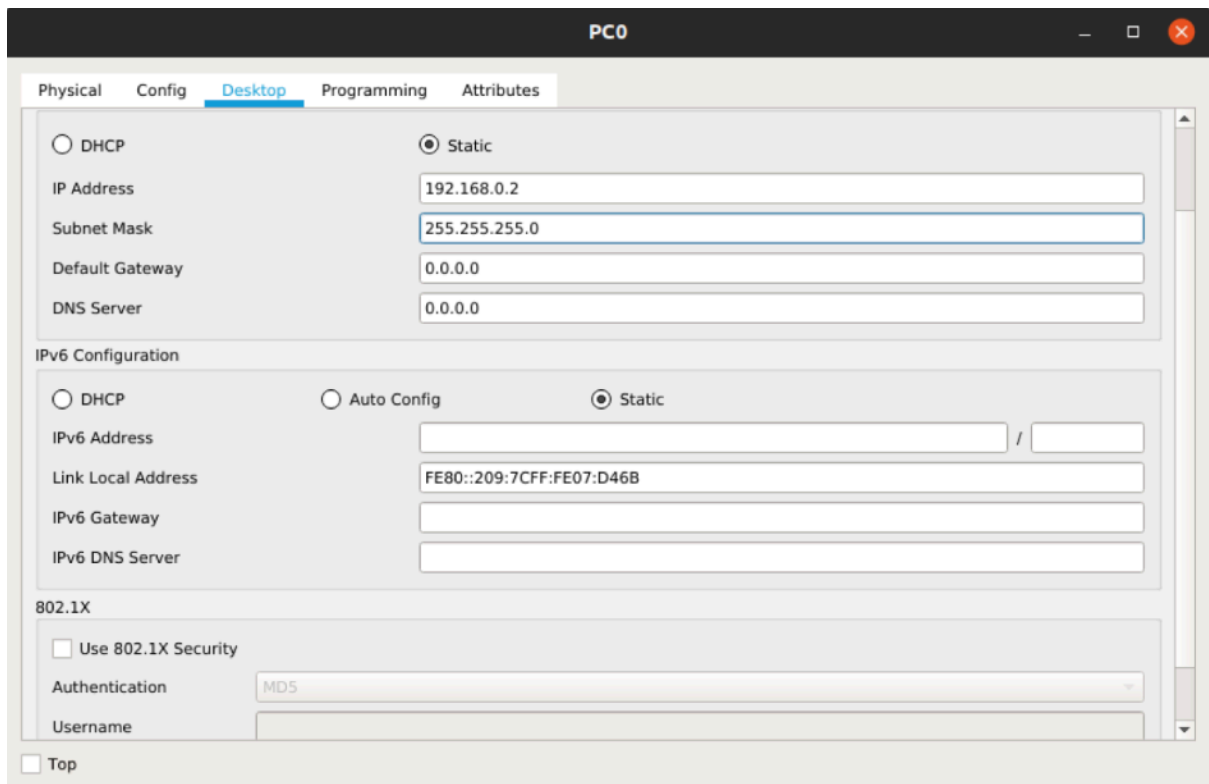
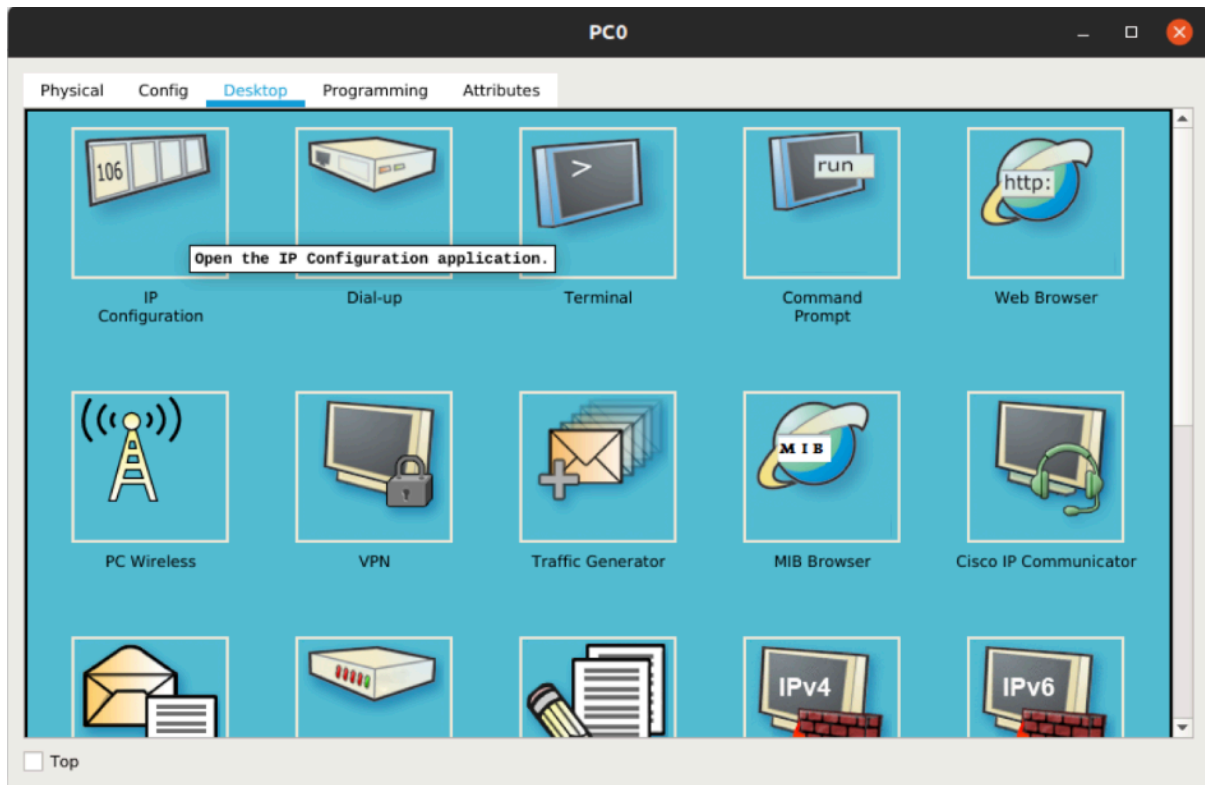
Default Gateway 192.168.0.2

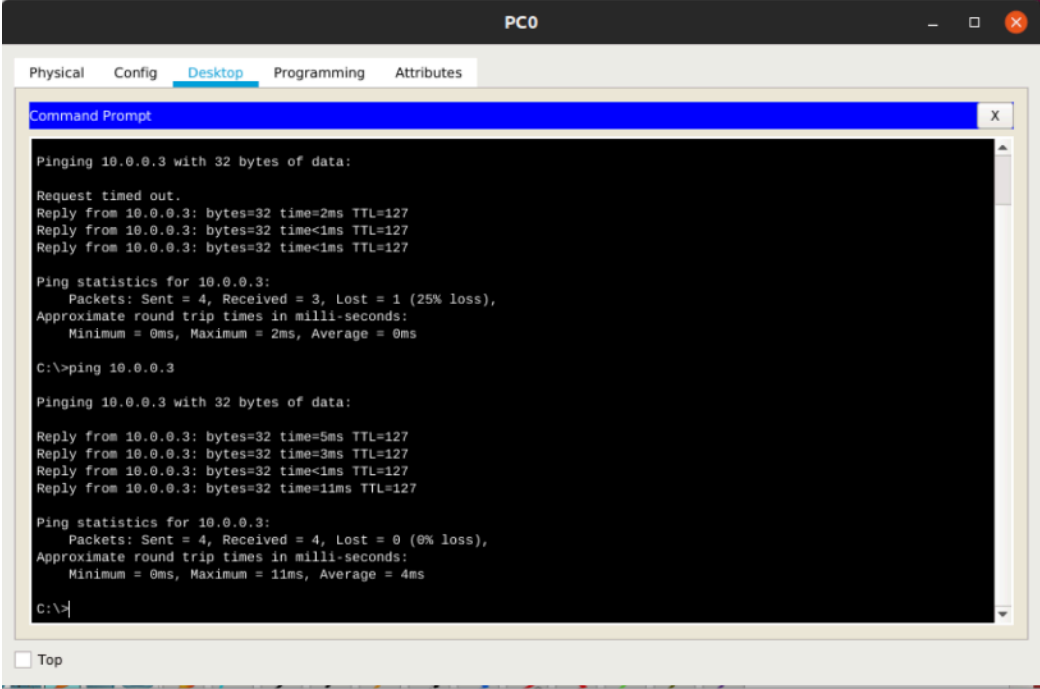
B. Passiamo al PC1 con doppio click il *Desktop* configuro

IP Address 10.0.0.2

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1





The screenshot shows a Packet Tracer PC0 desktop environment. The 'Desktop' tab is selected, and a 'Command Prompt' window is open. The window displays the results of two ping commands to the IP address 10.0.0.3. The first command shows a 25% loss rate, while the second shows a 0% loss rate.

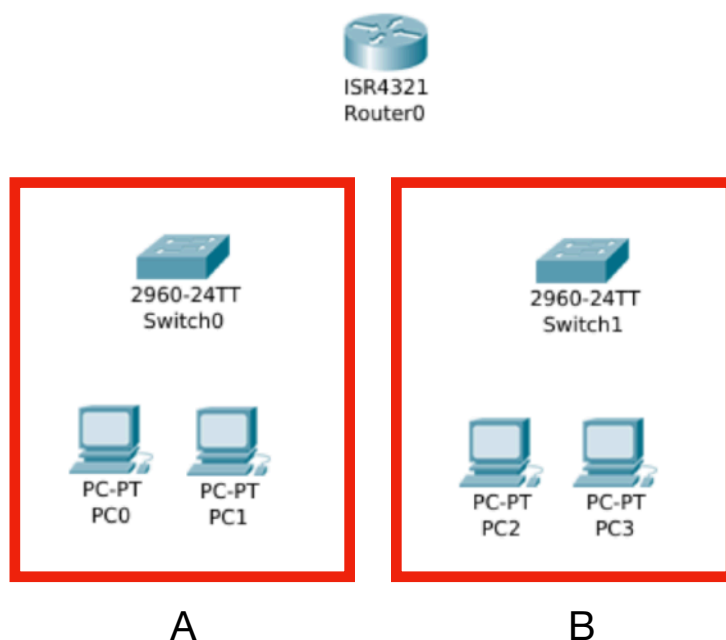
```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Pinging 10.0.0.3 with 32 bytes of data:
Request timed out.
Reply from 10.0.0.3: bytes=32 time=2ms TTL=127
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127
Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms
c:\>ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data:
Reply from 10.0.0.3: bytes=32 time=5ms TTL=127
Reply from 10.0.0.3: bytes=32 time=3ms TTL=127
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127
Reply from 10.0.0.3: bytes=32 time=11ms TTL=127
Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 4ms
c:\>
```

Apriamo PC0 > Desktop > Command Prompt

Ping 192.168.0.2

Problem Statement 2

Connettere PC appartenenti a subnet diverse utilizzando uno Switch e un Router ed effettuare un ping di prova



La sottorete A è caratterizzata da:

A) PC0:

Indirizzi IP 192.168.0.2

Subnet Mask 255.255.255.0

B) PC1 :

Indirizzi IP 192.168.0.3

Subnet Mask 255.255.255.0

La sottorete B è caratterizzata da:

A) PC2:

Indirizzi IP 10.0.0.2

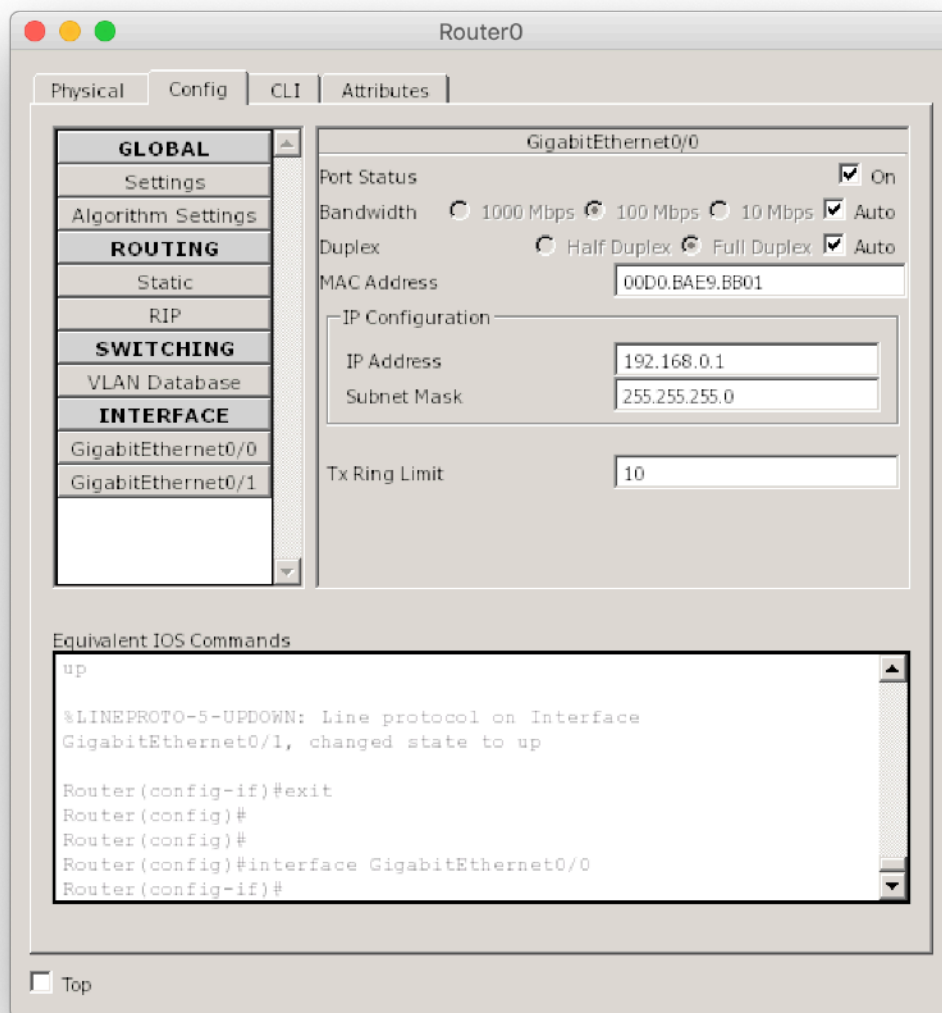
Subnet Mask 255.0.0.0

A) PC3:

Indirizzi IP 10.0.0.3

Subnet Mask 255.0.0.0

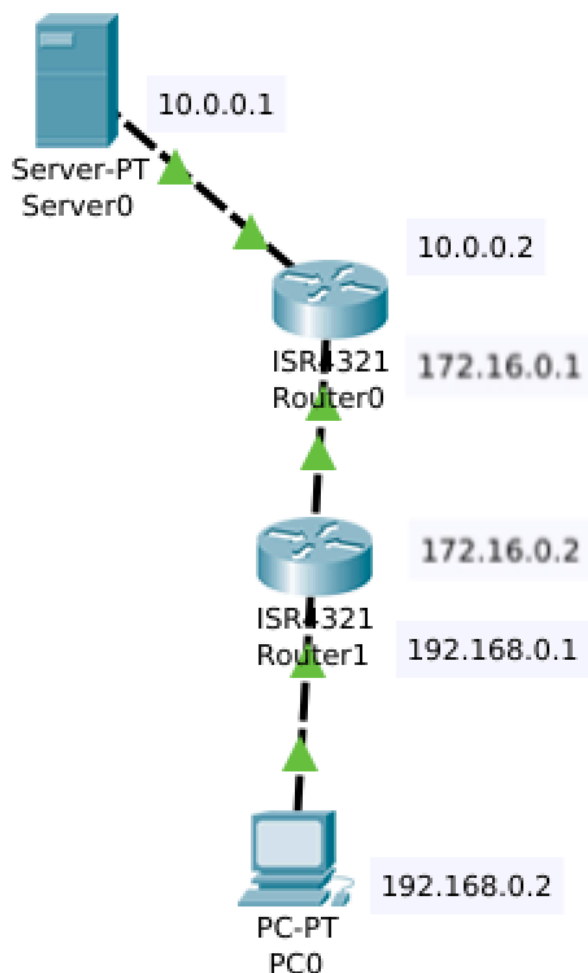
E' necessario collegare i dispositivi innanzitutto e procedere al set-up dei personal computer con relativi indirizzi IP e subnet mask come visto in precedenza.



Successivamente si passa alla configurazione del Router0 e si impostano le relative interfacce.

Problem Statement 3

Set up topologia client server e ping di prova



Si configurano i Router come in figura, con rispettivi gateway e maschere di rete.

Successivamente è richiesta la configurazione delle tabelle di routing del Router0 e del Router1. Accedendo alle console dei rispettivi si accede al tab Static Routing dove si possono configurare le rotte.

Il PC0 può ora provare ad effettuare un ping verso la macchina 10.0.0.1 con successo.

The screenshot shows the configuration window for Router0. The 'Config' tab is active, and the 'Static Routes' section is selected in the left-hand menu. The 'Static Routes' area contains three input fields: 'Network', 'Mask', and 'Next Hop'. Below these fields is an 'Add' button. A table below the 'Add' button shows a single entry: '192.168.0.0/24 via 172.16.0.2'. Below the table is a 'Remove' button. At the bottom, there is a text area for 'Equivalent IOS Commands' containing the following text:

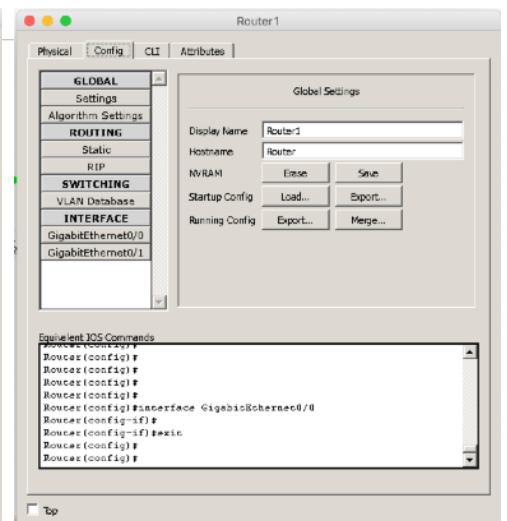
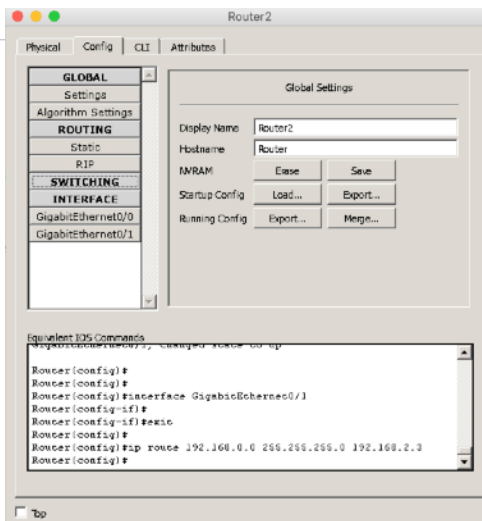
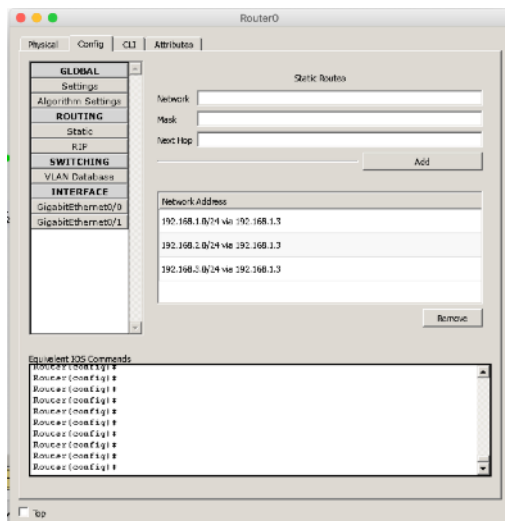
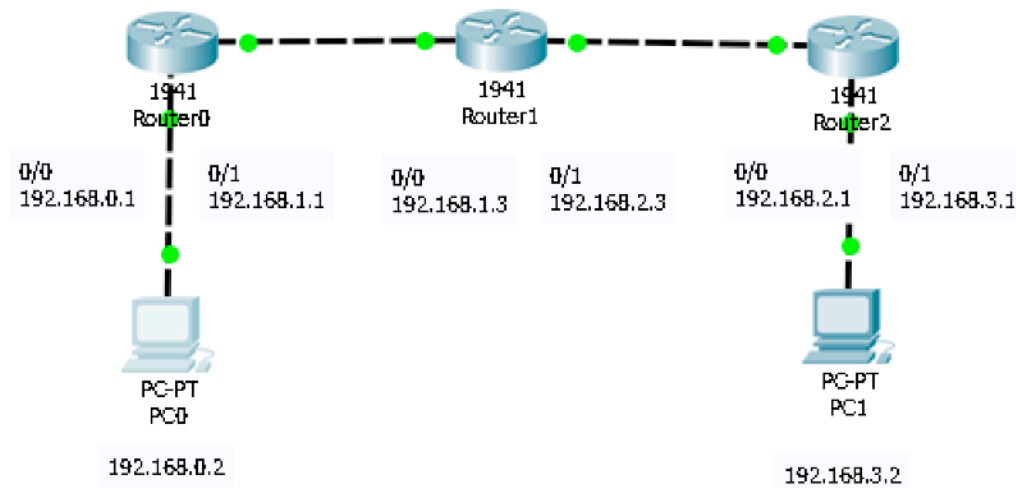
```
Router(config-1)#  
Router(config-if)#exit  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#
```

The screenshot shows the configuration window for Router1. The 'Config' tab is active, and the 'Static Routes' section is selected in the left-hand menu. The 'Static Routes' area contains three input fields: 'Network', 'Mask', and 'Next Hop'. Below these fields is an 'Add' button. A table below the 'Add' button shows a single entry: '10.0.0.0/8 via 172.16.0.1'. Below the table is a 'Remove' button. At the bottom, there is a text area for 'Equivalent IOS Commands' containing the following text:

```
Router(config-1)#  
Router(config-if)#exit  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#
```

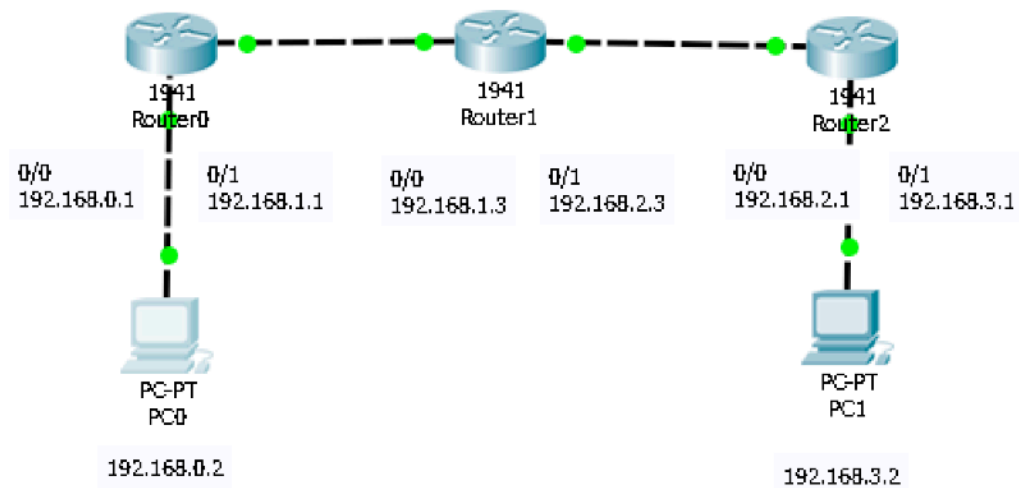
Problem Statement 4

Topologia Estesa con Routing Statico



Problem Statement 5

Topologia Estesa con Routing RIP



Router0

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Network

RIP Routing

Add

Network Address

192.168.0.0

192.168.1.0

Remove

Equivalent IOS Commands

```

Router(config)# ip rip
Router(config-router)# network 192.168.0.0
Router(config-router)#
Router(config-router)# end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# router rip
Router(config-router)#
$SYS-S-COMFIG_1: Configured from console by console
    
```

Tip

Router1

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Network

RIP Routing

Add

Network Address

192.168.1.0

192.168.2.0

Remove

Equivalent IOS Commands

```

Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# router rip
Router(config-router)#
$SYS-S-COMFIG_1: Configured from console by console
    
```

Tip

Router2

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Network

RIP Routing

Add

Network Address

192.168.2.0

192.168.3.0

Remove

Equivalent IOS Commands

```

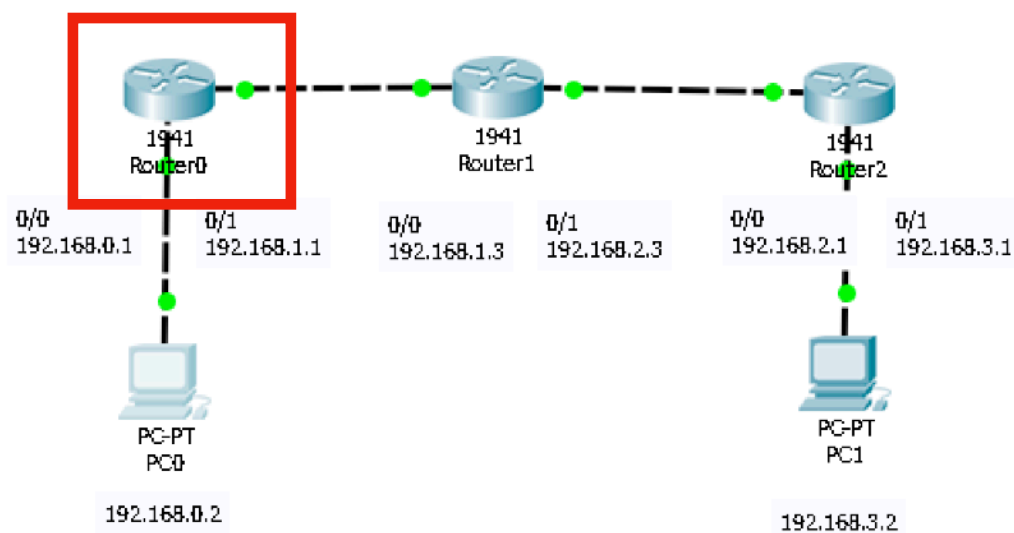
Router(config)# ip rip
$SYS-S-COMFIG_1: Configured from console by console
network 192.168.2.0
Router(config-router)#
Router(config-router)# end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# router rip
Router(config-router)#
$SYS-S-COMFIG_1: Configured from console by console
    
```

Tip

Problem Statement 6

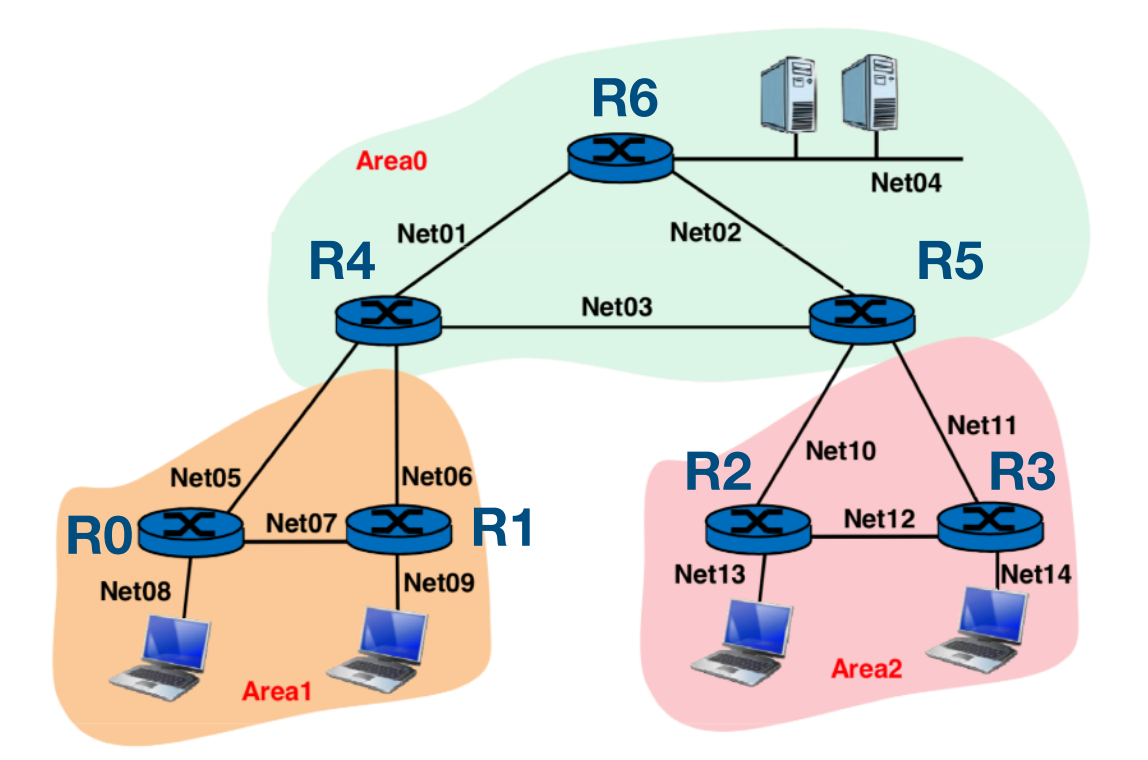
From Routing Table to Network

Type	Network	Port	Next Hop IP	Metric
C	192.168.0.0/24	GigabitEthernet0/0	—	0/0
L	192.168.0.1/32	GigabitEthernet0/0	—	0/0
C	192.168.1.0/24	GigabitEthernet0/1	—	0/0
L	192.168.1.1/32	GigabitEthernet0/1	—	0/0
S	192.168.2.0/24	—	192.168.1.3	1/0
S	192.168.3.0/24	—	192.168.1.3	1/0



Problem Statement 7

OSPF Network



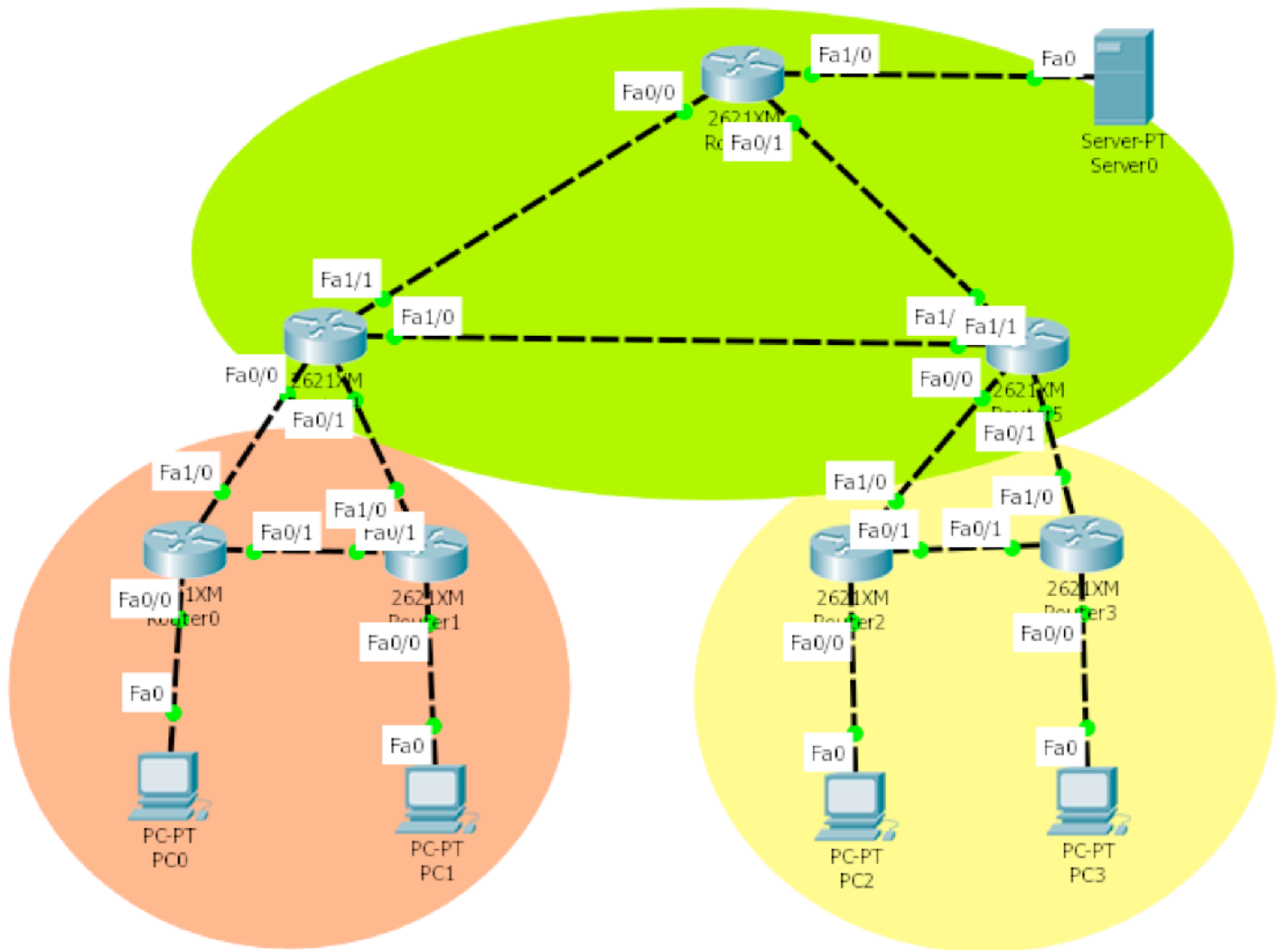
Si descrive una rete caratterizzata da 7 router e 5 end-systems.

La topologia di rete richiede 14 subnet e per l'indirizzamento si ha a disposizione il blocco di 128 indirizzi 192.168.24.0/25

Si effettua un subnetting con maschera a lunghezza variabile con Netmask /30 per i 9 collegamenti punto punto fra router e /28 per le reti LAN che ospitano gli endpoint.

End Point	Indirizzo/subnet
S01	192.168.24.50/28
C11	192.168.24.66/28
C12	192.168.24.82/28
C21	192.168.24.98/28
C22	192.168.24.114/2

Network	Indirizzo/subnet
Net 01	192.168.24.0/30
Net 02	192.168.24.4/30
Net 03	192.168.24.8/30
	192.168.24.12/30
Net 05	192.168.24.16/30
Net 06	192.168.24.20/30
Net 07	192.168.24.24/30
	192.168.24.28/30
Net 10	192.168.24.32/30
Net 11	192.168.24.36/30
Net 12	192.168.24.40/30
Net 04	192.168.24.48/28
Net 08	192.168.24.64/28
Net 09	192.168.24.80/28
Net 13	192.168.24.96/28
Net 14	192.168.24.112/28



Comandi utili

(Cheat Sheet)

```
enable
configure
Show running-config
copy running-config startup-config
```

```
interface FastEthernet0
ip address 192.168.24.5 255.255.255.252
duplex auto
speed auto
```

https://www.cisco.com/c/en/us/td/docs/security/asa/asa72/configuration/guide/conf_gd/intparam.html

```
router ospf 1
network 192.168.24.0 0.0.0.3 area 1
passive-interface FastEthernet 0/1
```

```
show ip ospf database
show ip ospf neighbor
show ip ospf
```

https://www.cisco.com/c/en/us/td/docs/security/asa/asa72/configuration/guide/conf_gd/ip.html#wp1094564

Configurazioni dei router

R0

```
interface FastEthernet0/0
!
ip address 192.168.24.65 255.255.255.240
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.24.25 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.24.18 255.255.255.252
duplex auto
speed auto
!
router ospf 1
log-adjacency-changes
network 192.168.24.24 0.0.0.3 area 1
network 192.168.24.64 0.0.0.15 area 1
network 192.168.24.16 0.0.0.3 area 1
```

R1

```
interface FastEthernet0/0
!
ip address 192.168.24.81 255.255.255.240
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.24.26 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.24.22 255.255.255.252
duplex auto
speed auto
!
router ospf 1
log-adjacency-changes
```

```
network 192.168.24.24 0.0.0.3 area 1
network 192.168.24.80 0.0.0.15 area 1
network 192.168.24.20 0.0.0.3 area 1
```

R4

```
interface FastEthernet0/0
ip address 192.168.24.17 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.24.21 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.24.9 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet1/1
ip address 192.168.24.2 255.255.255.252
duplex auto
speed auto
!
router ospf 1
log-adjacency-changes
network 192.168.24.16 0.0.0.3 area 1
network 192.168.24.20 0.0.0.3 area 1
network 192.168.24.8 0.0.0.3 area 0
network 192.168.24.0 0.0.0.3 area 0
```

R5

```
interface FastEthernet0/0

ip address 192.168.24.33 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.24.37 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.24.6 255.255.255.252
duplex auto
```

```
speed auto
!  
interface FastEthernet1/1  
ip address 192.168.24.10 255.255.255.252  
duplex auto  
speed auto  
!  
router ospf 1  
log-adjacency-changes  
network 192.168.24.32 0.0.0.3 area 2  
network 192.168.24.36 0.0.0.3 area 2  
network 192.168.24.8 0.0.0.3 area 0  
network 192.168.24.4 0.0.0.3 area 0
```

R2

```
interface FastEthernet0/0  
  
ip address 192.168.24.97 255.255.255.240  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
ip address 192.168.24.41 255.255.255.252  
duplex auto  
speed auto  
!  
interface FastEthernet1/0  
ip address 192.168.24.34 255.255.255.252  
duplex auto  
speed auto  
!  
router ospf 1  
log-adjacency-changes  
network 192.168.24.40 0.0.0.3 area 2  
network 192.168.24.96 0.0.0.15 area 2  
network 192.168.24.32 0.0.0.3 area 2
```

R3

```
interface FastEthernet0/0  
  
ip address 192.168.24.113 255.255.255.240  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
ip address 192.168.24.42 255.255.255.252  
duplex auto
```

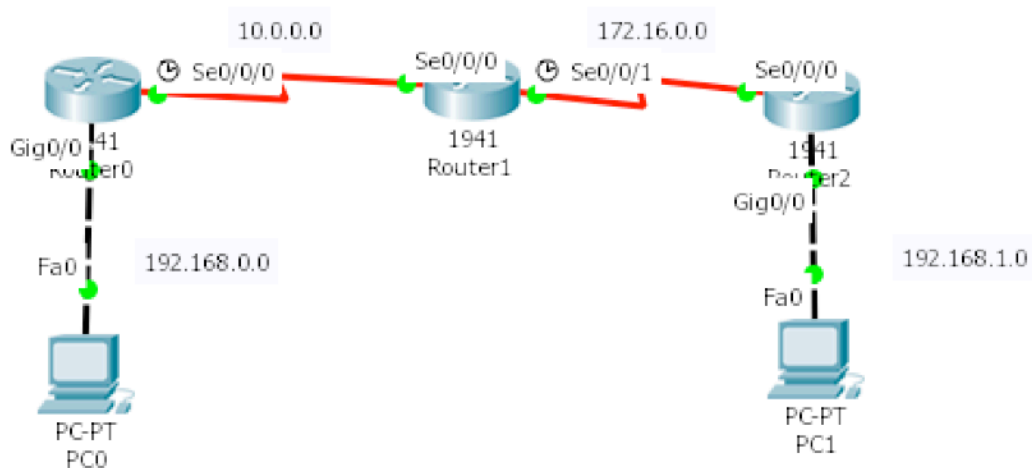
```
speed auto
!  
interface FastEthernet1/0  
ip address 192.168.24.38 255.255.255.252  
duplex auto  
speed auto  
!  
router ospf 1  
log-adjacency-changes  
network 192.168.24.40 0.0.0.3 area 2  
network 192.168.24.112 0.0.0.15 area 2  
network 192.168.24.36 0.0.0.3 area 2  
!
```

R6

```
interface FastEthernet0/0  
  
ip address 192.168.24.1 255.255.255.252  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
ip address 192.168.24.5 255.255.255.252  
duplex auto  
speed auto  
!  
router ospf 1  
log-adjacency-changes  
network 192.168.24.0 0.0.0.3 area 0  
network 192.168.24.4 0.0.0.3 area 0
```

Statement 8

Configurazione Routing BGP



Configurazioni dei router

R0

se0/0/0 - 10.0.0.1

```
router bgp 10
neighbor 10.0.0.2 remote-as 20
network 192.168.0.0 mask 255.255.255.0
```

R1

se0/0/0 - 10.0.0.2
se0/0/1 - 172.16.0.1

```
router bgp 20
neighbor 10.0.0.1 remote-as 10
neighbor 172.16.0.2 remote-as 30
```

R2

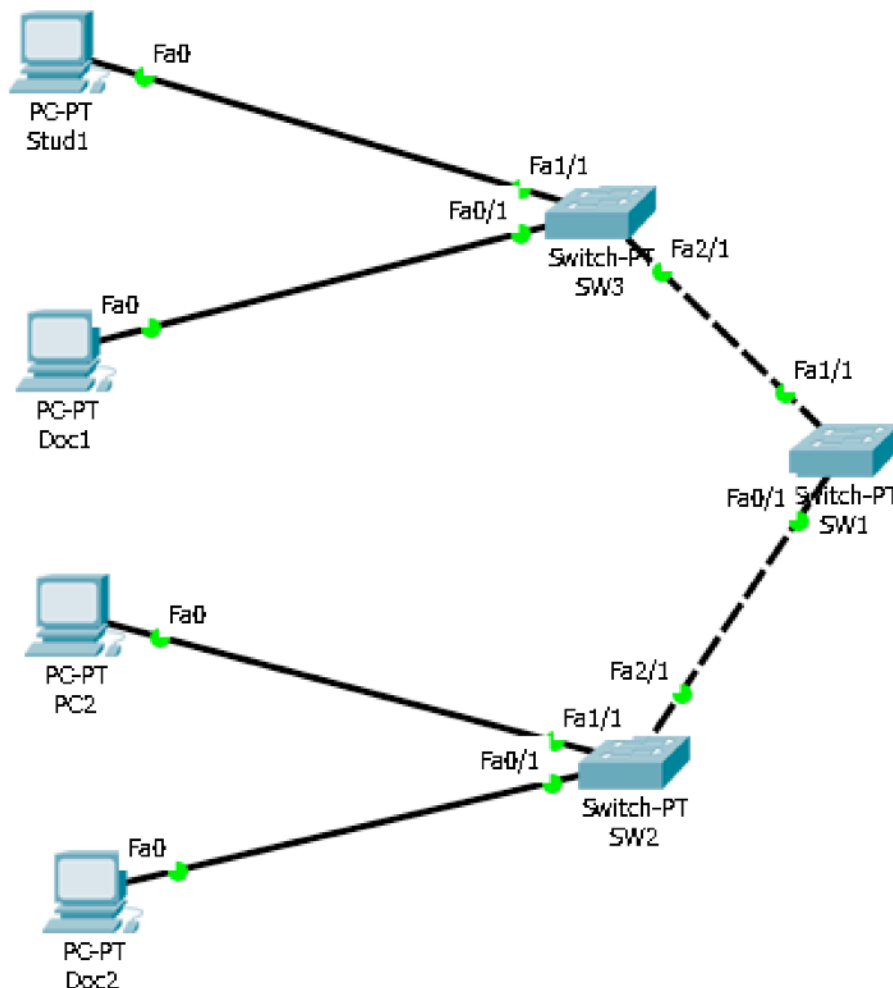
```
se0/0/0 - 172.16.0.2  
router bgp 30  
neighbor 172.16.0.1 remote-as 20  
network 192.168.1.0 mask 255.255.255.0
```

Comandi utili (Cheat Sheet)

```
router bgp 10  
neighbor 172.16.0.1 remote-as 20  
network 192.168.1.0 mask 255.255.255.0
```

[https://www.cisco.com/c/en/us/td/docs/switches/
datacenter/nexus6000/sw/unicast/6_x/
cisco_n6k_layer3_ucast_cfg_rel_602_N2_1/13_bgp.html](https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus6000/sw/unicast/6_x/cisco_n6k_layer3_ucast_cfg_rel_602_N2_1/13_bgp.html)

Statement 9 - VLAN con trunk



Fire	Last Status	Source	Destination	Type	Color	Time(sec)
	Successful	Stud1	PC2	ICMP	Blue	0.000
	Failed	Doc2	PC2	ICMP	Red	0.000
	Successful	Doc2	Doc1	ICMP	Brown	0.000

Configurazioni dei router/PC

Stud1

IP: 192.168.1.10

gateway: 192.168.1.254

Doc1

IP: 192.168.2.10

gateway: 192.168.2.254

Stud 2

IP: 192.168.1.11

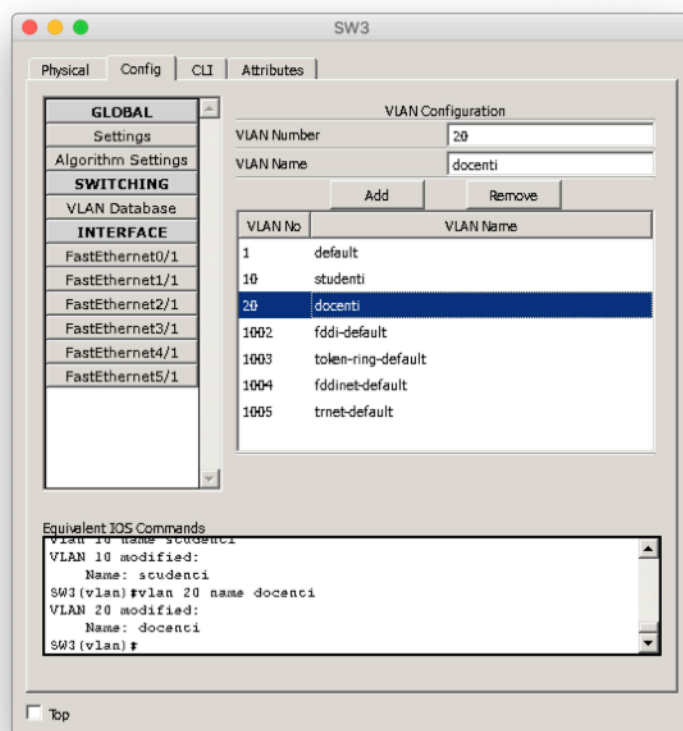
gateway: 192.168.1.254

Doc 2

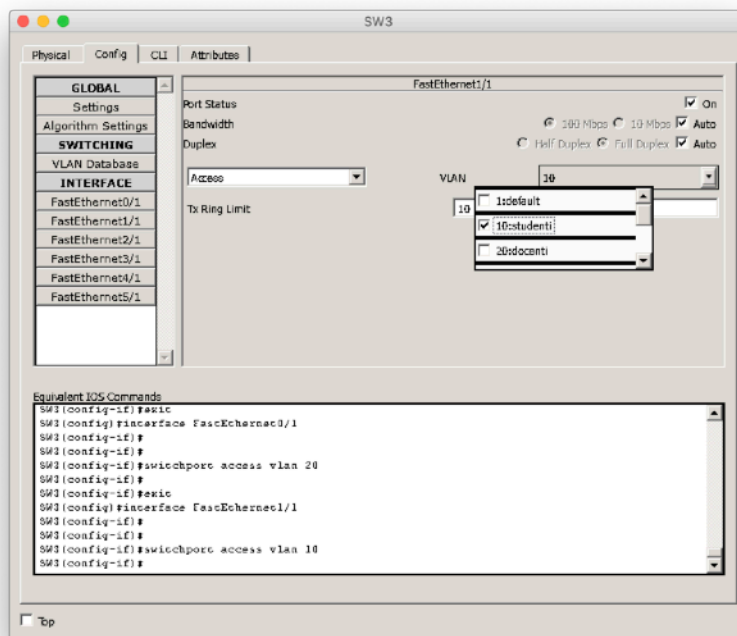
IP: 192.168.2.11

gateway: 192.168.2.254

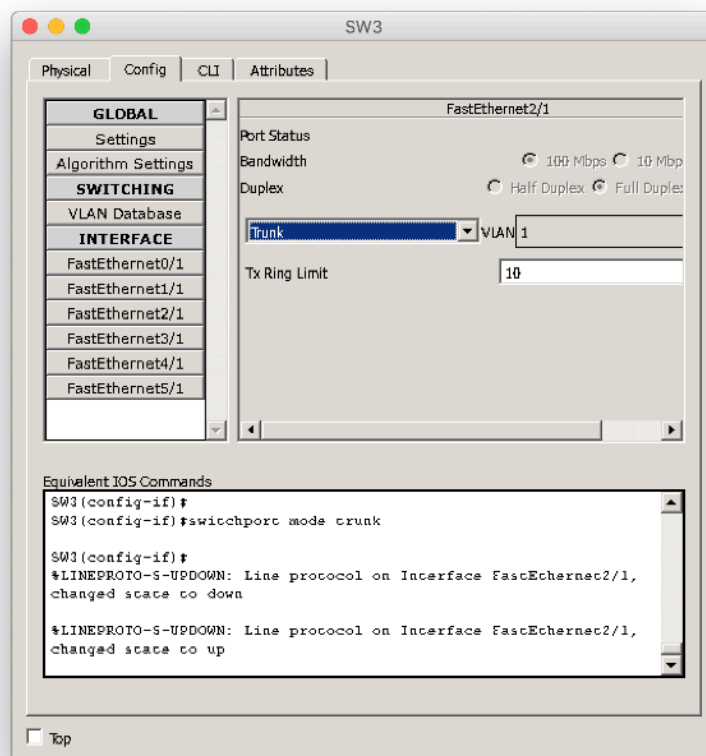
Dopo aver impostato i PC si procede ad aggiungere in ogni switch le VLAN da creare.



Per ogni interfaccia si imposta la VLAN corrispondente al PC e alla rete virtuale a cui fa parte.



Infine per i collegamenti tra switch si setta la relativa interfaccia come trunk.



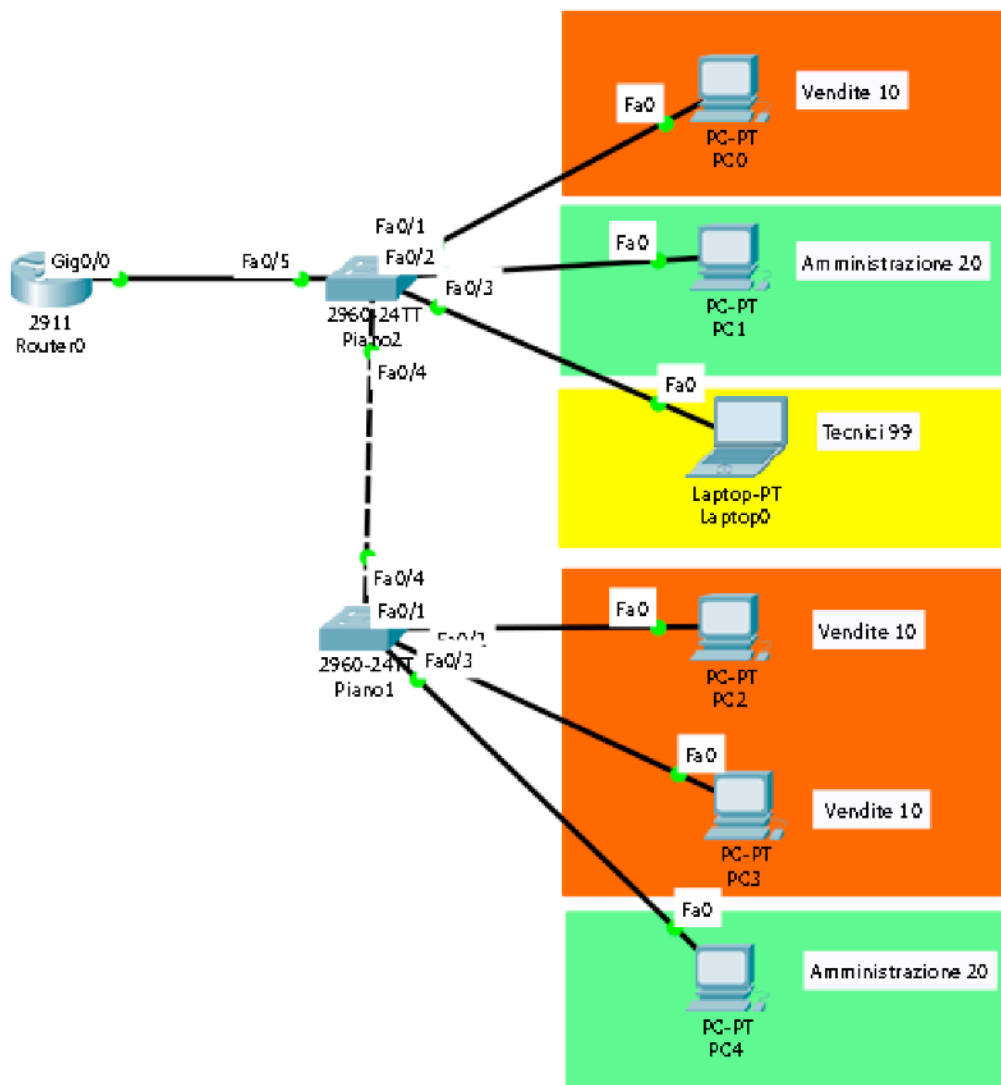
Comandi utili (Cheat Sheet)

```
vlan 10  
name studenti
```

```
show vlan brief
```

```
interface  
switchport access vlan 3
```

Statement 10 - VLAN con Trunk e Routing



Fire	Last Status	Source	Destination	Type	Color	Time(s)
	Successful	PC3	PC0	ICMP		0.00
	Failed	PC4	PC3	ICMP		0.00
	Successful	PC4	PC1	ICMP		0.00
	Failed	PC0	Laptop0	ICMP		0.00

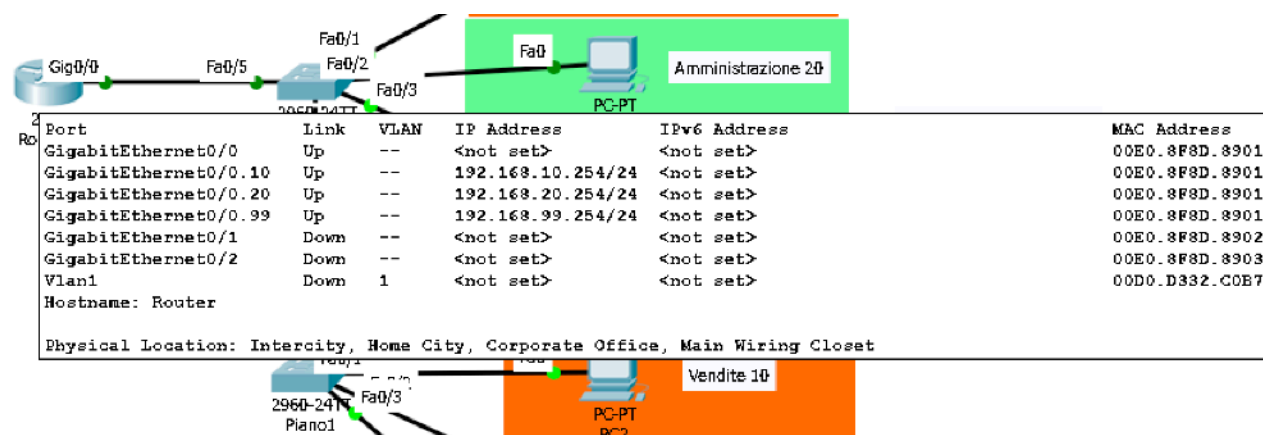
Configurazioni dei router

Router0

```
interface gigabitEthernet 0/0.20
GigabitEthernet0/0.20, changed state to up
encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.20.254
```

```
interface gigabitEthernet 0/0.10
GigabitEthernet0/0.10, changed state to up
encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.254
```

```
interface gigabitEthernet 0/0.99
GigabitEthernet0/0.99, changed state to up
encapsulation dot1Q 99
Router(config-subif)#ip address 192.168.99.254
```



Configurazioni dei PC

Amministrazione

IP: 192.168.20.0 un indirizzo di questa subnet con relativa subnet
Gateway 192.168.20.254

Vendite

IP: 192.168.10.0 un indirizzo di questa subnet con relativa subnet
Gateway 192.168.10.254

Tecnici

IP: 192.168.99.0 un indirizzo di questa subnet con relativa subnet
Gateway 192.168.99.254