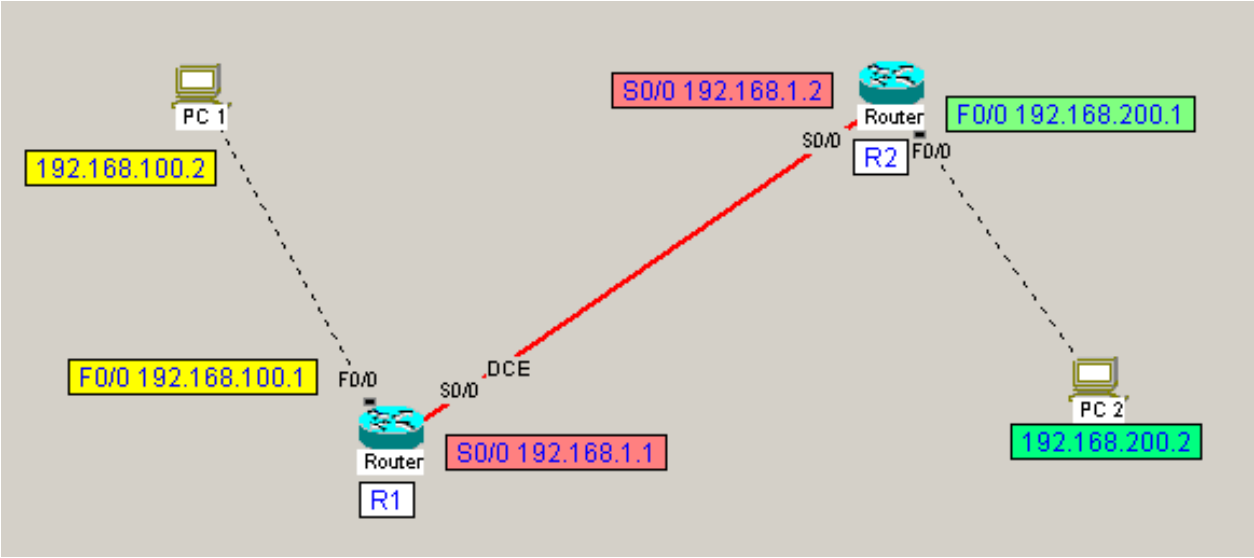
ROUTING

ESERCIZIO N. 1.1- ROUTING STATICO



DESCRIZIONE:

Si vuole far pingare i due PC , rappresentati nello schema, attraverso due router Cisco 2620 fra loro collegati attraverso un link seriale basato su leased line (linea dedicata di tipo T1/E1).

PC 1: Indirizzo IP 192.168.100.2 /24 - default gateway 192.168.100.1.
PC 2: Indirizzo IP 192.168.200.2 /24 - default gateway 192.168.200.1.

Router 1 – Serie 2600 – modello 2620
Interfaccia FastEthernet 0/0 - IP address : 192.168.100.1 /24
Interfaccia Serial 0/0 - IP address: 192.168.1.1 /24.

Router 2 – Serie 2600 – modello 2620
Interfaccia FastEthernet 0/0 - IP address of 192.168.200.1 /24
Interfaccia Serial 0/0 - IP address 192.168.1.2 /24.

Abbiamo un collegamento seriale tra il Router1 e Router 2.
Il link seriale deve avere velocità di 64K.

Configurare gli apparati dando gli hostname e impostando le rotte statiche , assicurandosi la raggiungibilità di ogni apparato tramite il ping.

SOLUZIONE:

Si configurano gli ip e i default gateway dei PC come visto nelle lezioni precedenti.

CONFIGURIAMO IL ROUTER R1:

Configuriamo l'hostname

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

Guardiamo che interfacce ha il nostro router

```
R1#show interface
FastEthernet0/0 is administratively down, line protocol is down
  Hardware is SteveK, address is E5B0.C000.1005
  No Internet address
  MTU 1500 bytes, BW 100000 Kbit, DLY 2000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP timeout 00.05.00
  ..blah blah blah – look at a real device...
  -- all sorts of stats such as packet rate, bad packets,
    broadcast packet count, late collision count,
    runts (pkt too small), giants (pkt too big) etc...

FastEthernet0/1 is administratively down, line protocol is down
  Hardware is SteveK, address is 1C17.C000.1006
  No Internet address
  MTU 1500 bytes, BW 100000 Kbit, DLY 2000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP timeout 00.05.00
  ..blah blah blah – look at a real device...
  -- all sorts of stats such as packet rate, bad packets,
    broadcast packet count, late collision count,
    runts (pkt too small), giants (pkt too big) etc...

Serial0/0 is administratively down, line protocol is down
  Hardware is HD64570
  No Internet address
  MTU 1500 bytes, BW 100000 Kbit, DLY 2000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  ...blah blah blah – stats & settings – blah ...

Serial0/1 is administratively down, line protocol is down
  Hardware is HD64570
  No Internet address
```

```
  MTU 1500 bytes, BW 100000 Kbit, DLY 2000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  ...blah blah blah – stats & settings – blah ...

Serial0/2 is administratively down, line protocol is down
  Hardware is HD64570
  No Internet address
  MTU 1500 bytes, BW 100000 Kbit, DLY 2000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  ...blah blah blah – stats & settings – blah ...
```

Configuriamo l'interfaccia F0/0

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface F0/0
R1(config-if)#ip address 192.168.100.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
%LDXX – Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
```

Configuriamo l'interfaccia S0/0

Per un approfondimento delle modalità di configurazione del link seriale si rimanda al documento in inglese, riportato in allegato dal link **http://www.jlsnet.co.uk/index.php?page=cc_wan,** che spiega in modo chiaro le varie tipologie di connessione e configurazione.

Si rammenta che ogni interfaccia seriale del router viene denominata DTE (data terminal equipment); questa viene collegata, tramite un cavo di tipo DTE/DCE (ve ne sono di diversi tipi come si può vedere nel documento allegato; in Italia il più utilizzato è il cavo denominato V.35) ad un dispositivo, di solito fornito da ISP, denominato DCE (data communications equipment). Il DCE può essere:

1) un modem analogico nel caso che la connettività fornita da ISP si basi su linee che utilizzano un segnale di tipo analogico
2) un dispositivo CSU/CDU (ossia un terminal adapter digitale) nel caso di linee di comunicazione basate su segnale digitale

Il DCE ha il compito di ricevere il segnale digitale trasmesso da DTE (ossia dall'interfaccia seriale del router) e di trasformarlo in un segnale (analogico o digitale) che possa essere veicolato sulla linea di comunicazione fornita da ISP. Quando, in laboratorio, si voglia testare il funzionamento di una comunicazione basata su link seriale si può, per semplicità, sostituire i due CSU/DSU e la relativa linea di interconnessione, con un apposito cavo incrociato DTE/DCE (DTE/DCE crossover cable). Le due estremità di questo cavo vengono denominate rispettivamente DTE e DCE.

crossover DTE/DCE cable

Quando si usa questo particolare tipo di cavo, l'interfaccia del router al quale è collegato l'estremità di tipo DCE deve fornire il clock; quest'ultimo non deve essere assegnato per l'altra interfaccia del router collegata all'estremità di tipo DTE.
Con questo semplice accorgimento (paragonabile al cavo null modem utilizzato per collegare in modo diretto le porte seriali di due PC), può essere facilmente simulata in laboratorio una WAN di qualsiasi tipo.

Guardo se è DCE o DTE

Lo scopo del comando è capire se all'interfaccia seriale del router R1 è stata collegata l'estremità di tipo DTE o DCE (nota: in Netsimk, il crossover cable DTE/DCE è chiamato "wan serial")

```
R1#show controllers S0/0

<Blah blah blah for a few lines>
buffer size 1524  HD unit -1, V.35 DCE cable, no clock
<Blah blah blah for LOTS more lines...
  ...This information is specific to the chipset in the interface
  and includes a lot of incomprehensible gobbledy gook...
  But it DOES have statistical counts such as:
   - buffer over/under runs,
   - memory errors,
   - encapsulation errors,
   - etc.
  which is useful for indicating a congested or error-prone line.
```

E' DCE quindi devo impostare il Clock su questa interfaccia (infatti si è già visto che il clock, nel link seriale simulato da DTE/DCE crossover cable, va impostato solo per l'interfaccia seriale alla quale è collegata l'estremità di tipo DCE)**.**

```
R1(config)#interface S0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
```

CONFIGURIAMO IL ROUTER R2:

Configuriamo l'hostname

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#exit
```

Configuriamo l'interfaccia F0/0

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface F0/0
R2(config-if)#ip address 192.168.200.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
```

```
%LDXX - Line protocol on Interface FastEthernet0/0, changed state to up
R2(config-if)#exit
```

Configuriamo l'interfaccia S0/0

```
R2(config)#interface S0/0
R2(config-if)#ip address 192.168.1.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit
%LDXX - Line protocol on Interface Serial0/0, changed state to up
```

Testiamo ora se il Router 2 riesce a raggiungere il Router 1

```
R2(config)#exit
R2#ping 192.168.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.1.
Timeout is 2 seconds:
!!!!!
Success rate is 100% (5/5), round trip min/avg/max = 9/10/12 ms
```

Testiamo ora se il Router 2 riesce a raggiungere il PC 1

```
R2#ping 192.168.100.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.100.2.
Timeout is 2 seconds:
.....
Success rate is 0% (0/5), round trip min/avg/max = 0/0/0 ms
R2#
```

Come si può vedere, non riusciamo a raggiungere il PC1, dato che non è definita nel router R2 alcuna rotta verso la rete avente net-id 192.168.100.0

Definiamo quindi due rotte statiche, una sul Router 1 e una sul Router 2

Definiamo la prima rotta statica sul Router 2

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 192.168.100.0 255.255.255.0 192.168.1.1
```

Praticamente stiamo dicendo al Router 2 che tutti i pacchetti con destinazione di rete 192.168.100.0 / 24 vanno spediti al Router 1 che ha indirizzo 192.168.1.1

Analogamente definiamo anche una rotta statica sul Router 1

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
R1(config)#ip route 192.168.200.0 255.255.255.0 192.168.1.2
```

Anche al Router 1 diciamo che tutti i pacchetti con destinazione di rete 192.168.200.0 / 24 vanno spediti al Router 2 che ha indirizzo 192.168.1.2

Proviamo ora a Pingare il PC 2

```
R1(config)#exit
R1#ping 192.168.200.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.200.2.
Timeout is 2 seconds:
!!!!!
Success rate is 100% (5/5), round trip min/avg/max = 18/18/23
```

Torniamo sul Router 2 e proviamo a pingare il PC 1

```
R2(config)#exit
R2#ping 192.168.100.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.100.2.
Timeout is 2 seconds:
!!!!!
Success rate is 100% (5/5), round trip min/avg/max = 16/17/23 ms
```

Andiamo sul PC 1 e proviamo a pingare il PC 2

```
C:>ping 192.168.200.2

Pinging 192.168.200.2 with 32 bytes of data:

Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
```

Proviamo ora a fare un traceroute dal PC1 al PC2

```
C:>tracert 192.168.200.2

Tracing route to 192.168.200.2

1 4ms - 6ms 192.168.100.1
2 8ms 12ms 9ms 192.168.1.2
3 14ms 12ms 17ms 192.168.200.2
Destination trace successful.
```

Vediamo che il nostro pacchetto prima raggiunge l'interfaccia Eth0 del Router 1 (192.168.100.1), poi arriva all'interfaccia Serial 0 del Router 2 (192.168.1.2) e infine arriva al PC2 (192.168.200.2)

MONITORAGGIO ROUTER

Per vedere le tabelle di routing si utilizza il comando **show ip route**

Andiamo ad interrogare il Router 1

```
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate
default
       U - per-user static route, o - ODR

Gateway of last resort is not set

C  192.168.1.0/24 is directly connected to Serial0/0
C  192.168.100.0/24 is directly connected to FastEthernet0/0
S  192.168.200.0/24 [1/0] via 192.168.1.2 00.00.10 S0/0
```

Andiamo ad interrogare il Router 2

```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate
default
       U - per-user static route, o - ODR

Gateway of last resort is not set

C  192.168.1.0/24 is directly connected to Serial0/0
S  192.168.100.0/24 [1/0] via 192.168.1.1 00.00.37 S0/0
C  192.168.200.0/24 is directly connected to FastEthernet0/0
```

Per vedere le'ARP table si utilizza il comando **show arp**

```
R2#show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.200.2           3   5AF3.3300.1003  ARPA   FastEthernet0/0
Internet  192.168.200.1           -   E4E0.8500.1005  ARPA   FastEthernet0/0
Internet  0.0.0.0                 -   28ED.8500.1006  ARPA   FastEthernet0/1
```

Per vedere il modello di Router e altre informazioni si utilizza il comando **show version**

```
R2#show version
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-D-M), Version 12.2(16), RELEASE SOFTWARE (fc3)
Copyright (c) 1986-2008 by cisco Systems, Inc.
>>LITTLE OF THE FOLLOWING IS RELEVANT - JUST FOR LOOKS<<
Compiled Wed 04-Mar-8 04:44 by Someone
Image text-base: 0x02005000, data-base: 0x0246B4A4

ROM: System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)

R2 uptime is 23 minutes
System restarted by power-on
System image file is "flash:c2600-d-mz.122-16.bin", booted via flash

cisco 2620 (MPC860) processor (revision 0x200) with 29696K/3072K bytes of
memory.
Processor board ID 07708054, with hardware revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
2 FastEthernet/IEEE 802.3 interface(s)
3 serial(sync/async) network interface(s)
System/IO memory with parity disabled
8192K bytes of DRAM onboard 2048K bytes of DRAM on SIMM
System running from RAM
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read/Write)

Configuration register is 0x2102
```

DEFINIZIONE ROTTE DI DEFAULT

Si utilizzano per dire ai router che i pacchetti per qualsiasi destinazione vanno inviati all'indirizzo specificato.

Impostiamo quindi sul router R1 questa rotta di default:

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.2
```

E sul sul router R2 questa rotta di default:

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.Router2(config)#
R2(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.1
```

Andiamo a vedere le tabelle di routing

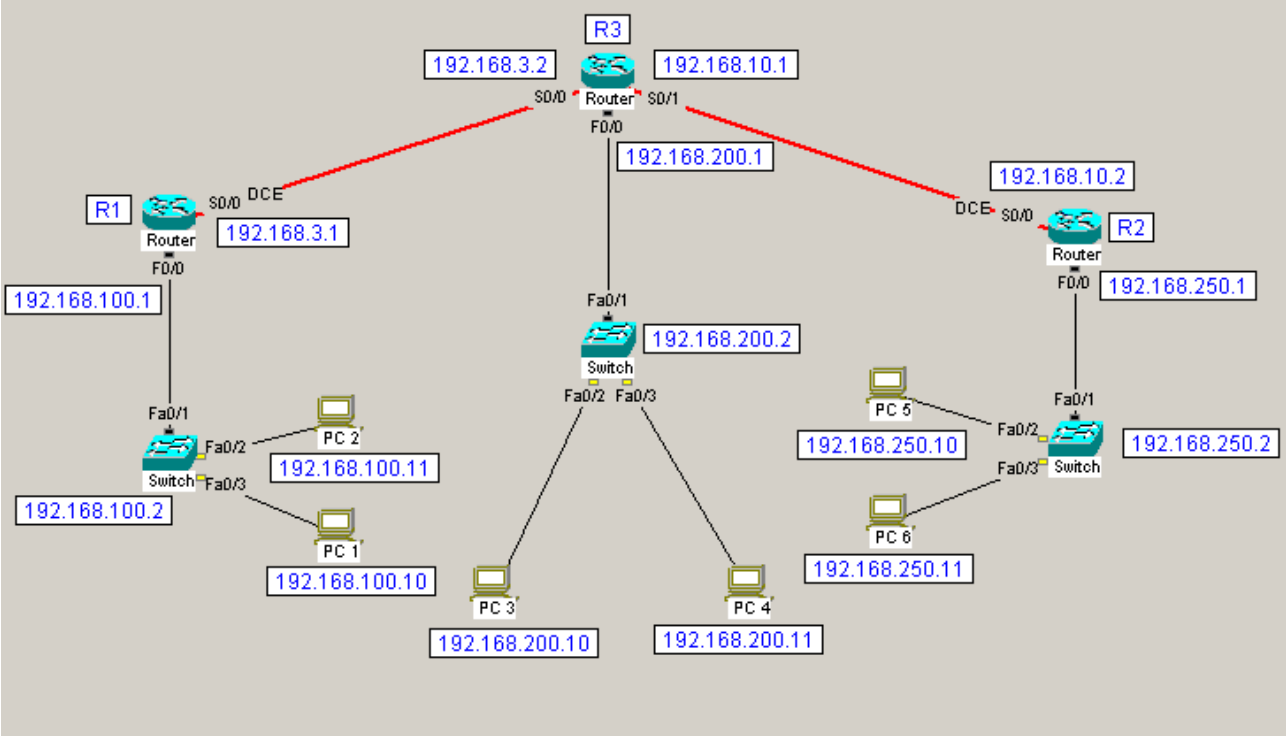
```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is 192.168.1.1 to network 0.0.0.0

C  192.168.1.0/24 is directly connected to Serial0/0
S  192.168.100.0/24 [1/0] via 192.168.1.1 00.00.50 S0/0
C  192.168.200.0/24 is directly connected to FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 192.168.1.1 00.00.50 S0/0
```

Provare infine a definire il link seriale fra i due router usando un netmask di tipo 255.255.255.252.

ESERCIZIO N. 2- ROUTING DINAMICO



Obiettivo: si vuole costruire la rete rappresentata nello schema, attraverso tre router Cisco 2620 fra loro collegati attraverso link seriali basati su leased line (linea dedicata di tipo T1/E1) con velocità 64K.

Configurare gli apparati dando gli hostname e impostando le rotte dinamiche tramite il protocollo RIP assicurandosi la raggiungibilità di ogni apparato tramite il ping.

SOLUZIONE:

Si configurano gli ip e i default gateway dei PC come visto nelle lezioni precedenti.

CONFIGURIAMO LO SWITCH SW1:

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW1
SW1(config)#interface vlan 1
SW1(config-if)#ip address 192.168.100.2 255.255.255.0
SW1(config-if)#no shutdown
%LDXX - Interface vlan 1, changed state to up
SW1(config-if)#exit
SW1(config)#ip default-gateway 192.168.100.1
SW1(config)#exit
```

CONFIGURIAMO LO SWITCH SW2:

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW2
SW2(config)#interface vlan 1
SW2(config-if)#ip address 192.168.200.2 255.255.255.0
SW2(config-if)#no shutdown
%LDXX - Interface vlan 1, changed state to up
SW2(config-if)#exit
SW2(config)#ip default-gateway 192.168.100.1
SW2(config)#exit
```

CONFIGURIAMO LO SWITCH SW3:

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW3
SW3(config)#interface vlan 1
SW3(config-if)#ip address 192.168.250.2 255.255.255.0
SW3(config-if)#no shutdown
%LDXX - Interface vlan 1, changed state to up
SW3(config-if)#exit
SW3(config)#ip default-gateway 192.168.250.1
SW3(config)#exit
```

CONFIGURIAMO IL ROUTER R1:

Configuriamo l'hostname

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

Configuriamo l'interfaccia F0/0

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface F0/0
R1(config-if)#ip address 192.168.100.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
%LDXX - Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
```

Configuriamo l'interfaccia S0/0

```
R1(config)#interface S0/0
R1(config-if)#ip address 192.168.3.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
%LDXX - Interface Serial0/0, changed state to down
R1(config-if)#exit
R1(config)#exit
```

Guardo se è DCE o DTE

```
R1#show controllers s0/0

<Blah blah blah for a few lines>
buffer size 1524  HD unit -1, V.35 DCE cable, no clock
<Blah blah blah for LOTS more lines...
  ...This information is specific to the chipset in the interface
  and includes a lot of incomprehensible gobbledy gook...
  But it DOES have statistical counts such as:
   - buffer over/under runs,
   - memory errors,
   - encapsulation errors,
   - etc.
  which is useful for indicating a congested or error-prone line.
```

E' DCE quindi devo impostare il Clock su questa interfaccia

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface S0/0
R1(config-if)#clock rate 64000
R1(config-if)#exit
```

Abilito il RIP

```
R1(config)#router rip
R1(config-router)#network 192.168.100.0
R1(config-router)#network 192.168.3.0
R1(config-router)#exit
```

CONFIGURIAMO IL ROUTER R3:

Configuriamo l'hostname

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R3
```

Configuriamo l'interfaccia F0/0

```
R3(config)#interface F0/0
R3(config-if)#ip address 192.168.200.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
%LDXX - Line protocol on Interface FastEthernet0/0, changed state to up
R3(config-if)#exit
```

Configuriamo l'interfaccia S0/0

```
R3(config)#interface S0/0
R3(config-if)#ip address 192.168.3.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
%LDXX - Line protocol on Interface Serial0/0, changed state to up
R3(config-if)#exit
```

Configuriamo l'interfaccia S0/1

```
R3(config)#interface S0/1
R3(config-if)#ip address 192.168.10.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#exit
```

Guardo se è DCE o DTE

```
R3#show controllers S0/1

<Blah blah blah for a few lines>
buffer size 1524  HD unit 0, V.35 DTE cable (no clock detected)
<Blah blah blah for LOTS more lines...
  ...This information is specific to the chipset in the interface
```

```
  and includes a lot of incomprehensible gobbledy gook...
  But it DOES have statistical counts such as:
   - buffer over/under runs,
   - memory errors,
   - encapsulation errors,
   - etc.
  which is useful for indicating a congested or error-prone line.
```

E' DTE quindi devo impostare il Clock sull' interfaccia alla parte opposta del cavo.

Abilito il RIP

```
R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router rip
R3(config-router)#network 192.168.3.0
R3(config-router)#network 192.168.200.0
R3(config-router)#network 192.168.10.0
R3(config-router)#exit
```

Controlliamo le interfacce

```
R3(config)#exit
R3#show ip interface brief

Any interface listed with OK? value "NO" does not have a valid configuration
Interface        IP-Address      OK?  Method     Status                Protocol
FastEthernet0/0  192.168.200.1   YES  manual     up                    up
FastEthernet0/1  unassigned      YES  unset      administratively down  down
Serial0/0        192.168.3.2     YES  manual     up                    up
Serial0/1        192.168.10.1    YES  manual     up                    down
Serial0/2        unassigned      YES  unset      administratively down  down
```

Guardiamo la routing table

```
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is not set

C  192.168.3.0/24 is directly connected to Serial0/0
R  192.168.100.0/24 [120/1] via 192.168.3.1 00.00.00 S0/0
C  192.168.200.0/24 is directly connected to FastEthernet0/0
```

Notiamo che è stata aggiunta tramite il RIP la rotta per la rete 192.168.100.0

CONFIGURIAMO IL ROUTER R2:

Configuriamo l'hostname

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
```

Configuriamo l'interfaccia F0/ 0

```
R2(config)#interface F0/0
R2(config-if)#ip address 192.168.250.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
%LDXX - Line protocol on Interface FastEthernet0/0, changed state to up
R2(config-if)#exit
```

Configuriamo l'interfaccia S0/0

```
R2(config)#interface S0/0
R2(config-if)#ip address 192.168.10.2 255.255.255.0
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown
R2(config-if)#
%LDXX - Line protocol on Interface Serial0/0, changed state to up
R2(config-if)#exit
```

Abilito il RIP

```
R2(config)#router rip
R2(config-router)#network 192.168.10.0
R2(config-router)#network 192.168.250.0
R2(config-router)#exit
R2(config)#exit
```

Andiamo quindi a vedere le tabelle di routing

```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is not set

R  192.168.3.0/24 [120/1] via 192.168.10.1 00.00.04 S0/0
C  192.168.10.0/24 is directly connected to Serial0/0
R  192.168.100.0/24 [120/2] via 192.168.10.1 00.00.04 S0/0
R  192.168.200.0/24 [120/1] via 192.168.10.1 00.00.04 S0/0
C  192.168.250.0/24 is directly connected to FastEthernet0
```

Come si può vedere sono state aggiunte tre nuove entry per le reti 192.168.100.0 , 192.168.3.0 e 192.168.200.0

Torniamo quindi a vedere le tabelle di routing sul Router R3

```
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is not set

C  192.168.3.0/24 is directly connected to Serial0/0
C  192.168.10.0/24 is directly connected to Serial0/1
R  192.168.100.0/24 [120/1] via 192.168.3.1 00.00.03 S0/0
C  192.168.200.0/24 is directly connected to FastEthernet0/0
R  192.168.250.0/24 [120/1] via 192.168.10.2 00.00.04 S0/1
```

Vediamo che rispetto a prima si è aggiunta un'altra rotta dinamica, per la rete 192.168.250.0

Testiamo ora se il PC1 riesce a raggiungere gli altri PC , gli SWITCH e i ROUTERS

PC 2:

```
C:>ping 192.168.100.11

Pinging 192.168.100.11 with 32 bytes of data:

Reply from 192.168.100.11 on Eth, time<10ms TTL=128
Reply from 192.168.100.11 on Eth, time<10ms TTL=128
Reply from 192.168.100.11 on Eth, time<10ms TTL=128
Reply from 192.168.100.11 on Eth, time<10ms TTL=128
```

PC 3:

```
C:>ping 192.168.200.10

Pinging 192.168.200.10 with 32 bytes of data:

Reply from 192.168.200.10 on Eth, time<10ms TTL=126
Reply from 192.168.200.10 on Eth, time<10ms TTL=126
Reply from 192.168.200.10 on Eth, time<10ms TTL=126
Reply from 192.168.200.10 on Eth, time<10ms TTL=126
```

PC 4:

```
C:>ping 192.168.200.11

Pinging 192.168.200.11 with 32 bytes of data:

Reply from 192.168.200.11 on Eth, time<10ms TTL=126
Reply from 192.168.200.11 on Eth, time<10ms TTL=126
Reply from 192.168.200.11 on Eth, time<10ms TTL=126
Reply from 192.168.200.11 on Eth, time<10ms TTL=126
```

PC 5:

```
C:>ping 192.168.250.10

Pinging 192.168.250.10 with 32 bytes of data:

Reply from 192.168.250.10 on Eth, time<10ms TTL=125
Reply from 192.168.250.10 on Eth, time<10ms TTL=125
Reply from 192.168.250.10 on Eth, time<10ms TTL=125
Reply from 192.168.250.10 on Eth, time<10ms TTL=125
```

PC 6:

```
C:>ping 192.168.250.11

Pinging 192.168.250.11 with 32 bytes of data:

Reply from 192.168.250.11 on Eth, time<10ms TTL=125
Reply from 192.168.250.11 on Eth, time<10ms TTL=125
Reply from 192.168.250.11 on Eth, time<10ms TTL=125
Reply from 192.168.250.11 on Eth, time<10ms TTL=125
```

SW 1:

```
C:>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Reply from 192.168.100.2 on Eth, time<10ms TTL=128
Reply from 192.168.100.2 on Eth, time<10ms TTL=128
Reply from 192.168.100.2 on Eth, time<10ms TTL=128
Reply from 192.168.100.2 on Eth, time<10ms TTL=128
```

SW 2:

```
C:>ping 192.168.200.2

Pinging 192.168.200.2 with 32 bytes of data:

Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
Reply from 192.168.200.2 on Eth, time<10ms TTL=126
```

SW 3:

```
C:>ping 192.168.250.2

Pinging 192.168.250.2 with 32 bytes of data:

Reply from 192.168.250.2 on Eth, time<10ms TTL=125
Reply from 192.168.250.2 on Eth, time<10ms TTL=125
Reply from 192.168.250.2 on Eth, time<10ms TTL=125
Reply from 192.168.250.2 on Eth, time<10ms TTL=125
```

R1 – F0/0:

```
C:>ping 192.168.100.1

Pinging 192.168.100.1 with 32 bytes of data:

Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
```

R1 – S0/0:

```
C:>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:

Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
Reply from 192.168.100.1 on Eth, time<10ms TTL=80
```

R3 – S0/0:

```
C:>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
```

R3 – F0/0:

```
C:>ping 192.168.200.1

Pinging 192.168.200.1 with 32 bytes of data:

Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
```

R3 – S0/1:

```
C:>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
Reply from 192.168.3.2 on Eth, time<10ms TTL=79
```

R2 – S0/0:

```
C:>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
```

R2 – F0/0:

```
C:>ping 192.168.250.1

Pinging 192.168.250.1 with 32 bytes of data:

Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
Reply from 192.168.10.2 on Eth, time<10ms TTL=78
```