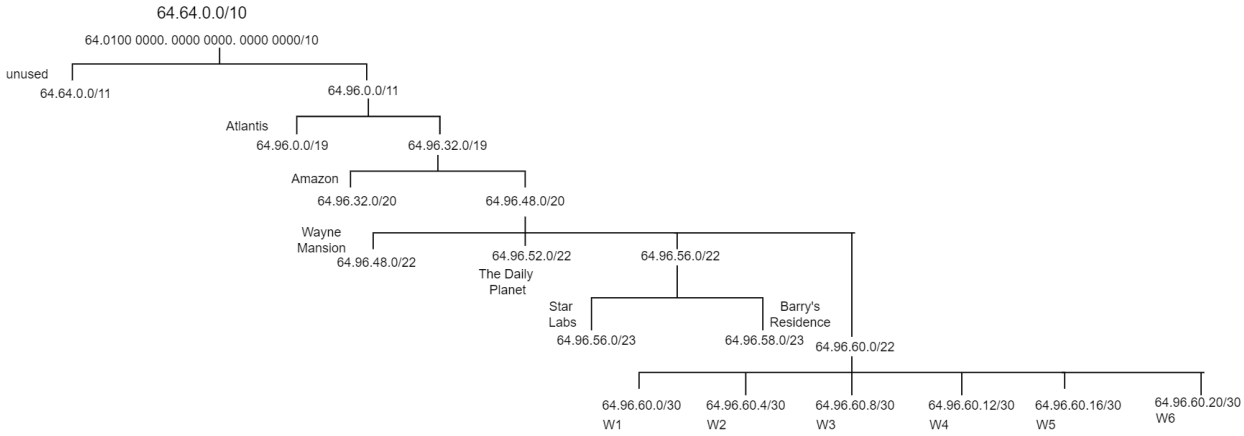
VLSM Tree:



VLSM table:

Subnet Name	Host requirement	+2	Upper bound	Host bit	Network bit	Address	Mask	Dec Mask	Assignable range
R1: Atlantis	7082	7084	8192	13	19	64.96.0.0	/19	255.255.224.0	64.96.0.1 - 64.96.31.254
R2: Amazon	3940	3942	4096	12	20	64.96.32.0	/20	255.255.240.0	64.96.32.1 - 64.96.47.254
R3: Wayne Mansion	940	942	1024	10	22	64.96.48.0	/22	255.255.252.0	64.96.48.1 - 64.96.51.254
R4: The Daily Planet	760	762	1024	10	22	64.96.52.0	/22	255.255.252.0	64.96.52.1 - 64.96.55.254
R5: Star Labs	509	511	512	9	23	64.96.56.0	/23	255.255.254.0	64.96.56.1 - 64.96.57.254
R6: Barry's Residence	492	494	512	9	23	64.96.58.0	/23	255.255.254.0	64.96.58.1 - 64.96.59.254

W1-W-B	2	4	4	2	30	64.96.60.0	/30	255.255.255.252	64.96.60.1 - 64.96.60.2
W2-W-T	2	4	4	2	30	64.96.60.4	/30	255.255.255.252	64.96.60.5 - 64.96.60.6
W3-W-S	2	4	4	2	30	64.96.60.8	/30	255.255.255.252	64.96.60.9 - 64.96.60.10
W4-W-Am	2	4	4	2	30	64.96.60.12	/30	255.255.255.252	64.96.60.13 - 64.96.60.14
W5-S-At	2	4	4	2	30	64.96.60.16	/30	255.255.255.252	64.96.60.17 - 64.96.60.18
W6-W-At	2	4	4	2	30	64.96.60.20	/30	255.255.255.252	64.96.60.21 - 64.96.60.22

IP address table:

Devices	Interface	IPv4 Address	Subnet mask	Default gateway
R1: Atlantis	Fa0/0	64.96.0.1	255.255.224.0	N/A
	Se2/0	64.96.60.17	255.255.255.252	N/A
	Se3/0	64.96.60.21	255.255.255.252	N/A
R2: Amazon	Fa0/0	64.96.32.1	255.255.240.0	N/A
	Se2/0	64.96.60.13	255.255.255.252	N/A
R3: Wayne Mansion	Fa0/0	64.96.48.1	255.255.252.0	N/A
	Se2/0	64.96.60.14	255.255.255.252	N/A
	Se3/0	64.96.60.2	255.255.255.252	N/A
	Se6/0	64.96.60.6	255.255.255.252	N/A
	Se7/0	64.96.60.10	255.255.255.252	N/A
	Se8/0	64.96.60.22	255.255.255.252	N/A
R4: The Daily Planet	Fa0/0	64.96.52.1	255.255.252.0	N/A
	Se2/0	64.96.60.5	255.255.255.252	N/A
R5: Star Labs	Fa0/0	64.96.56.1	255.255.254.0	N/A
	Se2/0	64.96.60.9	255.255.255.252	N/A
	Se3/0	64.96.60.18	255.255.255.252	N/A
R6: Barry's Residence	Fa0/0	64.96.58.1	255.255.254.0	N/A
	Se2/0	64.96.60.1	255.255.255.252	N/A
PC1(1)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC1(2)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC2	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC3	Fa0	DHCP assigned	DHCP assigned	DHCP assigned

PC4(1)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC4(2)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC5(1)	Fa0	64.96.56.10	255.255.254.0	64.96.56.1
PC5(2)	Fa0	64.96.56.11	255.255.254.0	64.96.56.1
PC6(1)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
PC6(2)	Fa0	DHCP assigned	DHCP assigned	DHCP assigned
Mail Server Amazon	Fa0	64.96.32.10	255.255.240.0	64.96.32.1
Web Server Wayne Mansion	Fa0	64.96.48.10	255.255.252.0	64.96.48.1
DNS Server Wayne Mansion	Fa0	64.96.48.11	255.255.252.0	64.96.48.1

Assumptions:

1. The shortest route is calculated from Wayne Mansion's perspective.
2. A floating route set from Wayne Mansion to Atlantis.

Commands:

```
Router>erase start
Router>erase startup
Router>erase startup-
Router>en
Router#erase
Router#erase sta
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
Initializing memory for ECC
..
PT1000 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

Self decompressing the image :
############################################################################
[OK]

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        170 West Tasman Drive
        San Jose, California 95134-1706



Cisco Internetwork Operating System Software
```

```
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
3 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)


        --- System Configuration Dialog ---

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


Press RETURN to get started!



Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#no ip domain-lookup
R1(config)#enable secret class
R1(config)#banner motd &
Enter TEXT message.  End with the character '&'.
**********************************
  !!!AUTHORIZED ACCESS ONLY!!!
**********************************
&

R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#line vty 0 4
```

```
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#



Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R5
R5(config)#no ip domain-lookup
R5(config)#enable secret class
R5(config)#banner motd &
Enter TEXT message.  End with the character '&'.
******************************
  !!!AUTHORIZED ACCESS ONLY!!!
******************************
&

R5(config)#line console 0
R5(config-line)#password cisco
R5(config-line)#login
R5(config-line)#exit
R5(config)#line vty 0 4
R5(config-line)#password cisco
R5(config-line)#login
R5(config-line)#exit
R5(config)#int fa0/0
R5(config-if)#ip address 64.96.56.1 255.255.254.0
R5(config-if)#no shutdown

R5(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R5(config-if)#int se3/0
R5(config-if)#ip address 64.96.60.18 255.255.255.252
R5(config-if)#clock rate 64000
R5(config-if)#no shutdown

R5(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
```

```
R5(config-if)#end
R5#
%SYS-5-CONFIG_I: Configured from console by console

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

R5#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R5#



Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R6
R6(config)#no ip domain-lookup
R6(config)#enable secret class
R6(config)#banner motd &
Enter TEXT message.  End with the character '&'.
************************************
  !!!AUTHORIZED ACCESS ONLY!!!
************************************
&

R6(config)#line console 0
R6(config-line)#password cisco
R6(config-line)#login
R6(config-line)#exit
R6(config)#line vty 0 4
R6(config-line)#password cisco
R6(config-line)#login
R6(config-line)#exit
R6(config)#int fa0/0 64.96.52.1 255.255.252.0
                   ^
% Invalid input detected at '^' marker.

R6(config)#int fa0/0
R6(config-if)#ip address 64.96.58.1 255.255.254.0
R6(config-if)#no shutdown
```

```
R6(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R6(config-if)#int se2/0
R6(config-if)#ip address 64.96.60.1 255.255.255.252
R6(config-if)#no shutdown

R6(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

R6(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

R6(config-if)#end
R6#
%SYS-5-CONFIG_I: Configured from console by console

R6#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R6#


Router>en
Router#erase
Router#erase
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
Initializing memory for ECC
..
PT1000 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized
```

Self decompressing the image :
##
[OK]

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Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
3 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

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

Press RETURN to get started!

```
Router>


Router con0 is now available


Press RETURN to get started.


Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R4
R4(config)#no ip domain-lookup
R4(config)#enable secret class
R4(config)#banner motd &
Enter TEXT message.  End with the character '&'.
****************************************
   !!!AUTHORIZED ACCESS ONLY!!!
****************************************
```

&

```
R4(config)#line console 0
R4(config-line)#password cisco
R4(config-line)#login
R4(config-line)#exit
R4(config)#line vty 0 4
R4(config-line)#password cisco
R4(config-line)#login
R4(config-line)#exit
R4(config)#int fa0/0
R4(config-if)#ip address 64.96.52.1 255.255.252.0
R4(config-if)#no shutdown

R4(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R4(config-if)#int se2/0
R4(config-if)#ip address 64.96.60.5 255.255.255.252
R4(config-if)#no shutdown

R4(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

R4(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

R4(config-if)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R4#



Router>en
Router#erase
```

```
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
Initializing memory for ECC
..
PT1000 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

Self decompressing the image :
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[OK]

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Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
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Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
```

PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>

Router con0 is now available

Press RETURN to get started.

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#no ip
R2(config)#no ip do
R2(config)#no ip domain-lookup
R2(config)#enable secret class
R2(config)#banner motd &
Enter TEXT message.  End with the character '&'.
**********************************
  !!!AUTHORIZED ACCESS ONLY!!!
**********************************
&

R2(config)#line console 0
R2(config-line)#password cisco
R2(config-line)#login exit
                   ^
% Invalid input detected at '^' marker.

R2(config-line)#login
R2(config-line)#exit
R2(config)#line vty 0 4
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#int fa0/0
R2(config-if)#ip address 64.96.32.1 255.255.240.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R2(config-if)#int se2/0
R2(config-if)#ip address 64.96.60.13 255.255.255.252
R2(config-if)#no shutdown
```

```
R2(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

R2(config-if)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

```
R3(config)#ip dhcp exclude
R3(config)#ip dhcp excluded-address 64.96.48.1
R3(config)#ip dhcp excluded-address 64.96.48.10 64.96.48.11
R3(config)#ip dhcp pool R3-LAN
R3(dhcp-config)#net
R3(dhcp-config)#network 64.96.48.0 255.255.252.0
R3(dhcp-config)#de
R3(dhcp-config)#default-router 64.96.48.1
R3(dhcp-config)#dn
R3(dhcp-config)#dns-server 64.96.48.11
R3(dhcp-config)#
R3(dhcp-config)#
R3(dhcp-config)#
R3(dhcp-config)#web
R3(dhcp-config)#web-s
R3(dhcp-config)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R3#
```

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

```
**************************************
  !!!AUTHORIZED ACCESS ONLY!!!
**************************************
```

User Access Verification

Password:

```
R6>en
Password:
R6#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R6(config)#ip dhcp
R6(config)#ip dhcp e
R6(config)#ip dhcp excluded-address 64.96.58.1
R6(config)#ip dh
R6(config)#ip dhcp p
R6(config)#ip dhcp pool R6-LAN
R6(dhcp-config)#network
R6(dhcp-config)#network
R6(dhcp-config)#network 64.96.58.0 255.255.254.0
R6(dhcp-config)#default
R6(dhcp-config)#default-router 64.96.58.1
R6(dhcp-config)#dns
R6(dhcp-config)#dns-server 64.96.48.11
R6(dhcp-config)#no shutdown
                ^
% Invalid input detected at '^' marker.

R6(dhcp-config)#
R6(dhcp-config)#end
R6#
```

```
%SYS-5-CONFIG_I: Configured from console by console

R6#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R6#



R4>en
Password:
R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#ip dhcp ex
R4(config)#ip dhcp excluded-address 64.96.52.1
R4(config)#ip dhcp pool R4-LAN
R4(dhcp-config)#network 64.96.52.0
R4(dhcp-config)#network 64.96.52.0
% Incomplete command.
R4(dhcp-config)#
R4(dhcp-config)#network 64.96.52.0 255.255.252.0
R4(dhcp-config)#dns
R4(dhcp-config)#dns-server 64.96.48.11
R4(dhcp-config)#
R4(dhcp-config)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#show ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
R4#show ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
64.96.52.2       0090.0C17.28D3          --                      Automatic
64.96.52.3       000D.BD74.A858          --                      Automatic
R4#



R2>en
Password:
Password:
```

```
Password:
R2#ip dhcp ex
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip
R2(config)#ip d
R2(config)#ip dhcp
R2(config)#ip dhcp ex
R2(config)#ip dhcp excluded-address 64.96.32.1
R2(config)#ip dhcp excluded-address 64.96.32.10
R2(config)#ip dhcp pool R2-LAN
R2(dhcp-config)#network 64.96.32.0 255.255.240.0
R2(dhcp-config)#default
R2(dhcp-config)#default-router 64.96.32.1
R2(dhcp-config)#dns
R2(dhcp-config)#dns-server 64.96.48.11
R2(dhcp-config)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R2#




Password:

R1>en
Password:
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip dhcp ex
R1(config)#ip dhcp excluded-address 64.96.0.1
R1(config)#ip dhcp po
R1(config)#ip dhcp pool R1-LAN
R1(dhcp-config)#network 64.96.0.0 255.255.224.0
R1(dhcp-config)#default-
R1(dhcp-config)#default-router 64.96.0.1
R1(dhcp-config)#dns
```

```
R1(dhcp-config)#dns-server 64.96.48.11
R1(dhcp-config)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R1#


R1>en
Password:
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int se3/0
R1(config-if)#ip address 64.96.60.21 255.255.255.252
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

R1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R1#


User Access Verification

Password:

R3>en
Password:
```

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int se8/0
R3(config-if)#ip address 64.96.60.22 255.255.255.252
R3(config-if)#clock rate 64000
R3(config-if)#no shutdown
R3(config-if)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R3#




R3>en
Password:
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 64.96.56.0 255.255.254.0 se7/0
R3(config)#ip route 64.96.60.16255.255.254.0 se7/0^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 64.96.60.16 255.255.255.252 se7/0
R3(config)#ip route 64.96.0.0 255.255.224.0 se7/0
R3(config)#ip route 64.96.0.0 255.255.224.0 se8/0 5
R3(config)#show ip route
          ^
% Invalid input detected at '^' marker.

R3(config)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

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, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

    64.0.0.0/8 is variably subnetted, 9 subnets, 4 masks
S       64.96.0.0/19 is directly connected, Serial7/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
S       64.96.56.0/23 is directly connected, Serial7/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
C       64.96.60.8/30 is directly connected, Serial7/0
C       64.96.60.12/30 is directly connected, Serial2/0
S       64.96.60.16/30 is directly connected, Serial7/0
C       64.96.60.20/30 is directly connected, Serial8/0

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R3#
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 64.96.58.0 255.255.254.0 se3/0
R3(config)#
R3#
%SYS-5-CONFIG_I: Configured from console by console


R6>en
Password:
R6#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R6(config)#ip route 64.96.48.0 255.255.252.0 se2/0
R6(config)#



R6>en
Password:
```

```
R6#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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     64.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
S       64.96.48.0/22 is directly connected, Serial2/0
C       64.96.58.0/23 is directly connected, FastEthernet0/0
C       64.96.60.0/30 is directly connected, Serial2/0

R6#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R6(config)#router rip
R6(config-router)#version 2
R6(config-router)#no auto-summary
R6(config-router)#do show ip route connected
 C   64.96.58.0/23  is directly connected, FastEthernet0/0
 C   64.96.60.0/30  is directly connected, Serial2/0

R6(config-router)#network 64.96.58.0
R6(config-router)#network 64.96.60.0
R6(config-router)#passive
R6(config-router)#passive-interface fa0/0
R6(config-router)#end
R6#
%SYS-5-CONFIG_I: Configured from console by console

R6#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R6#




R3>en
Password:
```

```
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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     64.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
S       64.96.0.0/19 is directly connected, Serial7/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
S       64.96.56.0/23 is directly connected, Serial7/0
S       64.96.58.0/23 is directly connected, Serial3/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
C       64.96.60.8/30 is directly connected, Serial7/0
C       64.96.60.12/30 is directly connected, Serial2/0
S       64.96.60.16/30 is directly connected, Serial7/0
C       64.96.60.20/30 is directly connected, Serial8/0

R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#no auto
R3(config-router)#no auto-summary
R3(config-router)#do show
R3(config-router)#do show
R3(config-router)#do show ip
R3(config-router)#do show ip co
R3(config-router)#do show ip connected
show ip connected
        ^
% Invalid input detected at '^' marker.

R3(config-router)#do show ip route connected
 C   64.96.48.0/22  is directly connected, FastEthernet0/0
 C   64.96.60.0/30  is directly connected, Serial3/0
 C   64.96.60.4/30  is directly connected, Serial6/0
 C   64.96.60.8/30  is directly connected, Serial7/0
 C   64.96.60.12/30  is directly connected, Serial2/0
```

```
 C   64.96.60.20/30  is directly connected, Serial8/0

R3(config-router)#network ?
  A.B.C.D  Network number
R3(config-router)#network 64.96.48.0
R3(config-router)#network 64.96.60.0
R3(config-router)#network 64.96.60.4
R3(config-router)#network 64.96.60.8
R3(config-router)#network 64.96.60.12
R3(config-router)#network 64.96.60.20
R3(config-router)#passive
R3(config-router)#passive-interface fa0/0
R3(config-router)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R3#




User Access Verification

Password:

R2>en
Password:
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#no au
R2(config-router)#no auto-summary
R2(config-router)#do show ip route connecetd
Translating "connecetd"...domain server (255.255.255.255)
% Invalid input detected

R2(config-router)#do show ip route connected
 C   64.96.32.0/20  is directly connected, FastEthernet0/0
 C   64.96.60.12/30  is directly connected, Serial2/0
```

```
R2(config-router)#network 64.96.32.0
R2(config-router)#network 64.96.60.12
R2(config-router)#passive
R2(config-router)#passive-interface fa0/0
R2(config-router)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

```
R4>en
Password:
R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#router rip
R4(config-router)#version 2
R4(config-router)#no
R4(config-router)#no au
R4(config-router)#no auto-summary
R4(config-router)#do show ip route
R4(config-router)#do show ip route connected
 C   64.96.52.0/22  is directly connected, FastEthernet0/0
 C   64.96.60.4/30  is directly connected, Serial2/0

R4(config-router)#network 64.96.52.0
R4(config-router)#network 64.96.60.4
R4(config-router)#passive
R4(config-router)#passive-interface fa0/0
R4(config-router)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
R4#



R5#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R5(config)#router rip
R5(config-router)#version 2
R5(config-router)#no au
R5(config-router)#no auto-summary
R5(config-router)#do show ip route connecetd
Translating "connecetd"...domain server (255.255.255.255)
% Invalid input detected

R5(config-router)#do show ip route connected
 C   64.96.56.0/23  is directly connected, FastEthernet0/0
 C   64.96.60.8/30  is directly connected, Serial2/0
 C   64.96.60.16/30  is directly connected, Serial3/0

R5(config-router)#network 64.96.56.0
R5(config-router)#network 64.96.60.8
R5(config-router)#network 64.96.60.16
R5(config-router)#pass
R5(config-router)#passive-interface fa0/0
R5(config-router)#end
R5#
%SYS-5-CONFIG_I: Configured from console by console

R5#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R5#



R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#roter rip
           ^
% Invalid input detected at '^' marker.
```

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#no au
R1(config-router)#no auto-summary
R1(config-router)#do show ip route connected
 C   64.96.0.0/19  is directly connected, FastEthernet0/0
 C   64.96.60.16/30  is directly connected, Serial2/0
 C   64.96.60.20/30  is directly connected, Serial3/0

R1(config-router)#network 64.96.0.0
R1(config-router)#network 64.96.60.16
R1(config-router)#network 64.96.60.20
R1(config-router)#pas
R1(config-router)#passive-interface fa0/0
R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R1#



R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#ip dhcp ex
R4(config)#ip dhcp excluded-address 64.96.52.1
R4(config)#ip dhcp pool R4-LAN
R4(dhcp-config)#network 64.96.52.0
% Incomplete command.
R4(dhcp-config)#network 64.96.52.0 255.255.252.0
R4(dhcp-config)#defaul
R4(dhcp-config)#default-router 64.96.52.1
R4(dhcp-config)#dns
R4(dhcp-config)#dns-server 64.96.48.11
R4(dhcp-config)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
```

```
Building configuration...
[OK]
R4#
R4#
```

```
R3>en
Password:
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int s7/0
R3(config-if)#shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial7/0, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial7/0, changed state to down

R3(config-if)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     64.0.0.0/8 is variably subnetted, 9 subnets, 5 masks
S       64.96.0.0/19 is directly connected, Serial8/0
R       64.96.32.0/20 [120/1] via 64.96.60.13, 00:00:04, Serial2/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
R       64.96.52.0/22 [120/1] via 64.96.60.5, 00:00:16, Serial6/0
S       64.96.58.0/23 is directly connected, Serial3/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
```

```
C       64.96.60.12/30 is directly connected, Serial2/0
C       64.96.60.20/30 is directly connected, Serial8/0

R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 64.96.60.16 255.255.255.252 se8/0 5
R3(config)#ip route 64.96.56.0 255.255.254.0 se8/0 5
R3(config)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     64.0.0.0/8 is variably subnetted, 11 subnets, 5 masks
S       64.96.0.0/19 is directly connected, Serial8/0
R       64.96.32.0/20 [120/1] via 64.96.60.13, 00:00:04, Serial2/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
R       64.96.52.0/22 [120/1] via 64.96.60.5, 00:00:16, Serial6/0
S       64.96.56.0/23 is directly connected, Serial8/0
S       64.96.58.0/23 is directly connected, Serial3/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
C       64.96.60.12/30 is directly connected, Serial2/0
S       64.96.60.16/30 is directly connected, Serial8/0
C       64.96.60.20/30 is directly connected, Serial8/0

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, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

    64.0.0.0/8 is variably subnetted, 11 subnets, 5 masks
S       64.96.0.0/19 is directly connected, Serial8/0
R       64.96.32.0/20 [120/1] via 64.96.60.13, 00:00:17, Serial2/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
R       64.96.52.0/22 [120/1] via 64.96.60.5, 00:00:29, Serial6/0
S       64.96.56.0/23 is directly connected, Serial8/0
S       64.96.58.0/23 is directly connected, Serial3/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
C       64.96.60.12/30 is directly connected, Serial2/0
S       64.96.60.16/30 is directly connected, Serial8/0
C       64.96.60.20/30 is directly connected, Serial8/0

R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int se7/0
R3(config-if)#no shutdow

R3(config-if)#
%LINK-5-CHANGED: Interface Serial7/0, changed state to up

R3(config-if)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial7/0, changed state to up

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, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set
```

```
    64.0.0.0/8 is variably subnetted, 12 subnets, 5 masks
S       64.96.0.0/19 is directly connected, Serial7/0
R       64.96.32.0/20 [120/1] via 64.96.60.13, 00:00:15, Serial2/0
C       64.96.48.0/22 is directly connected, FastEthernet0/0
R       64.96.52.0/22 [120/1] via 64.96.60.5, 00:00:26, Serial6/0
S       64.96.56.0/23 is directly connected, Serial7/0
S       64.96.58.0/23 is directly connected, Serial3/0
C       64.96.60.0/30 is directly connected, Serial3/0
C       64.96.60.4/30 is directly connected, Serial6/0
C       64.96.60.8/30 is directly connected, Serial7/0
C       64.96.60.12/30 is directly connected, Serial2/0
S       64.96.60.16/30 is directly connected, Serial7/0
C       64.96.60.20/30 is directly connected, Serial8/0

R3#
```