Network Address: 132.100.0.0 / 16

IP Address Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
Headquarter	S0/0/0 (M)	132.100.28.69	255.255.255.252	N/A
	S0/1/0 (I)	132.100.28.73	255.255.255.252	N/A
	S0/1/1 (L)	132.100.28.65	255.255.255.252	N/A
	S0/0/1 (U)	132.100.28.77	255.255.255.252	N/A
	G0/0	132.100.16.1	255.255.248.0	N/A
Lobby	S0/0/0 (H)	132.100.28.66	255.255.255.252	N/A
	S0/1/1 (U)	132.100.28.89	255.255.255.252	N/A
	S0/1/0 (M)	132.100.28.81	255.255.255.252	N/A
	S0/0/1 (I)	132.100.28.85	255.255.255.252	N/A
	G0/0	132.100.0.1	255.255.240.0	N/A
Mercenary	S0/0/0 (H)	132.100.28.70	255.255.255.252	N/A
	S0/1/0 (L)	132.100.28.82	255.255.255.252	N/A
	S0/0/1 (I)	132.100.28.93	255.255.255.252	N/A
	S0/1/1 (U)	132.100.28.97	255.255.255.252	N/A
	G0/0	132.100.28.1	255.255.255.224	N/A
Intelligence	S0/0/0 (H)	132.100.28.74	255.255.255.252	N/A
	S0/1/1 (L)	132.100.28.86	255.255.255.252	N/A
	S0/0/1 (M)	132.100.28.94	255.255.255.252	N/A
	S0/1/0 (U)	132.100.28.101	255.255.255.252	N/A
	G0/0	132.100.24.1	255.255.252.0	N/A

Undertaking	S0/0/0 (H)	132.100.28.78	255.255.255.252	N/A
	S0/1/1 (L)	132.100.28.90	255.255.255.252	N/A
	S0/1/0 (M)	132.100.28.98	255.255.255.252	N/A
	S0/0/1 (I)	132.100.28.102	255.255.255.252	N/A
	G0/0	132.100.28.33	255.255.255.224	N/A
DNS Server	NIC	132.100.16.4	255.255.248.0	132.100.16.1
DHCP Server	NIC	132.100.16.2	255.255.248.0	132.100.16.1
HQ Email Server	NIC	132.100.16.3	255.255.248.0	132.100.16.1
Merc Web Server	NIC	132.100.28.2	255.255.255.224	132.100.28.1
Int Email Server	NIC	132.100.24.2	255.255.252.0	132.100.24.1
Undertaking Web Server	NIC	132.100.28.34	255.255.255.224	132.100.28.33
Lobby Printer	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
Leader	NIC	132.100.16.5	255.255.248.0	132.100.16.1
HQM1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
HQM2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
HQM3	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
MM1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
MM2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
MM3	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
INT1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
INT2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
INT3	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
L1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
L2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned

L3	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
UT1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
UT2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
UT3	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned

VLSM Table:

Host Name	Host requirement	+2	IP Block size	Host bits required	Network bits required
L	3200	3202	4096	12	20
H	1432	1434	2048	11	21
I	520	522	1024	10	22
M	20	22	32	5	27
U	20	22	32	5	27
WAN-1	2	4	4	2	30
WAN-2	2	4	4	2	30
WAN-3	2	4	4	2	30
WAN-4	2	4	4	2	30
WAN-5	2	4	4	2	30
WAN-6	2	4	4	2	30
WAN-7	2	4	4	2	30
WAN-8	2	4	4	2	30
WAN-9	2	4	4	2	30
WAN-10	2	4	4	2	30

Network Address & Broadcast Address Table:

	Network Address	Broadcast Address
Lobby	132.100.0.0 / 20	132.100.15.255 / 20
Headquarter	132.100.16.0 / 21	132.100.23.255 / 21
Intelligence	132.100.24.0 / 22	132.100.27.255 / 22
Mercenary	132.100.28.0 / 27	132.100.28.31 / 27
Undertaking	132.100.28.32 / 27	132.100.28.63 / 27
WAN-1 (H - L)	132.100.28.64 / 30	132.100.28.67 / 30
WAN-2 (H - M)	132.100.28.68 / 30	132.100.28.71 / 30
WAN-3 (H - I)	132.100.28.72 / 30	132.100.28.75 / 30
WAN-4 (H - U)	132.100.28.76 / 30	132.100.28.79 / 30
WAN-5 (L - M)	132.100.28.80 / 30	132.100.28.83 / 30
WAN-6 (L - I)	132.100.28.84 / 30	132.100.28.87 / 30
WAN-7 (L - U)	132.100.28.88 / 30	132.100.28.91 / 30
WAN-8 (M - I)	132.100.28.92 / 30	132.100.28.95 / 30
WAN-9 (M - U)	132.100.28.96 / 30	132.100.28.99 / 30
WAN-10 (I - U)	132.100.28.100 / 30	132.100.28.103 / 30

132.100. 0 0 0 0 | 0 0 0 0 . 0 0 0 0 0 0 0 0 (L)
132.100. 0 0 0 1 | 0 0 0 0 . 0 0 0 0 0 0 0 0

132.100. 0 0 0 1 | 0 | 0 0 0 . 0 0 0 0 0 0 0 0 (H)
132.100. 0 0 0 1 | 1 | 0 0 0 . 0 0 0 0 0 0 0 0

132.100. 0 0 0 1 | 1 | 0 | 0 0 . 0 0 0 0 0 0 0 0 (I)
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 0 0 0 0 0 0 0

132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 0 0 | 0 0 0 0 0 (M)
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 0 1 | 0 0 0 0 0 (U)
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 0 0 0 0 0

132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 0 0 0 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 0 0 1 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 0 1 0 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 0 1 1 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 1 0 0 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 1 0 1 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 1 1 0 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 0 | 1 1 1 | 0 0

132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 1 | 0 0 0 | 0 0
132.100. 0 0 0 1 | 1 | 1 | 0 0 . 0 1 1 | 0 0 1 | 0 0

132.100.0.0 / 16		
132.100.0.0 / 20 (L)	132.100.16.0 / 20	
132.100.16.0 / 21 (H)	132.100.24.0 / 21	
132.100.24.0 / 22 (I)	132.100.28.0 / 22	
132.100.28.0 / 27 (M)	132.100.28.32 / 27 (U)	132.100.28.64 / 27
132.100.28.64 / 30	132.100.28.68 / 30	132.100.28.72 / 30
132.100.28.76 / 30	132.100.28.80 / 30	132.100.28.84 / 30
132.100.28.88 / 30	132.100.28.92 / 30	132.100.28.96 / 30
132.100.28.100 / 30		

Assumptions:

1. As all the routers are interconnected, the distance provided will not matter since we will count hops for shortest route using RIPv2.

2. Email servers use the domain xyz.org instead of mail.xyz.org to match the email domain user@xyz.org.

Configuration Commands:

HQ	Router>en Router#erase startup-confiq ^ % Invalid input detected at '^' marker. 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 15.1(4)M4, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 2010 by cisco Systems, Inc. Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB CISCO2911/K9 platform with 524288 Kbytes of main memory Main memory is configured to 72/-1(On-board/DIMM0) bit mode with ECC disabled Readonly ROMMON initialized program load complete, entry point: 0x80803000, size: 0x1b340 program load complete, entry point: 0x80803000, size: 0x1b340 IOS Image Load Test _____ Digitally Signed Release Software program load complete, entry point: 0x81000000, size: 0x3bcd3d8 Self decompressing the image : ## ######## [OK] Smart Init is enabled smart init is sizing iomem TYPE MEMORY_REQ HWIC Slot 0 0x00200000 HWIC Slot 1 0x00200000 Onboard devices & buffer pools 0x022F6000 ----------

TOTAL: 0x032F6000
Rounded IOMEM up to: 53Mb.
Using 6 percent iomem. [53Mb/512Mb]

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Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706

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Compiled Wed 18-Jul-07 04:52 by pt_team
Image text-base: 0x2100F918, data-base: 0x24729040

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

--- System Configuration Dialog ---

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


Press RETURN to get started!



Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname HQ
HQ(config)#no ip domain-lookup
HQ(config)#
HQ(config)#
HQ(config)#interface GigabitEthernet0/0
HQ(config-if)#ip address 132.100.16.1 255.255.248.0
HQ(config-if)#exit
HQ(config)#interface Serial0/0/0
HQ(config-if)#ip address 132.100.28.69 255.255.255.252
HQ(config-if)#exit
HQ(config)#interface Serial0/0/1
HQ(config-if)#ip address 132.100.28.77 255.255.255.252
HQ(config-if)#
HQ(config-if)#exit
HQ(config)#interface Serial0/1/0
HQ(config-if)#ip address 132.100.28.73 255.255.255.252
HQ(config-if)#exit
HQ(config)#interface Serial0/1/1
HQ(config-if)#ip address 132.100.28.65 255.255.255.252
HQ(config-if)#no shut
HQ(config-if)#end
HQ#
%SYS-5-CONFIG_I: Configured from console by console

HQ#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
HQ#
HQ#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
HQ(config)#interface Serial0/0/0
HQ(config-if)#
HQ(config-if)#exit
HQ(config)#interface Serial0/0/0
HQ(config-if)#
HQ(config-if)#exit
HQ(config)#interface GigabitEthernet0/0
HQ(config-if)#
HQ(config-if)#exit
```

	HQ(config)#interface GigabitEthernet0/1 HQ(config-if)# HQ(config-if)#exit HQ(config)# HQ(config)#ip route 132.100.28.0 255.255.255.224 132.100.28.70 HQ(config)# HQ(config)# HQ(config)#ip route 132.100.28.32 255.255.255.224 132.100.28.78 HQ(config)# HQ(config)# HQ(config)#ip route 132.100.0.0 255.255.240.0 132.100.28.66 HQ(config)# HQ(config)# HQ(config)#ip route 132.100.24.0 255.255.252.0 132.100.28.74 HQ(config)# HQ(config)# HQ(config)# HQ(config)#interface Serial0/1/0 HQ(config-if)# HQ(config-if)#exit HQ(config)# HQ(config)# HQ con0 is now available Press RETURN to get started.

	HQ>enable HQ# HQ#configure terminal Enter configuration commands, one per line. End with CNTL/Z. HQ(config)# HQ(config)# HQ(config)#interface Serial0/1/0 HQ(config-if)# HQ(config-if)#exit HQ(config)#interface Serial0/1/0 HQ(config-if)# HQ(config-if)#exit HQ(config)# HQ(config)# HQ(config)#interface GigabitEthernet0/0 HQ(config-if)# HQ(config-if)#exit HQ(config)#interface GigabitEthernet0/1 HQ(config-if)# HQ(config-if)#exit HQ(config)#interface GigabitEthernet0/2 HQ(config-if)# HQ(config-if)#exit HQ(config)#interface Serial0/0/0 HQ(config-if)# HQ(config-if)#exit HQ(config)#interface GigabitEthernet0/0 HQ(config-if)# HQ con0 is now available Press RETURN to get started.

	HQ>enable HQ# HQ#configure terminal Enter configuration commands, one per line. End with CNTL/Z. HQ(config)#interface GigabitEthernet0/0 HQ(config-if)# HQ(config-if)# HQ(config-if)#int g0/0 HQ(config-if)# HQ(config-if)#ip helper-address 132.100.16.2 HQ(config-if)#exit HQ(config)#exi HQ# %SYS-5-CONFIG_I: Configured from console by console ex HQ con0 is now available Press RETURN to get started.

```
HQ>
HQ>en
HQ#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
HQ(config)#int g0/0
HQ(config-if)#ip helper-address 132.100.16.2
HQ(config-if)#
HQ(config-if)#exit
HQ(config)#exit
HQ#
%SYS-5-CONFIG_I: Configured from console by console

HQ#
HQ#conf t
HQ(config)#
HQ(config)#no ip route 132.100.28.0 255.255.255.224 132.100.28.70
HQ(config)#no ip route 132.100.28.32 255.255.255.224 132.100.28.78
HQ(config)#no ip route 132.100.0.0 255.255.240.0 132.100.28.66
HQ(config)#no ip route 132.100.24.0 255.255.252.0 132.100.28.74
HQ(config)#end

HQ>enable
HQ#
HQ#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
HQ(config)#
HQ(config)#
HQ(config)#router rip
HQ(config-router)#version 2
HQ(config-router)#no auto-summary
HQ(config-router)#network 132.100.16.0
HQ(config-router)#network 132.100.28.0
HQ(config-router)#network 132.100.24.0
HQ(config-router)#network 132.100.0.0
HQ(config-router)#network 132.100.28.32
HQ(config-router)#passive-interface g0/0
HQ(config-router)#end
HQ#
HQ#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
HQ#
HQ#show running-config | include ip helper-address
ip helper-address 132.100.16.2
HQ#
HQ#conf t
```

	Enter configuration commands, one per line. End with CNTL/Z. HQ(config)#int g0/0 HQ(config-if)#no ip ? access-group Specify access control for packets address Set the IP address of an interface authentication authentication subcommands flow NetFlow Related commands hello-interval Configures IP-EIGRP hello interval helper-address Specify a destination address for UDP broadcasts mtu Set IP Maximum Transmission Unit nat NAT interface commands ospf OSPF interface commands proxy-arp Enable proxy ARP split-horizon Perform split horizon summary-address Perform address summarization HQ(config-if)#no ip helper-address 132.100.16.2 HQ(config-if)#exit HQ(config)#exit HQ# %SYS-5-CONFIG_I: Configured from console by console HQ#show running-config | include ip helper-address HQ#
INT	Router>en Router#erase startup-confiq ^ % Invalid input detected at '^' marker. 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 15.1(4)M4, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 2010 by cisco Systems, Inc. Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB CISCO2911/K9 platform with 524288 Kbytes of main memory Main memory is configured to 72/-1(On-board/DIMM0) bit mode with ECC disabled Readonly ROMMON initialized program load complete, entry point: 0x80803000, size: 0x1b340 program load complete, entry point: 0x80803000, size: 0x1b340 IOS Image Load Test

_____
Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x3bcd3d8
Self decompressing the image :
##
######## [OK]
Smart Init is enabled
smart init is sizing iomem
TYPE MEMORY_REQ
HWIC Slot 0 0x00200000
HWIC Slot 1 0x00200000 Onboard devices &
buffer pools 0x022F6000

TOTAL: 0x032F6000
Rounded IOMEM up to: 53Mb.
Using 6 percent iomem. [53Mb/512Mb]

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If you require further assistance please contact us by sending email to

export@cisco.com.

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

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname INT
INT(config)#no ip domain-lookup
INT(config)#
INT(config)#interface GigabitEthernet0/0
INT(config-if)#ip address 132.100.24.1 255.255.252.0
INT(config-if)#
INT(config-if)#exit
INT(config)#interface GigabitEthernet0/1
INT(config-if)#
INT(config-if)#exit
INT(config)#interface Serial0/0/0
INT(config-if)#ip address 132.100.28.74 255.255.255.252
INT(config-if)#
INT(config-if)#exit
INT(config)#interface Serial0/0/1
INT(config-if)#ip address 132.100.28.94 255.255.255.252
INT(config-if)#
INT(config-if)#exit
INT(config)#interface Serial0/1/0
INT(config-if)#ip address 132.100.28.101 255.255.255.252
INT(config-if)#
INT(config-if)#exit
INT(config)#interface Serial0/1/1
INT(config-if)#ip address 132.100.28.86 255.255.255.252
INT(config-if)#
INT(config-if)#no shut

	INT(config-if)# %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up INT(config-if)#end INT# %SYS-5-CONFIG_I: Configured from console by console INT#copy run start Destination filename [startup-config]? Building configuration... [OK] INT# INT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. INT(config)#interface GigabitEthernet0/0 INT(config-if)#ip address 132.100.24.1 255.255.252.0 INT(config-if)# INT(config-if)#exit INT(config)#interface Serial0/0/0 INT(config-if)#ip address 132.100.28.74 255.255.255.252 INT(config-if)#ip address 132.100.28.74 255.255.255.252 INT(config-if)# INT(config-if)#exit INT(config)#interface Serial0/0/1 INT(config-if)# INT(config-if)#exit INT(config)# INT(config)#end INT>enable INT# INT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. INT(config)#router rip INT(config-router)#version 2 INT(config-router)#cocno auto-summary INT(config-router)#nonetwork 132.100.24.0 INT(config-router)#network 132.100.28.0 INT(config-router)#network 132.100.28.32 INT(config-router)#network 132.100.0.0 INT(config-router)#network 132.100.16.0 INT(config-router)#passive-interface g0/0 INT(config-router)#end INT# INT#cpcopy run start Destination filename [startup-config]?

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

INT>
INT>en
INT#
INT#show ip route config
Translating "config"...domain server (255.255.255.255)
% Invalid input detected

INT#show ip route
Codes: L - local, C - connected, S - static, 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 132.100.28.73 to network 0.0.0.0

       132.100.0.0/16 is variably subnetted, 20 subnets, 6 masks
R      132.100.0.0/20 [120/1] via 132.100.28.85, 00:00:05, Serial0/1/1
S      132.100.16.0/21 [1/0] via 132.100.28.73
C      132.100.24.0/22 is directly connected, GigabitEthernet0/0
L      132.100.24.1/32 is directly connected, GigabitEthernet0/0
R      132.100.28.0/27 [120/1] via 132.100.28.93, 00:00:04, Serial0/0/1
R      132.100.28.32/27 [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
R      132.100.28.64/30 [120/1] via 132.100.28.85, 00:00:05, Serial0/1/1
                        [120/1] via 132.100.28.73, 00:00:14, Serial0/0/0
R      132.100.28.68/30 [120/1] via 132.100.28.93, 00:00:04, Serial0/0/1
                        [120/1] via 132.100.28.73, 00:00:14, Serial0/0/0
C      132.100.28.72/30 is directly connected, Serial0/0/0
L      132.100.28.74/32 is directly connected, Serial0/0/0
R      132.100.28.76/30 [120/1] via 132.100.28.73, 00:00:14, Serial0/0/0
                        [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
R      132.100.28.80/30 [120/1] via 132.100.28.93, 00:00:04, Serial0/0/1
                        [120/1] via 132.100.28.85, 00:00:05, Serial0/1/1
C      132.100.28.84/30 is directly connected, Serial0/1/1
L      132.100.28.86/32 is directly connected, Serial0/1/1
R      132.100.28.88/30 [120/1] via 132.100.28.85, 00:00:05, Serial0/1/1
                        [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
C      132.100.28.92/30 is directly connected, Serial0/0/1
L      132.100.28.94/32 is directly connected, Serial0/0/1
R      132.100.28.96/30 [120/1] via 132.100.28.93, 00:00:04, Serial0/0/1
                        [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
C      132.100.28.100/30 is directly connected, Serial0/1/0
L      132.100.28.101/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 132.100.28.73, 00:00:14, Serial0/0/0
```

```
INT#
INT#
INT#
INT#
INT#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
INT(config)#ip route 132.100.28.0 255.255.255.224 132.100.28.73
INT(config)#end
INT#
%SYS-5-CONFIG_I: Configured from console by console

INT#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
INT#
INT#show ip route
Codes: L - local, C - connected, S - static, 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 132.100.28.73 to network 0.0.0.0

      132.100.0.0/16 is variably subnetted, 20 subnets, 6 masks
R     132.100.0.0/20 [120/1] via 132.100.28.85, 00:00:04, Serial0/1/1
S     132.100.16.0/21 [1/0] via 132.100.28.73
C     132.100.24.0/22 is directly connected, GigabitEthernet0/0
L     132.100.24.1/32 is directly connected, GigabitEthernet0/0
S     132.100.28.0/27 [1/0] via 132.100.28.73
R     132.100.28.32/27 [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
R     132.100.28.64/30 [120/1] via 132.100.28.85, 00:00:04, Serial0/1/1
                       [120/1] via 132.100.28.73, 00:00:15, Serial0/0/0
R     132.100.28.68/30 [120/1] via 132.100.28.93, 00:00:01, Serial0/0/1
                       [120/1] via 132.100.28.73, 00:00:15, Serial0/0/0
C     132.100.28.72/30 is directly connected, Serial0/0/0
L     132.100.28.74/32 is directly connected, Serial0/0/0
R     132.100.28.76/30 [120/1] via 132.100.28.73, 00:00:15, Serial0/0/0
                       [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
R     132.100.28.80/30 [120/1] via 132.100.28.93, 00:00:01, Serial0/0/1
                       [120/1] via 132.100.28.85, 00:00:04, Serial0/1/1
C     132.100.28.84/30 is directly connected, Serial0/1/1
L     132.100.28.86/32 is directly connected, Serial0/1/1
R     132.100.28.88/30 [120/1] via 132.100.28.85, 00:00:04, Serial0/1/1
                       [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0
C     132.100.28.92/30 is directly connected, Serial0/0/1
```

	L 132.100.28.94/32 is directly connected, Serial0/0/1 R 132.100.28.96/30 [120/1] via 132.100.28.93, 00:00:01, Serial0/0/1 [120/1] via 132.100.28.102, 00:00:11, Serial0/1/0 C 132.100.28.100/30 is directly connected, Serial0/1/0 L 132.100.28.101/32 is directly connected, Serial0/1/0 R* 0.0.0.0/0 [120/1] via 132.100.28.73, 00:00:15, Serial0/0/0 INT# INT# INT# %LINK-3-UPDOWN: Interface Serial0/0/0, changed state to down %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down INT con0 is now available Press RETURN to get started. %LINK-5-CHANGED: Interface Serial0/0/0, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up INT>

	INT>en INT#conf t Enter configuration commands, one per line. End with CNTL/Z. INT(config)# INT(config)#ip route 132.100.0.0 255.255.240.0 132.100.28.73 INT(config)#ip route 132.100.28.32 255.255.255.224 132.100.28.73 INT(config)#end INT#copy run start Destination filename [startup-config]? Building configuration... [OK] INT# INT# ?Bad filename %Error parsing filename (Bad file number) INT# INT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. INT(config)# INT(config)#
L	Router>en 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 15.1(4)M4, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 2010 by cisco Systems, Inc. Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB CISCO2911/K9 platform with 524288 Kbytes of main memory Main memory is configured to 72/-1(On-board/DIMM0) bit mode with ECC disabled Readonly ROMMON initialized program load complete, entry point: 0x80803000, size: 0x1b340 program load complete, entry point: 0x80803000, size: 0x1b340 IOS Image Load Test _____ Digitally Signed Release Software program load complete, entry point: 0x81000000, size: 0x3bcd3d8

Self decompressing the image :
##
######## [OK]
Smart Init is enabled
smart init is sizing iomem
TYPE MEMORY_REQ
HWIC Slot 0 0x00200000
HWIC Slot 1 0x00200000 Onboard devices &
buffer pools 0x022F6000

TOTAL: 0x032F6000
Rounded IOMEM up to: 53Mb.
Using 6 percent iomem. [53Mb/512Mb]

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Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.

	Processor board ID FTX152400KS 3 Gigabit Ethernet interfaces 4 Low-speed serial(sync/async) network interface(s) DRAM configuration is 64 bits wide with parity disabled. 255K bytes of non-volatile configuration memory. 249856K bytes of ATA System CompactFlash 0 (Read/Write) --- System Configuration Dialog --- Would you like to enter the initial configuration dialog? [yes/no]: no Press RETURN to get started! Router>en Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname L L(config)#no ip domain-lookup L(config)#interface GigabitEthernet0/0 L(config-if)#ip address 132.100.0.1 255.255.240.0 L(config-if)# L(config-if)#exit L(config)#interface Serial0/0/0 L(config-if)#ip address 132.100.28.66 255.255.255.252 L(config-if)# L(config-if)#exit L(config)#interface Serial0/0/1 L(config-if)#ip address 132.100.28.85 255.255.255.252 L(config-if)# L(config-if)#exit L(config)#interface Serial0/1/0 L(config-if)#ip address 132.100.28.81 255.255.255.252 L(config-if)# L(config-if)#exit L(config)#interface Serial0/1/1 L(config-if)#ip address 132.100.28.89 255.255.255.252 L(config-if)#no shut L(config-if)#end L# %SYS-5-CONFIG_I: Configured from console by console L#copy run start Destination filename [startup-config]? Building configuration... [OK] L#

	L#configure terminal Enter configuration commands, one per line. End with CNTL/Z. L(config)# L(config)#ip route 132.100.16.0 255.255.248.0 132.100.28.65 L(config)# L(config)#int g0/0 L(config-if)#ip helper-address 132.100.16.2 L(config-if)#no shut L(config-if)#end L>enable L# L#configure terminal Enter configuration commands, one per line. End with CNTL/Z. L(config)# L(config)# L(config)#router rip L(config-router)#version 2 L(config-router)#no auto-summary L(config-router)#network 132.100.24.0 L(config-router)#network 132.100.28.0 L(config-router)#network 132.100.28.32 L(config-router)#network 132.100.0.0 L(config-router)#network 132.100.16.0 L(config-router)#passive-interface % Incomplete command. L(config-router)#passive-interface g0/0 L(config-router)#end L# L#copy run start Destination filename [startup-config]? Building configuration... [OK] L# L> L>en L# L#conf t Enter configuration commands, one per line. End with CNTL/Z. L(config)# L(config)#ip route 132.100.24.0 255.255.252.0 132.100.28.65 L(config)#ip route 132.100.28.0 255.255.255.224 132.100.28.65 L(config)#ip route 132.100.28.32 255.255.255.224 132.100.28.65 L(config)#ip route 132.100.0.0 255.255.240.0 132.100.28.65 L(config)#end L#cpcopy run start Destination filename [startup-config]?

```
Building configuration...
[OK]
L#
L#show ip route
Codes: L - local, C - connected, S - static, 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 132.100.28.65 to network 0.0.0.0

      132.100.0.0/16 is variably subnetted, 20 subnets, 6 masks
C     132.100.0.0/20 is directly connected, GigabitEthernet0/0
L     132.100.0.1/32 is directly connected, GigabitEthernet0/0
S     132.100.16.0/21 [1/0] via 132.100.28.65
S     132.100.24.0/22 [1/0] via 132.100.28.65
S     132.100.28.0/27 [1/0] via 132.100.28.65
S     132.100.28.32/27 [1/0] via 132.100.28.65
C     132.100.28.64/30 is directly connected, Serial0/0/0
L     132.100.28.66/32 is directly connected, Serial0/0/0
R     132.100.28.68/30 [120/1] via 132.100.28.82, 00:00:10, Serial0/1/0
                       [120/1] via 132.100.28.65, 00:00:24, Serial0/0/0
R     132.100.28.72/30 [120/1] via 132.100.28.86, 00:00:21, Serial0/0/1
                       [120/1] via 132.100.28.65, 00:00:24, Serial0/0/0
R     132.100.28.76/30 [120/1] via 132.100.28.90, 00:00:21, Serial0/1/1
                       [120/1] via 132.100.28.65, 00:00:24, Serial0/0/0
C     132.100.28.80/30 is directly connected, Serial0/1/0
L     132.100.28.81/32 is directly connected, Serial0/1/0
C     132.100.28.84/30 is directly connected, Serial0/0/1
L     132.100.28.85/32 is directly connected, Serial0/0/1
C     132.100.28.88/30 is directly connected, Serial0/1/1
L     132.100.28.89/32 is directly connected, Serial0/1/1
R     132.100.28.92/30 [120/1] via 132.100.28.86, 00:00:21, Serial0/0/1
                       [120/1] via 132.100.28.82, 00:00:10, Serial0/1/0
R     132.100.28.96/30 [120/1] via 132.100.28.82, 00:00:10, Serial0/1/0
                       [120/1] via 132.100.28.90, 00:00:21, Serial0/1/1
R     132.100.28.100/30 [120/1] via 132.100.28.86, 00:00:21, Serial0/0/1
                        [120/1] via 132.100.28.90, 00:00:21, Serial0/1/1
R*  0.0.0.0/0 [120/1] via 132.100.28.65, 00:00:24, Serial0/0/0

L#
L#
L#
?Bad filename
%Error parsing filename (Bad file number)
L#
L#configure terminal
```

	Enter configuration commands, one per line. End with CNTL/Z. L(config)# L(config)#no ip route 132.100.0.0 255.255.240.0 132.100.28.65 L(config)# ?Bad filename %Error parsing filename (Bad file number) L(config)# ?Bad filename %Error parsing filename (Bad file number) L(config)# ?Bad filename %Error parsing filename (Bad file number) L(config)# L(config)# L(config)# ?Bad filename %Error parsing filename (Bad file number) L(config)#
M	Router>en 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 15.1(4)M4, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 2010 by cisco Systems, Inc. Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB CISCO2911/K9 platform with 524288 Kbytes of main memory Main memory is configured to 72/-1(On-board/DIMM0) bit mode with ECC disabled Readonly ROMMON initialized program load complete, entry point: 0x80803000, size: 0x1b340 program load complete, entry point: 0x80803000, size: 0x1b340 IOS Image Load Test _____ Digitally Signed Release Software program load complete, entry point: 0x81000000, size: 0x3bcd3d8 Self decompressing the image : ## [OK] Smart Init is enabled smart init is sizing iomem TYPE MEMORY_REQ HWIC Slot 0 0x00200000

HWIC Slot 1 0x00200000 Onboard devices &
buffer pools 0x022F6000

TOTAL: 0x032F6000
Rounded IOMEM up to: 53Mb.
Using 6 percent iomem. [53Mb/512Mb]

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

--- System Configuration Dialog ---

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

Press RETURN to get started!

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname M
M(config)#no ip domain-lookup
M(config)#interface GigabitEthernet0/0
M(config-if)#ip address 132.100.28.1 255.255.255.224
M(config-if)#
M(config-if)#exit
M(config)#interface Serial0/0/0
M(config-if)#ip address 132.100.28.70 255.255.255.252
M(config-if)#
M(config-if)#exit
M(config)#interface Serial0/0/1
M(config-if)#ip address 132.100.28.93 255.255.255.252
M(config-if)#
M(config-if)#exit
M(config)#interface Serial0/1/0
M(config-if)#ip address 132.100.28.82 255.255.255.252
M(config-if)#
M(config-if)#exit
M(config)#interface Serial0/1/1
M(config-if)#ip address 132.100.28.97 255.255.255.252
M(config-if)#no shut
M(config-if)#end
M#
%SYS-5-CONFIG_I: Configured from console by console

M#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
M#
M#
M#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
M(config)#interface Serial0/0/0
M(config-if)#
M(config-if)#exit
M(config)#interface GigabitEthernet0/0
```

```
M(config-if)#
M(config-if)#exit
M(config)#interface GigabitEthernet0/1
M(config-if)#
M(config-if)#exit
M(config)#interface GigabitEthernet0/2
M(config-if)#
M(config-if)#exit
M(config)#
M(config)#ip route 132.100.16.0 255.255.248.0 132.100.28.69
M(config)#
M(config)#
M(config)#int g0/0
M(config-if)#inip helper-address 132.100.16.2
M(config-if)#enexit
M(config)#exit


M>
M>en
M#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
M(config)#
M(config)#router rip
M(config-router)#version 2
M(config-router)#no auto-summary
M(config-router)#network 132.100.24.0
M(config-router)#network 132.100.28.0
M(config-router)#network 132.100.16.0
M(config-router)#network 132.100.28.32
M(config-router)#network 132.100.0.0
M(config-router)#passive-interface g0/0
M(config-router)#end
M#
M#cpcopy run start
Destination filename [startup-config]?
Building configuration...
[OK]
M#

M>
M>en
M#
M#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
M(config)#
M(config)#ip route 132.100.24.0 255.255.252.0 132.100.28.69
M(config)#end
M#
M#copy run start
```

```
Destination filename [startup-config]?
Building configuration...
[OK]
M#
M#show ip route
Codes: L - local, C - connected, S - static, 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 132.100.28.69 to network 0.0.0.0

       132.100.0.0/16 is variably subnetted, 20 subnets, 6 masks
R      132.100.0.0/20 [120/1] via 132.100.28.81, 00:00:05, Serial0/1/0
S      132.100.16.0/21 [1/0] via 132.100.28.69
S      132.100.24.0/22 [1/0] via 132.100.28.69
C      132.100.28.0/27 is directly connected, GigabitEthernet0/0
L      132.100.28.1/32 is directly connected, GigabitEthernet0/0
R      132.100.28.32/27 [120/1] via 132.100.28.98, 00:00:14, Serial0/1/1
R      132.100.28.64/30 [120/1] via 132.100.28.81, 00:00:05, Serial0/1/0
                        [120/1] via 132.100.28.69, 00:00:15, Serial0/0/0
C      132.100.28.68/30 is directly connected, Serial0/0/0
L      132.100.28.70/32 is directly connected, Serial0/0/0
R      132.100.28.72/30 [120/1] via 132.100.28.94, 00:00:18, Serial0/0/1
                        [120/1] via 132.100.28.69, 00:00:15, Serial0/0/0
R      132.100.28.76/30 [120/1] via 132.100.28.98, 00:00:14, Serial0/1/1
                        [120/1] via 132.100.28.69, 00:00:15, Serial0/0/0
C      132.100.28.80/30 is directly connected, Serial0/1/0
L      132.100.28.82/32 is directly connected, Serial0/1/0
R      132.100.28.84/30 [120/1] via 132.100.28.94, 00:00:18, Serial0/0/1
                        [120/1] via 132.100.28.81, 00:00:05, Serial0/1/0
R      132.100.28.88/30 [120/1] via 132.100.28.81, 00:00:05, Serial0/1/0
                        [120/1] via 132.100.28.98, 00:00:14, Serial0/1/1
C      132.100.28.92/30 is directly connected, Serial0/0/1
L      132.100.28.93/32 is directly connected, Serial0/0/1
 --More--
%SYS-5-CONFIG_I: Configured from console by console

%LINK-3-UPDOWN: Interface Serial0/0/0, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down
```

	M con0 is now available Press RETURN to get started. %LINK-5-CHANGED: Interface Serial0/0/0, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up M> M>en M#stsconf t Enter configuration commands, one per line. End with CNTL/Z. M(config)# M(config)#ip route 132.100.0.0 255.255.240.0 132.100.28.69 M(config)#ip route 132.100.28.32 255.255.255.224 132.100.28.69 M(config)#end M#copy run start Destination filename [startup-config]? Building configuration... [OK] M#
UT	Router>en 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 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
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Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO2911/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 72/-1(On-board/DIMM0) bit mode with ECC disabled

Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0x1b340
program load complete, entry point: 0x80803000, size: 0x1b340

IOS Image Load Test

_____
Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x3bcd3d8
Self decompressing the image :
##
######## [OK]
Smart Init is enabled
smart init is sizing iomem
TYPE MEMORY_REQ
HWIC Slot 0 0x00200000
HWIC Slot 1 0x00200000 Onboard devices &
buffer pools 0x022F6000

TOTAL: 0x032F6000
Rounded IOMEM up to: 53Mb.
Using 6 percent iomem. [53Mb/512Mb]

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Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version
15.1(4)M5, RELEASE SOFTWARE (fc2)Technical Support:
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Compiled Wed 18-Jul-07 04:52 by pt_team
Image text-base: 0x2100F918, data-base: 0x24729040

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

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

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname UT
UT(config)#no ip domain-lookup
UT(config)#interface GigabitEthernet0/0
UT(config-if)#ip address 132.100.28.33 255.255.255.224
UT(config-if)#
UT(config-if)#exit
UT(config)#interface Serial0/0/0
UT(config-if)#ip address 132.100.28.78 255.255.255.252
UT(config-if)#
UT(config-if)#exit
UT(config)#interface Serial0/0/1

	UT(config-if)#ip address 132.100.28.102 255.255.255.252 UT(config-if)# UT(config-if)#exit UT(config)#interface Serial0/1/0 UT(config-if)#ip address 132.100.28.98 255.255.255.252 UT(config-if)# UT(config-if)#exit UT(config)#interface Serial0/1/1 UT(config-if)#ip address 132.100.28.90 255.255.255.252 UT(config-if)#no shut UT(config-if)#end UT# %SYS-5-CONFIG_I: Configured from console by console UT#copy run start Destination filename [startup-config]? Building configuration... [OK] UT# UT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. UT(config)# UT(config)#ip route 132.100.16.0 255.255.248.0 132.100.28.77 UT(config)#int g0/0 UT(config-if)#ip helper-address 132.100.16.2 UT(config-if)#exit UT(config)#end UT>enable UT# UT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. UT(config)#router rip UT(config-router)#version 2 UT(config-router)#ono auto-summary UT(config-router)#network 132.100.0.0 UT(config-router)#network 132.100.24.0 UT(config-router)#network 132.100.28.0 UT(config-router)#network 132.100.28.32 UT(config-router)#network 132.100.16.0 UT(config-router)#passive-interface g0/0 UT(config-router)#end UT# UT#scpcopy run start Destination filename [startup-config]? Building configuration... [OK] UT#

	UT> UT>en UT#chcnconf t Enter configuration commands, one per line. End with CNTL/Z. UT(config)# UT(config)#ip route 132.100.24.0 255.255.252.0 132.100.28.77 UT(config)#ip route 132.100.28.0 255.255.255.224 132.100.28.77 UT(config)#ip route 132.100.0.0 255.255.240.0 132.100.28.77 UT(config)#end UT#copy run start Destination filename [startup-config]? Building configuration... [OK] UT# UT# ?Bad filename %Error parsing filename (Bad file number) UT# UT#configure terminal Enter configuration commands, one per line. End with CNTL/Z. UT(config)# UT(config)# ?Bad filename %Error parsing filename (Bad file number) UT(config)#