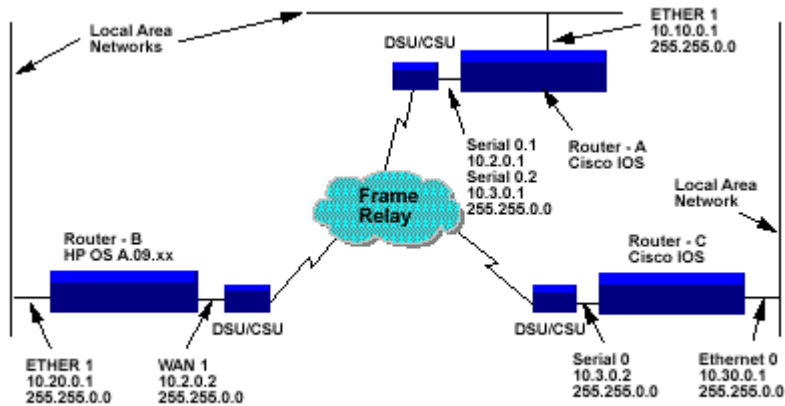


## Frame Relay Connections Between IOS and HP routers

This document describes how to connect an IOS router to an HP router and an IOS router. The following illustration shows that topology:



This network is connected with frame relay in a partial mesh configuration, where the central site router is a Cisco using sub-addressing.

The routers are configured with the following:

- IP routing
- RIP routing protocol
- Telnet access allowed
- SNMP with read only access
- Serial interfaces are configured for frame relay using LMI management.

The topology can be implemented with the configurations shown below.

Follow the steps below to connect these routers together.

### 1) Open the Sample Configurations

Note: Use the initial System Configuration Dialog when the router boots up for the first time to configure as much of the IOS router as possible, then modify the IOS router configuration. For the HP router use Quick Config to configure as much as you can and then use the configuration editor to add or modify the file. Please note that IETF encapsulation is required on the Cisco routers in order for the HP routers to de-encapsulate correctly.

- See the Router A Configuration File below
- See the Router B Configuration File below
- See the Router C Configuration File below

### 2) Configuration Checklist

You will need to change the following items in the sample configuration below in order to use the files to configure your routers:

#### IOS

- Hostnames
- Passwords:
  - enable secret
  - enable
  - virtual terminal
- RIP
- IP address on interface Ethernet 0 (E0) or 100VG-AnyLAN0 (V0)
- Serial 0 (S0) frame relay management type if it is not LMI
- IP addresses on interface Serial 0.1 and Serial 0.2 etc.
- Frame relay DLCI numbers on each of the subaddressed interfaces
- Community string if it is not "public"

## HP

- IP address on ETHER1G
- IP addresses on interface WAN1G, with Split Horizon/Poision Reverse set to none
- Community string if it is not "public"
- Adjacent host's IP address configuration for the IOS router's serial interface

Note: IOS routers cannot IP ping their own frame relay serial interface.

```

Router-A's configuration file
! In a configuration file all comments begin with a "!"
!
version 11.2
service udp-small-servers
service tcp-small-servers
!
hostname Router-A      ! define the hostname for the router
!
enable secret 5 xxxxx ! password in encrypted form
                        ! Enable password used if the secret
                        ! password is not configured
!
enable password xx     ! define the password for entering enable level
!
!
interface Ethernet0    ! designates the ethernet interface
!
 ip address 10.10.0.1 255.255.0.0
                        ! assign the IP address and subnet mask
 no mop enabled
!
interface Serial0      ! designates the serial 0 interface
 no ip address
 encapsulation frame-relay IETF
                        ! configure frame relay as the link protocol
!
interface Serial0.1 point-to-point
                        ! configure subaddressed interface S0.1
!
 ip address 10.2.0.1 255.255.0.0
                        ! assign the IP address and subnet mask
!
 frame-relay interface-dlci 102
                        ! assign the DLCI to the subinterface
!
interface Serial0.2 point-to-point
 ip address 10.3.0.1 255.255.0.0
 frame-relay interface-dlci 103
!
interface Serial1      ! this interface is not operational
!
 no ip address
 shutdown
!
interface BRI0         ! this interface is not operational
 no ip address
 shutdown
!
router rip             ! enable RIP routing
 network 10.0.0.0
!
no ip classless
snmp-server community public RO
                        ! enable SNMP for get only with public as string
!
line con 0            ! define the console port
 exec-timeout 0 0
line aux 0
line vty 0 4          ! define virtual terminals for remote access

```

```
password xx          ! define the virtual terminal password
login
!
end
```

Router-B's configuration

----- / -----

- 1. System (1)
- 2. Software (1)
- 3. Lines (2)
- 4. Circuits (2)
- 5. Circuit Groups (2)
- 6. Bridge (0)
- 7. DoD Internet Router (1)
- 8. DECNET IV Routing Service (0)
- 9. SNMP Sessions (1)
- 10. Xerox Routing Service (0)
- 11. IPX Routing Service (0)
- 12. AppleTalk Router (0)
- 13. X.25 Network Service (0)
- 14. V.25 bis Network Mapping (0)

----- / System/1/ -----

System Name : HP-ROUTER-B    Auto Enable : Yes  
Automatic Reboot : Yes  
Timezone : 0  
Daylight Time Rule : None  
System Contact :  
System Location :

- 1. System Session (1)

----- / System/1/System Session -----

System Session

Event Filter Level      Session Mode

- 1. Show All Events      Telnet

----- / System/1/System Session/1/ -----

Event Filter Level: Show All Events    Session Mode : Telnet  
Terminal : VT100      Screen Refresh Rate : 3

----- / Software -----

Software

Protocol

- 1. DoD IP Router

----- / Software/1/ -----

Protocol : DoD IP Router

----- / Lines -----

Lines

Physical Access Method

- 1. CSMA/CD
- 2. SYNC

----- / Lines/1/ -----

Physical Access Method : CSMA/CD

Connector : ETHER1

- 1. Circuit Name (1)

----- / Lines/1/Circuit Name/1/ -----

Circuit Name : ETHER1

----- / Lines/2/ -----

Physical Access Method : SYNC

Connector : WAN1 Clock Speed : 56K

Clock Source : External

1. Circuit Name (1)

----- / Lines/2/Circuit Name/1/ -----

Circuit Name : WAN1

----- / Circuits -----

|              | Circuits     |
|--------------|--------------|
| Circuit Name | Circuit Type |
| -----        | -----        |
| 1. ETHER1    | Ether/802.3  |
| 2. WAN1      | Frame Relay  |

----- / Circuits/1/ -----

Circuit Name : ETHER1 Auto Enable : Yes  
Quality of Service : LLC 1 (datagram) Circuit Type : Ether/802.3

LAN Address : XCVR signal polling : Inactive

----- / Circuits/2/ -----

Circuit Name : WAN1 Auto Enable : Yes  
Quality of Service : LLC 1 (datagram) Circuit Type : Frame Relay

DLCI Encoding Type : Q922 DLCI Encoding length : TWO BYTES  
Maximum packet size : 1600 Provide InARP : Yes  
Max Link Latency (ms) (0=none) : 1000 Management Type : LMI

Poll Interval (seconds) : 10 Intervals between Full Polls : 6  
Monitored Events : 4 Events for Error : 3  
Alarm Timer : 10

- 1. Permanent Virtual Circuits (0)
- 2. Multicast Support (0)
- 3. Bandwidth Reservation (0)

----- / Circuit Groups -----

Circuit Groups  
Circuit Group Name  
-----

- 1. ETHER1G
- 2. WAN1G

----- / Circuit Groups/1/ -----

Circuit Group Name : ETHER1G  
Circuit Group Speed : 56000

- 1. Circuit Group Members (1)
- 2. Circuit Group Backup Members (0)
- 3. Circuit Group Pool Members (0)

----- / Circuit Groups/1/Circuit Group Members -----

Circuit Group Members

Circuit Name

-----

1. ETHER1

----- / Circuit Groups/1/Circuit Group Members/1/ -----

Circuit Name : ETHER1

----- / Circuit Groups/2/ -----

Circuit Group Name : WAN1G

Circuit Group Speed : 56000

1. Circuit Group Members (1)
2. Circuit Group Backup Members (0)
3. Circuit Group Pool Members (0)

----- / Circuit Groups/2/Circuit Group Members -----

Circuit Group Members

Circuit Name

-----

1. WAN1

----- / Circuit Groups/2/Circuit Group Members/1/ -----

Circuit Name : WAN1

----- / DoD Internet Router/1/ -----

Auto Enable : Yes Global Broadcast : Yes  
RIP Network Diameter : 15 Mode : Router/Host  
Non Local ARP Source : Drop and Log  
Suppress Authentication Traps : Yes

1. Lists (0)
2. Network Interface Definitions (2)
3. Static Routes (0)
4. OSPF (0)
5. EGP Configuration (0)
6. TCP Configuration (0)
7. TFTP Configuration (1)
8. Time Protocol Configuration (0)
9. BOOTP Configuration (0)
10. Import Route Filters (0)
11. Export Route Filters (0)

----- / DoD Internet Router/1/Network Interface Definitions -----

Network Interface Definitions

| Internet Address | Subnet Mask | Circuit Group |
|------------------|-------------|---------------|
|------------------|-------------|---------------|

- |              |             |         |
|--------------|-------------|---------|
| 1. 10.20.0.1 | 255.255.0.0 | ETHER1G |
| 2. 10.2.0.2  | 255.255.0.0 | WAN1G   |

----- / DoD Internet Router/1/Network Interface Definitions/1/ -----

Internet Address : 10.20.0.1  
Subnet Mask : 255.255.0.0 Receive Broadcast: Network and Subnet  
Circuit Group : ETHER1G Transmit Broadcast: All Ones

Address Resolution : ARP & HP Probe RIP Supply : Yes  
Normal ARP : Yes RIP Listen : Yes  
Proxy ARP : Yes Default Route Supply : No

Host Cache : No Default Route Listen : No  
UDP Checksum Off : No Poisoned Reverse/Split Horizon: Poison  
RIP Interface Cost : 1  
Address Mask Reply : No ASB Flood : No  
MTU Discovery Option : No Source Route (Token Ring): No  
Load Balancing : No Send ICMP Redirects : Yes

1. Traffic Filters (0)
2. Traffic Priority (0)
3. UDP Broadcast Routing Dest Port Number(s) (0)

----- / DoD Internet Router/1/Network Interface Definitions/2/ ---

Internet Address : 10.2.0.2  
Subnet Mask : 255.255.0.0 Receive Broadcast : Network and Subnet  
Circuit Group : WAN1G Transmit Broadcast : All Ones

Address Resolution : ARP RIP Supply: Yes  
Normal ARP : Yes RIP Listen: Yes  
Proxy ARP : Yes Default Route Supply: No  
Host Cache : No Default Route Listen: No  
UDP Checksum Off : No Poisoned Reverse/Split Horizon : Poison  
RIP Interface Cost: 1

Address Mask Reply : No ASB Flood: No  
MTU Discovery Option : No Source Route (Token Ring): No  
Load Balancing : No Send ICMP Redirects: Yes

1. Traffic Filters (0)
2. Traffic Priority (0)
3. UDP Broadcast Routing Dest Port Number(s) (0)

----- / DoD Internet Router/1/TFTP Configuration/1/ -----

Max Retransmissions : 5  
Retransmission Time Out : 5  
Connection Close Time Out : 25  
Auto Enable : No  
Allow Router to Accept Files : No

1. Client Address(es) (0)

----- / SNMP Sessions -----

| SNMP Sessions  |              |              |
|----------------|--------------|--------------|
| Community Name | Session Mode | Session type |
| 1. PUBLIC      | Read/Write   | Regular      |

----- / SNMP Sessions/1/ -----

Community Name : PUBLIC Session Mode: Read/Write  
Session type : Regular  
1. Node Addresses (1)

----- / SNMP Sessions/1/Node Addresses -----

Node Addresses  
Node Address  
-----  
1. 0.0.0.0

----- / SNMP Sessions/1/Node Addresses/1/ -----

Node Address : 0.0.0.0



```
Router-C's configuration file
!
version 11.2
no service udp-small-servers
no service tcp-small-servers
!
hostname Router-C
!
enable secret 5 xxxxx
enable password xx
!
!
interface Ethernet0
 ip address 10.30.0.1 255.255.0.0
 no mop enabled
!
interface Serial0
 ip address 10.3.0.2 255.255.0.0
 encapsulation frame-relay IETF
!
interface Serial1
 no ip address
 shutdown
!
interface BRI0
 no ip address
 shutdown
!
router rip
 network 10.0.0.0
!
no ip classless
snmp-server community public RO
!
line con 0
line aux 0
line vty 0 4
 password xx
 login
!
end
```