Sample Configuration: Using Floating Static Routes and Dial-on-Demand Routing

Contents

Introduction

The goal of this document is to configure an ISDN Basic Rate Interface (BRI) to dial and carry traffic to a remote site in the event of a logical failure of the Frame Relay circuit.

Enhanced Interior Gateway Routing Protocol (EIGRP) is not running on the BRIs. Instead, the example in this document uses floating static routes to redirect traffic over the BRI only if normal routes learned through EIGRP over the Frame Relay circuit are lost.

In all routers, ensure that **ip classless** is enabled.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

Configure

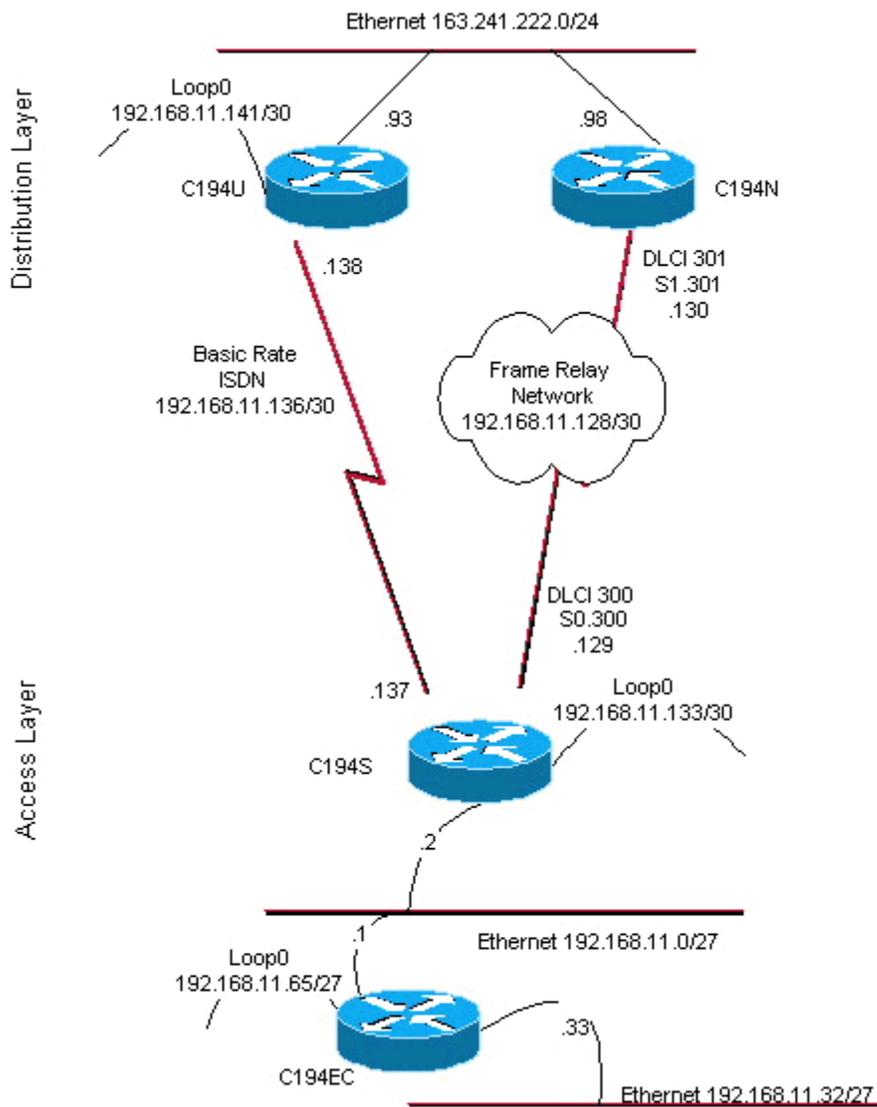These configurations are snippets of the complete configurations.

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses this network setup:

Figure 1 – Network Diagram

Ethernet 163.241.222.0/24

Loop0
192.168.11.141/30
.93
.98
C194U
C194N

.138

DLCI 301
S1.301
.130

Basic Rate
ISDN
192.168.11.136/30

Frame Relay
Network
192.168.11.128/30

DLCI 300
S0.300
.129

.137
Loop0
192.168.11.133/30

C194S

.2

.1
Loop0
192.168.11.65/27

Ethernet 192.168.11.0/27

.33
C194EC

Ethernet 192.168.11.32/27

Distribution Layer

Access Layer

Configurations

This document uses these configurations:

- Distribution Layer Router #1

- Distribution Layer Router #2

- Access Layer Router

- Remote Site Router

Router C194u is one of the two distribution layer routers. In this example, Router C194u has the BRI to the remote site. The other distribution layer router, C194n, has the companion serial interface to the remote site.

Distribution Layer Router #1

```
hostname c194u
!
```

```
username c194s password 7 XXXXXXXX
!
ip subnet-zero
isdn switch-type basic-dms100
!
interface Loopback0
 ip address 192.168.11.141 255.255.255.252
!
interface Ethernet0
 ip address 163.241.222.93 255.255.255.0
 media-type 10BaseT
!
interface BRI0
 description to Remote Site c194s, (this end 08358662 08358664)
 ip address 192.168.11.138 255.255.255.252
 no ip mroute-cache
 encapsulation ppp
 no ip route-cache
 isdn spid1 0835866201
 isdn spid2 0835866401
 dialer idle-timeout 600
 dialer wait-for-carrier-time 10
 dialer map ip 192.168.11.137 name c194s broadcast 8358661
 dialer map ip 192.168.11.137 name c194s broadcast 8358663
 dialer hold-queue 5
 dialer load-threshold 128  outbound
 dialer-group 1
 no fair-queue
 ppp authentication chap
 ppp multilink
!
router eigrp 65535
```

!--- We redistribute the static routes listed below, so if the Frame Relay
!--- network fails, the other routers in this autonomous system (AS) will
!--- begin to see the remote networks advertised from this router.
!--- Normally these routes are learned through EIGRP across the Frame Relay link.
!--- Make the BRI interfaces passive. An alternative is to use a dialer-list
!--- to identify EIGRP packets as "uninteresting" packets.

redistribute static
 passive-interface BRI0
```
 network 192.168.11.0
 network 163.241.0.0
 default-metric 64 200 255 1 1500
 no auto-summary
 eigrp log-neighbor-changes
!
ip classless
```

!--- Both distribution layer routers have a default route to their Null
!--- interfaces so that they advertise the 0/0 network to all other routers

```
!--- in the AS.

ip route 0.0.0.0 0.0.0.0 Null0

!--- There must be a static route for each network behind the C194s
!--- router at the remote site. Use the IP address of the BRI interface
!--- of router C194s, and ensure that the administrative distance is 240.
!--- Note: Summarize these routes if your addressing scheme lends itself
!--- to summarization. If the Frame Relay network fails, this will force
!--- packets destined to the remote site out the BRI interface, and will cause
!--- it to dial and restore connectivity.

ip route 192.168.11.0 255.255.255.224 192.168.11.137 240
ip route 192.168.11.32 255.255.255.224 192.168.11.137 240
ip route 192.168.11.64 255.255.255.224 192.168.11.137 240
ip route 192.168.11.132 255.255.255.252 192.168.11.137 240
!
access-list 100 deny    icmp any any
access-list 100 permit ip any any
dialer-list 1 protocol ip list 100
!
end
```

Here is a sample **show dialer** command output for Router C194u:

Distribution Layer Router #1

```
c194u#show dialer

BRI0 - dialer type = ISDN

Dial String      Successes   Failures    Last called   Last status
8358663                  4       1311    01:32:08            failed
8358661               1874       1315    00:02:07        successful
0 incoming call(s) have been screened.

BRI0:1 - dialer type = ISDN
Idle timer (600 secs), Fast idle timer (20 secs)
Wait for carrier (5 secs), Re-enable (15 secs)
Dialer state is physical layer up
Dial reason: ip (s=192.168.11.138, d=192.168.11.137)
```

The next router, C194n, is the second distribution layer router because. In this illustration, it is the frame link router. It does not have any special configuration. It only has the default route redistributed into EIGRP.

Distribution Layer Router #2

```
hostname c194n
!
!
interface Ethernet0
 ip address 163.241.222.98 255.255.255.0
!
interface Serial1
 no ip address
```

```
 bandwidth 1544
 no ip mroute-cache
 encapsulation frame-relay
 no fair-queue
!
interface Serial1.301 point-to-point
 ip address 192.168.11.130 255.255.255.252
 bandwidth 32
 frame-relay interface-dlci 301
!
router eigrp 65535
 redistribute static
 network 192.168.11.0
 network 163.241.0.0
 default-metric 64 200 255 1 1500
 no auto-summary
 eigrp log-neighbor-changes
!
ip classless
ip route 0.0.0.0 0.0.0.0 Null0
!
```

The next router, C194s, is the remote site router, the access layer router. It connects the remote network to the backbone via the distribution layer router.

Access Layer Router

```
!
hostname c194s
!

!--- Create a username for the distribution layer router.

username c194u password 7 XXXXXXXXX
!
isdn switch-type basic-dms100
!
interface Loopback0
 ip address 192.168.11.133 255.255.255.252
!
interface Ethernet0
 ip address 192.168.11.2 255.255.255.224
!
interface Serial0
 no ip address
 bandwidth 64
 encapsulation frame-relay
!
interface Serial0.300 point-to-point
 ip address 192.168.11.129 255.255.255.252
 bandwidth 32
 frame-relay interface-dlci 300
!
interface BRI0
 description to Hub Site c194u, (this end 08358661 08358663)
 ip address 192.168.11.137 255.255.255.252
 no ip mroute-cache
 encapsulation ppp
```

```
 no ip route-cache
 isdn spid1 0835866101
 isdn spid2 0835866301
 dialer idle-timeout 600
 dialer wait-for-carrier-time 10
 dialer map ip 192.168.11.138 name c194u broadcast 8358662
 dialer map ip 192.168.11.138 name c194u broadcast 8358664
 dialer hold-queue 5
 dialer load-threshold 128
 dialer-group 1
 no fair-queue
 ppp multilink
 ppp authentication chap
!
router eigrp 65535

!--- Redistribute the static route, so any routers which you could have attached
!--- to the Ethernet network 192.168.11.0/27 will see this router as their way
!--- out to the remainder of the network. However, do not allow this default
!--- route back into your distribution layer routers. Use a distribute list
!--- to block the advertisement.

redistribute static
 passive-interface BRI0
 network 192.168.11.0
 default-metric 64 200 255 1 1500
 distribute-list 2 out Serial0.300
 no auto-summary
 eigrp log-neighbor-changes
!
ip classless

!--- Use the IP address of the BRI interface of the distribution layer router to
!--- Add a default route. When the frame network goes down, this will
!--- push your traffic out the BRI interface, and cause it to dial and
!--- restore connectivity.

ip route 0.0.0.0 0.0.0.0 192.168.11.138 240
!
access-list 1 permit any
!
access-list 2 deny    0.0.0.0
access-list 2 permit any
!
dialer-list 1 protocol ip list 1
!
end
!
```

The next router represents the *remote site* network. Nothing special needs be done here, other than to participate in the IGP dynamic routing protocol, EIGRP, of the access-layer router.

Remote Site Router

`hostname c194ec`
`!`
`!`
`interface Loopback0`

```
 ip address 192.168.11.65 255.255.255.224
!
interface Ethernet0
 ip address 192.168.11.1 255.255.255.224
!
interface Ethernet1
 ip address 192.168.11.33 255.255.255.224
!
!
router eigrp 65535
 network 192.168.11.0
 default-metric 64 200 255 1 1500
 no auto-summary
 eigrp log-neighbor-changes
!
ip classless
!
end
```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the [Output Interpreter Tool]( ) (registered customers only) , which allows you to view an analysis of **show** command output.

With the Frame Relay network down, try a traceroute from the network at the remote site. Based on the network diagram (see [figure 1]( )), the target IP address is the loopback interface of the hub site router.

```
c194ec#trace
Target IP address: 192.168.11.141
Source address: 192.168.11.65
Tracing the route to 192.168.11.141

  1 192.168.11.2 4 msec 4 msec 4 msec
  2  *   *   *
  3  *   *
    192.168.11.138 24 msec
```

Notice how it required several packets to get the BRI interface up. Issue the **traceroute** command again, before the BRI goes inactive and packets are lost:

```
c194ec#traceroute 192.168.11.141

Tracing the route to 192.168.11.141

  1 192.168.11.2 4 msec 4 msec 4 msec
  2 192.168.11.138 20 msec *  20 msec
```

Bring the frame switch up again. With the Frame Relay network now operational, you do not use ISDN:

```
c194ec#traceroute 192.168.11.141
Tracing the route to 192.168.11.141

  1 192.168.11.2 4 msec 4 msec 4 msec
```

```
    2 192.168.11.130 36 msec 36 msec 32 msec
    3 163.241.222.93 36 msec *  32 msec
```

The routing tables for the operational Frame Relay network are shown below. Notice how individual routes are learned through EIGRP for networks at the hub site. There is also a default route learned through EIGRP.

```
c194ec#show ip route

Gateway of last resort is 192.168.11.2 to network 0.0.0.0

     163.241.0.0 255.255.255.0 is subnetted, 1 subnets
D       163.241.222.0 [90/2221056] via 192.168.11.2, 00:02:09, Ethernet0
     192.168.11.0 is variably subnetted, 7 subnets, 2 masks
C       192.168.11.64 255.255.255.224 is directly connected, Loopback0
C       192.168.11.32 255.255.255.224 is directly connected, Ethernet1
C       192.168.11.0 255.255.255.224 is directly connected, Ethernet0
D       192.168.11.128 255.255.255.252
            [90/2195456] via 192.168.11.2, 00:02:13, Ethernet0
D       192.168.11.132 255.255.255.252
            [90/409600] via 192.168.11.2, 01:23:14, Ethernet0
D       192.168.11.136 255.255.255.252
            [90/40537600] via 192.168.11.2, 01:23:14, Ethernet0
D       192.168.11.140 255.255.255.252
            [90/2349056] via 192.168.11.2, 00:02:10, Ethernet0
D*EX 0.0.0.0 0.0.0.0 [170/40614400] via 192.168.11.2, 00:02:10, Ethernet
```

The routing tables for when the Frame Relay network is down are shown below. There is still a default route, but some individual routes of networks back at the hub site are lost. But because **ip classless** is enabled, and you have a default route, you still can get everywhere in the network.

```
c194ec#show ip route

Gateway of last resort is 192.168.11.2 to network 0.0.0.0

     192.168.11.0 is variably subnetted, 5 subnets, 2 masks
C       192.168.11.64 255.255.255.224 is directly connected, Loopback0
C       192.168.11.32 255.255.255.224 is directly connected, Ethernet1
C       192.168.11.0 255.255.255.224 is directly connected, Ethernet0
D       192.168.11.132 255.255.255.252
            [90/409600] via 192.168.11.2, 01:25:27, Ethernet0
D       192.168.11.136 255.255.255.252
            [90/40537600] via 192.168.11.2, 01:25:27, Ethernet0
D*EX 0.0.0.0 0.0.0.0 [170/40076800] via 192.168.11.2, 00:00:15, Ethernet
```

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

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