

Configuring FRAS BNN Router with Ethernet–Connected Devices

Document ID: 12254

Introduction

Prerequisites

- Requirements

- Conventions

Configure

- Configuration Notes

- Network Diagram

- Network Diagram Notes

- Configurations

Verify

- Debug and Verification Tips

- Show Command Output

Troubleshoot

NetPro Discussion Forums – Featured Conversations

Related Information

Introduction

In this sample configuration, a Cisco router configured for Frame Relay Access Support (FRAS) boundary network node (BNN) is connected to Ethernet devices that communicate with a FRAS host configured router; the FRAS host configured router is connected to a Token Ring–attached host.

The BNN support in this sample configuration is based on Cisco IOS® Software Release 11.2 and earlier versions in which you need to define each of the end stations attached to the LAN with the **fras map** command.

Note: If needed, the FRAS host router can be replaced with a Network Control Program (NCP) Frame Relay connection. If you use that scenario, there is no need to change the configuration of the FRAS BNN router from what is presented in the Network Diagram.

Prerequisites

Requirements

There are no specific requirements for this document.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Configure

Configuration Notes

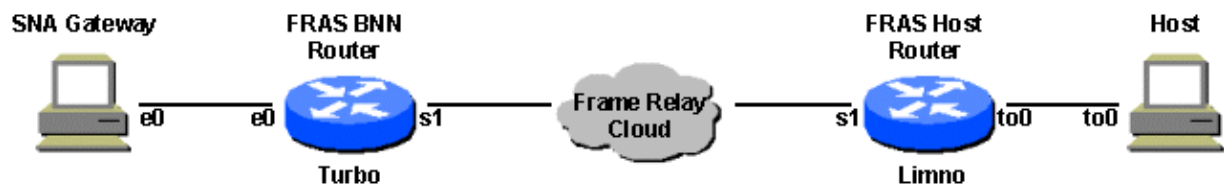
In this section, you are presented with the information to configure the features described in this document.

- The FRAS BNN router (Turbo) e0 MAC address is the same as the destination MAC (DMAC) configured in all the end devices (0200.2222.0000).
- The FRAS BNN router configuration contains the `fras map llc 0000.2222.0000 4 8 Serial 1 frame-relay dlci 20 4 4` command. This command accepts inbound requests from 0000.2222.0000 with SAP 0x08 that try to connect to 0200.2222.0000 with SAP 0x04. On the Frame Relay side, the router sends data over DLCI 20, with a destination SAP (DSAP) of 0x04 and a SSAP of 0x04.
- The FRAS Host router configuration contains the `fras-host bnn Serial1 fr-lsap 04 vmac 4000.2222.0000 hmac 4000.3745.0000` command. This command enables the FRAS Host function for the BNN router to accept inbound BNN frames that arrive at Serial 1 with a DSAP of 0x04. The router sends Logical Link Control (LLC) frames to the MAC addresses specified in the HMAC parameter. The HMAC parameter must match the MAC address of the CIP adapter or LAN-attached host. By default, the router uses DSAP = 0x04. The VMAC parameter is used in combination with the DLCI number to form a unique source MAC address that the router uses to communicate with the host. The DLCI number is appended to the last two bytes of the VMAC parameter, which is visible in the `show fras-host` command output.
- Cisco IOS Software Release 11.2 and earlier support for BNN requires you to map every single end station in the segment/ring with the **fras map** command. The MAC address in the **fras map** command represents the end station source MAC (SMAC).
- In this example scenario, the Frame Relay connection is back-to-back with no Frame Relay switch in the middle; there is no Local Management Interface (LMI) or keepalives. In a real situation, you have a Frame Relay switch in the middle.

Note: Use the Command Lookup Tool (registered customers only) to find more information on the commands used in this document.

Network Diagram

This document uses this network setup.



Network Diagram Notes

- The SNA Gateway is configured with these Media Access Control (MAC) addresses:

```
smac = 0000.2222.0000 (canonical), dmac = 0200.2222.0000 (canonical)
lsap = 0x08 and dsap = 0x04
```

For easy reference, these are the bit swap values of the MAC addresses:

```
smac = 0000.4444.0000 (non-canonical), dmac = 4000.4444.0000
(non-canonical)
```

- The Host uses this MAC value on to0:

smac = 4000.3745.0000 (non-canonical)

Configurations

This document uses these configurations:

```
FRAS BNN Router

turbo#show running-config

Building configuration...
!
hostname turbo
!
!
interface Ethernet0
!This MAC is the DMAC of all the Ethernet stations.
  mac-address 0200.2222.0000
  ip address 5.5.5.1 255.255.255.0
  no ip directed-broadcast
  frs map llc 0000.2222.0000 4 8 Serial 1 frame-relay dlci 20 4 4
!
interface Serial1
  ip address 2.2.2.1 255.255.255.0
  no ip directed-broadcast
  encapsulation frame-relay IETF
  no keepalive
  frame-relay map llc2 20
  frame-relay interface-dlci 20
!
end
```

```
FRAS Host Router

limno#show running-config

Building configuration...
!
hostname limno
!
source-bridge ring-group 500
!
interface Serial1
  ip address 2.2.2.2 255.255.255.0
  no ip directed-broadcast
  encapsulation frame-relay IETF
  no keepalive
  clockrate 4000000
  frame-relay map llc2 20
  frame-relay interface-dlci 20
!
interface TokenRing0
  ip address 4.4.4.2 255.255.255.0
  no ip directed-broadcast
  ring-speed 16
  source-bridge 10 1 500
!
interface Virtual-TokenRing0
  no ip address
  no ip directed-broadcast
  ring-speed 16
  source-bridge 400 1 500
```

```
source-bridge spanning
fras-host bnn Serial1 fr-lsap 04 vmac 4000.2222.0000 hmac 4000.3745.0000
!
end
```

Verify

Debug and Verification Tips

You can turn on these debugs in the FRAS BNN router:

- **debug fras error** – Displays information about FRAS protocol errors.
- **debug fras state** – Displays information about FRAS data link control link state changes. These are the possible states: reset, request open station is sent, exchange xid, connection request is sent, signal station wait, connection response wait, connection response sent, connection established, disconnect wait, and number of link states.
- **debug fras message** – Displays general information about FRAS messages.

You can turn on these debugs in the FRAS HOST router:

- **debug fras-host packet** – Sees what LLC2 session frames are handled by FRAS Host. Use this command with great care. If many LLC2 sessions are active and passing data, this command can generate a tremendous amount of output to the console and impact performance.
- **debug fras-host error** – Enables FRAS Host to send error messages to the console.
- **debug fras-host activation** – Displays the LLC2 session activation and deactivation frames (such as XID, SABME, DISC, UA) that are handled by FRAS Host. If many LLC2 sessions are activated or deactivated at any time, this command can generate large amounts of output to the console.

Show Command Output

You can use the show commands to verify the configuration.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

```
FRAS BNN Router
turbo#show fras

Boundary Network Node (BNN):

DLCI: 20
Type Destination      Int LSap RSap Role State
llc 0000.2222.0000 Et0 4    8    P    ls_Contacted
fr   -                Sel 4    4    S    ls_Contacted
Boundary Access Node (BAN):

turbo#show llc
LLC2 Connections: total of 2 connections
Serial1 DTE: 20 04 04 state NORMAL
V(S)=1, V(R)=1, Last N(R)=1, Local window=7, Remote Window=127
akmax=3, n2=10,
xid-retry timer 0/0 ack timer 0/1000
p timer 0/1000 idle timer 9400/10000
rej timer 0/3200 busy timer 0/9600
```

```
akdelay timer 0/100 txQ count 0/200
```

```
Ethernet0 DTE: 0000.2222.0000 0200.2222.0000 04 08 state NORMAL  
V(S)=1, V(R)=1, Last N(R)=1, Local window=7, Remote Window=127  
akmax=3, n2=10,  
xid-retry timer 0/0 ack timer 0/1000  
p timer 0/1000 idle timer 8480/10000  
rej timer 0/3200 busy timer 0/9600  
akdelay timer 0/100 txQ count 0/200
```

FRAS Host Router

```
limno#show fras-host
```

```
Number of Active Control Blocks = 1  
Number of Available Control Blocks in Pool = 127
```

Port	Dlci	Type	FrRsap	FrLsap	HostSap	FrMac / VMac	HostMac
Sel	20	BNN	04	04	04	4000.2222.0014	4000.3745.0000

```
limno#show fras-host detail
```

```
Number of Active Control Blocks = 1  
Number of Available Control Blocks in Pool = 127
```

```
Port = Sel, Dlci = 20, Type = BNN, FrRsap = 04, FrLsap = 04, HostSap = 04  
Host Mac = 4000.3745.0000, Rif = 0810.1901.1F41.00A0  
Frames Fwd to Host = 110, Last Rcvd From Frad = 0 sec  
Fr Mac = 4000.2222.0014, Rif = NONE  
Frames Fwd to Frad = 111, Last Rcvd from Host = 0 sec
```

```
limno#show fras-host serial 1
```

```
Number of Active Control Blocks = 1  
Number of Available Control Blocks in Pool = 127
```

Port	Dlci	Type	FrRsap	FrLsap	HostSap	FrMac / VMac	HostMac
Sel	20	BNN	04	04	04	4000.2222.0014	4000.3745.0000

```
limno#show fras-host dlci 20
```

```
Number of Active Control Blocks = 1  
Number of Available Control Blocks in Pool = 127
```

Port	Dlci	Type	FrRsap	FrLsap	HostSap	FrMac / VMac	HostMac
Sel	20	BNN	04	04	04	4000.2222.0014	4000.3745.0000

```
limno#show llc
```

```
No LLC2 connections.
```

Note: The FRAS Host router does not maintain any LLC sessions because it works in passthrough mode.

Troubleshoot

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

NetPro Discussion Forums – Featured Conversations

Networking Professionals Connection is a forum for networking professionals to share questions, suggestions, and information about networking solutions, products, and technologies. The featured links are some of the most recent conversations available in this technology.

NetPro Discussion Forums – Featured Conversations for Router and IOS Architecture
Network Infrastructure: LAN Routing and Switching
Network Infrastructure: WAN Routing and Switching

Related Information

- [Technology Support](#)
- [Product Support](#)
- [Technical Support & Documentation – Cisco Systems](#)

All contents are Copyright © 2006–2007 Cisco Systems, Inc. All rights reserved. [Important Notices and Privacy Statement](#).

Updated: Mar 01, 2007

Document ID: 12254
