# SNA Frame Relay Access Support Commands

This chapter describes the commands to configure Systems Network Architecture (SNA) Frame Relay access support (FRAS). For SNA FRAS configuration tasks and examples, refer to the "Configuring SNA Frame Relay Access Support" chapter of the *Bridging and IBM Networking Configuration Guide*.

**Note** Because Frame Relay does not provide the reliable transport required by SNA, the RFC 1490 support of SNA uses Logical Link Control, type 2 (LLC2) as part of the encapsulation to provide link-level sequencing, acknowledgment, and flow control. The serial interface configured for Internet Engineering Task Force (IETF) encapsulation (RFC 1490) accepts all LLC2 interface configuration commands. For more information about LLC2 interface configuration commands, refer to the "LLC2 and SDLC Commands".

# frame-relay map llc2

Use the **frame-relay map llc2** interface configuration command to map LLC2 traffic to a data-link connection identifier (DLCI).

**frame-relay map llc2** *dlci-number*

## Syntax Description

| | |
|---|---|
| *dlci-number* | Frame Relay DLCI. |

## Default

No defaults are defined.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

Direct encapsulation over Frame Relay is supported only for an encapsulation type of cisco, configured using the **encapsulation frame-relay cisco** command.

## Example

The following example maps LLC2 traffic to DLCI number 200:

```
frame-relay map llc2 200
```

# frame-relay map rsrb

Use the **frame-relay map rsrb** interface configuration command to specify the DLCI number onto which the RSRB traffic is to be mapped.

**frame-relay map rsrb** *dlci-number*

## Syntax Description

| | |
|---|---|
| *dlci-number* | Frame Relay DLCI. |

## Default

No defaults are defined.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

Direct encapsulation over Frame Relay is supported only for an encapsulation type of cisco, configured using the **encapsulation frame-relay cisco** command.

## Example

The following example shows RSRB traffic mapped to DLCI number 30:

```
frame-relay map rsrb 30
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**encapsulation frame-relay**

# fras backup dlsw

Use the **fras backup dlsw** interface configuration command to configure an auxiliary route between the end stations and the host for use as a backup when the DLCI connection to the Frame Relay network is lost. Use the **no** form of this command to cancel the backup configuration.

**fras backup dlsw** *virtual-mac-address target-ring-number host-mac-address* [**retry** *retry-number*]
**no fras backup dlsw** *virtual-mac-address target-ring-number host-mac-address* [**retry** *retry-number*]

## Syntax Description

| | |
|---|---|
| *virtual-mac-address* | 12-digit hexadecimal string used as a source MAC address for all packets going to the host. |
| *target-ring-number* | Number configured in the **source-bridge ring-group** command. This is a virtual ring. The valid range is 1 to 4095. |
| *host-mac-address* | Destination MAC address of the host. |
| **retry** *retry-number* | (Optional) Number of attempts by the end station to reconnect to the primary Frame Relay interface before activating the backup link. The range is 1 to 5 retries. If the **retry** option is not specified, the default number of retries is 5. |

## Default

FRAS dial backup over DLSw+ is disabled.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

Configure DLSw+ as normally required. Specify the optional keyword **dynamic** at the end of the **dlsw remote-peer** configuration command to enable the peer relationship to be established only when needed (for example, when the **fras backup dlsw** command becomes active).

## Example

The following example configures FRAS dial backup over DLSw+:

```
fras backup dlsw 4000.1000.2000 200 1000.5aed.1f53
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**dlsw local-peer**
**dlsw remote-peer tcp**
**frame-relay lmi-type**
**frame-relay map llc2**
**fras map llc**
**show fras**
**source-bridge ring-group**

# fras ban

Use the **fras ban** interface configuration command to associate bridging over a Frame Relay network using boundary access node (BAN). Use the **no** form of this command to cancel each association.

**fras ban** *local-ring bridge-number ring-group ban-dlci-mac* **dlci** *dlci#1* [*dlci#2 … dlci#5*] [**bni** *mac-addr*]
**no fras ban** *local-ring bridge-number ring-group ban-dlci-mac* **dlci** *dlci#1* [*dlci#2 … dlci#5*] [**bni** *mac-addr*]

## Syntax Description

| | |
|---|---|
| *local-ring* | Decimal number from 1 to 4095 describing the Token Ring interface. |
| *bridge-number* | Decimal number from 1 to 15 that uniquely identifies a bridge connecting two rings. |
| *ring-group* | Decimal number from 1 to 4095 representing a collection of Token Ring interfaces on one or more routers. |
| *ban-dlci-mac* | Frame Relay BAN PVC MAC address. |
| *dlci#1* [*dlci#2 … dlci#5*] | Frame Relay DLCI. Each DLCI number is unique and is a decimal within the range of 16 to 1007. The keyword **dlci** precedes the list of one or more DLCI numbers. If more than one DLCI number is needed for load balancing in the FRAS BAN configuration command, a maximum of five DLCI numbers are allowed. |
| **bni** *mac-addr* | (Optional) Boundary node identifier (BNI) MAC address of the NCP that receives frames from the router. |

## Default

No defaults are defined.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

Multipule **fras ban** commands may be configured; however, each **fras ban** command must use a unique DLCI MAC address.

You must configure the **source-bridge ring-group** global configuration command prior to configuring the **fras ban** command.

## Example

The following configuration shows FRAS BAN support for Token Ring and serial interfaces:

```
source-bridge ring-group 200
!
interface serial 0
 mtu 4000
 encapsulation frame-relay ietf
 frame-relay lmi-type ansi
 frame-relay map llc2  16
 frame-relay map llc2  17
 fras ban 120 1 200 4000.1000.2000 dlci 16 17
!
interface tokenring 0
 source-bridge 100 5 200
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**source-bridge ring-group**

# fras ddr-backup

Use the **fras ddr-backup** interface configuration command to configure an auxiliary interface for use as a backup when the primary Frame Relay link to the Frame Relay WAN fails. Use the **no** form of this command to cancel the backup configuration.

**fras ddr-backup interface** *interface dlci-number*
**no fras ddr-backup**

## Syntax Description

| | |
|---|---|
| **interface** *interface* | The interface over which the backup connection is made. |
| *dlci-number* | The DLCI number of the session. |

## Default

FRAS DLCI backup is disabled by default.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Example

The following example configures FRAS DLCI backup on serial interface 1:

```
fras ddr-backup interface serial1 188
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**show llc2**
**show fr pvc**
**show fras**

# fras-host ban

Use the **fras-host ban** interface configuration command to enable the FRAS Host function for BAN. Use the **no** form of this command to disable the FRAS Host BAN functionality.

**fras-host ban** *(sub)interface* **hmac** *hmac* [**bni** *bni*]
**no fras-host ban**

## Syntax Description

| | |
|---|---|
| *(sub)interface* | Associated Frame Relay interface or subinterface. |
| **hmac** *hmac* | MAC address of the CIP adapter or LAN-attached host. |
| **bni** *bni* | (Optional) Boundary node identifier MAC address. The default *bni* is 4FFF.0000.0000. |

## Default

The FRAS Host function for BAN is disabled for the Frame Relay subinterface.

The default *bni* is 4FFF.0000.0000.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Example

The following example enables the FRAS Host function for BAN:

```
fras-host ban Serial0 hmac 4001.3745.0001
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**fras ban**
**fras-host bnn**
**fras-host dlsw-local-ack**
**interface virtual-tokenring**

# fras-host bnn

Use the **fras-host bnn** interface configuration command to enable the FRAS Host function for BNN. Use the **no** form of this command to disable the FRAS Host function.

**fras-host bnn** *(sub)interface* **fr-lsap** *sap* **vmac** *virt-mac* **hmac** *hmac* [**hsap** *hsap*]
**no fras-host bnn**

## Syntax Description

| | |
|---|---|
| *(sub)interface* | Associated Frame Relay interface or subinterface. |
| **fr-lsap** *sap* | LLC2 service access point (SAP). The destination SAP on inbound BNN frames received from Frame Relay. |
| **vmac** *virt-mac* | Used in combination with the DLCI number to form a unique MAC address. The first 4 bytes of the MAC address are formed by the VMAC while the last 2 bytes are formed from the DLCI number. The last 2 bytes of the VMAC must be configured as zeros. |
| **hmac** *hmac* | MAC address of the CIP adaptor or LAN-attached host. |
| **hsap** *hsap* | (Optional) Host SAP. If this parameter is not specified, the host SAP value used will match **fr-lsap**. |

## Default

FRAS Host for BNN is disabled for the Frame Relay subinterface.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Example

The following example enables the FRAS Host function for BNN:

```
fras-host bnn Serial0 fr-lsap 04 vmac 4005.3003.0000 hmac 4001.3745.0001
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**fras-host ban**
**fras-host dlsw-local-ack**
**fras-map**
**interface virtual-tokenring**

# fras-host dlsw-local-ack

Use the **fras-host dlsw-local-ack** interface configuration command to enable LLC2 local termination for FRAS Host connections using the virtual Token-Ring. Use the **no** form of this command to disable LLC2 local termination.

**fras-host dlsw-local-ack**
**no fras-host dlsw-local-ack**

## Syntax Description

This command has no arguments or keywords.

## Default

The default state is FRAS Host LLC2 local termination disabled.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Example

The following command enables LLC2 local termination for FRAS Host connections using the virtual Token Ring:

```
fras-host dlsw-local-ack
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**dlsw local-peer**
**fras-host ban**
**fras-host bnn**
**interface virtual-tokenring**

# fras map llc

Use the **fras map llc** interface configuration command to associate an LLC connection with a Frame Relay DLCI. Use the **no** form of this command to disable the association.

**fras map llc** *lan-lsap* **serial** *interface* **frame-relay dlci** *dlci fr-rsap*
**no fras map llc** *lan-lsap* **serial** *interface* **frame-relay dlci** *dlci fr-rsap*

## Syntax Description

| | |
|---|---|
| *lan-lsap* | LLC2 LAN SAP that is the local SAP address of the router. |
| **serial** *interface* | Serial interface on which Frame Relay is configured. |
| **frame-relay dlci** *dlci* | Frame Relay DLCI. |
| *fr-rsap* | LLC2 Frame Relay SAP that is the destination SAP of the router on the Frame Relay side. |

## Default

The default state is FRAS BNN enhancement disabled.

## Command Mode

Interface configuration

## Usage Guidelines

This revised version of the **fras map llc** command for the enhanced FRAS BNN functionality first appeared in Cisco IOS Release 11.2 F.

If the destination SAP specified by the end station is equal to *lan-lsap*, the router associates the LLC (LAN) connection with the Frame Relay DLCI.

The MAC address and the SAP address of the end station are no longer required for the BNN enhanced configuration.

## Example

In the FRAS BNN enhancement, the revised **fras map llc** command achieves the same result as using multiple **fras map llc** commands in the original FRAS BNN implementation. The following example provides one map definition for both end stations:

```
fras map llc 4 Serial 0 frame-relay dlci 16 04
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**show fras**
**show llc2**

# fras map sdlc

Use the **fras map sdlc** interface configuration command to associate an SDLC link with a Frame Relay DLCI. Use the **no** form of this command to cancel the association.

**fras map sdlc** *sdlc-address* **serial** *port* **frame-relay** *dlci fr-lsap fr-rsap* [**pfid2** | **afid2** | **fid4**]
**no fras map sdlc** *sdlc-address* **serial** *port* **frame-relay** *dlci fr-lsap fr-rsap* [**pfid2** | **afid2** | **fid4**]

## Syntax Description

| | |
|---|---|
| *sdlc-address* | SDLC address of the downstream SNA device in hexadecimal. |
| **serial** *port* | Serial interface on which Frame Relay is configured. |
| **frame-relay** *dlci* | Frame Relay DLCI. |
| *fr-lsap* | Local SAP address of the logical link connection on the Cisco Frame Relay Access Device (CFRAD). |
| *fr-rsap* | Destination SAP address on the host. |
| **pfid** | (Optional) FID2 SNA transmission header for SNA peripheral traffic. |
| **afid2** | (Optional) FID2 transmission header for APPN traffic. |
| **fid4** | (Optional) Transmission header used on SNA subarea flows. |

## Default

No defaults are defined.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

You can map multiple SDLC links to a DLCI.

## Example

The following example associates an SDLC link with a Frame Relay DLCI:

```
fras map sdlc c1 serial 0 frame-relay 200 4 4
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**frame-relay map llc2**

# interface virtual-tokenring

Use the **interface virtual-tokenring** command to create a virtual Token Ring interface. Use the **no** form of this command to cancel the configuration.

**interface virtual-tokenring** *number*
**no interface virtual-tokenring**

## Syntax Description

| | |
|---|---|
| *number* | Number of the virtual Token Ring. |

## Default

No defaults are assigned.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Example

The following example configures the virtual Token Ring interface:

```
interface virtual-tokenring 0
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**source bridge**
**fras ban**
**fras-host bnn**

# llc2 dynwind

Use the **llc2 dynwind** interface configuration command to enable dynamic window congestion management. Use the **no** form of this command to cancel the configuration.

**llc2 dynwind** [**nw** *nw-number*] [**dwc** *dwc-number*]
**no llc2 dynwind** [**nw** *nw-number*] [**dwc** *dwc-number*]

## Syntax Description

| | |
|---|---|
| **nw** *nw-number* | (Optional) Specifies a number of frames that must be received to increment the working window value by 1. The default is 4. |
| **dwc** *dwc-number* | (Optional) Specifies the number by which the working window value is divided when BECN occurs. Valid numbers are 1, 2, 4, 8, and 16. 1 is a special value that indicates that the working window value should be set to 1 when BECN is indicated. The default is 1. |

## Defaults

The default *nw-number* value is 4.

The default *dwc-number* value is 1.

## Command Mode

Interface configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

## Example

The following example specifies that to increment the working window 6 frames must be received, and the working window value should be set to 1 when BECN occurs:

```
llc2 dynwind nw 6 dwc 1
```

# show fras

Use the **show fras** privileged EXEC command to view notification that the FRAS dial backup over DLSw+ feature is active, to display information about the connection state in FRAS, and to display current BNN, BAN, and dial backup information.

**show fras**

## Syntax Description

This command has no arguments or keywords.

## Command Mode

Privileged EXEC

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

## Sample Display

The following is sample output from the **show fras** command:

```
Router# show fras

Boundary Network Node (BNN):
DLCI: 66
  Type   Destination      Int    LSap  RSap   Role  State
  fr                             4      4     S     ls_reset (Backup is enabled)
  llc    0000.f63a.2f50   To0    4      4     P     ls_contacted
```

Table 44 describes significant fields shown in the display.

**Table 44 Show FRAS Field Descriptions**

| Field | Description |
|---|---|
| Type | Connection type. The display example shows LLC and Frame Relay. |
| Destination | Destination MAC address from the perspective of the Cisco IOS software. |
| Int | Interface on which the connection resides. |
| LSap | Local SAP value. |
| RSap | Remote SAP value. |
| Role | Local link station role; P means primary and S means secondary. |

**Table 44 Show FRAS Field Descriptions (Continued)**

| Field | Description |
|---|---|
| State | Link station protocol machine state. This value may be one of the following states:<br>• ls_reset—Initial state.<br>• ls_RqOpnStnSent—TEST frame sent; request to open a connection endpoint.<br>• ls_ExchgXid—XID negotiation taking place.<br>• ls_ConnRqSent—SABME sent (connecting side).<br>• ls_SigStnWait—Waiting for signal to clean up the congestion and respond to polling with an RNR.<br>• ls_ConnRspWait—Wait for the other connection end point to bring up the link.<br>• ls_ConnRspSent—A UA has been sent and the router is waiting for a RR to clear up the flow.<br>• ls_Contacted—Everything is connected<br>• ls_DiscWait—Wait for acknowledge to disconnect request. |
| Backup is enabled | Notification displayed when the FRAS dial backup feature is configured. |

# show fras-host

Use the **show fras-host** EXEC command to display the status of LLC2 sessions using FRAS Host.

**show fras-host** [*(sub)interface*] [**dlci** *dlci-num*] [**detail**]

## Syntax Description

| | |
|---|---|
| *(sub)interface* | Only display LLC2 sessions from a specified Frame Relay interface or subinterface. |
| **dlci** *dlci-number* | Only display LLC2 sessions from a specified DLCI. |
| **detail** | Display additional information such as the routing information fields (RIFs) and statistics associated with the LLC2 sessions. |

## Command Mode

EXEC

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 F.

## Sample Display

The following is sample output from the **show fras-host** command:

```
router# show fras-host

Number of Active Control Blocks = 2
Number of Available Control Blocks in Pool = 126

Port   DLCI   Type   FrRsap   FrLSap  HostSap  VMac            HostMac
Se0    16     BNN    04       08      04       4000.ABBA.001E  4000.3000.2000
Se1    37     BAN    04       04      04       4000.0223.0019  4000.3000.2000
```

Table 45 describes significant fields shown in the display

**Table 45 Show FRAS Host Field Descriptions**

| Field | Description |
|---|---|
| Port | Frame Relay interface or subinterface associated with this LLC2 session. |
| DLCI | DLCI number associated with this LLC2 session |
| Type | FRAS encapsulation type associated with this LLC2 session |
| FrRsap | Frame Relay Remote LLC2 Sap associated with this LLC2 session. This SAP is the source sap on LLC2 frames sent by the remote FRAD. |
| FrLSap | Frame Relay Local LLC2 SAP associated with this LLC2 session. This SAP is the destination SAP on LLC2 frames sent by the remote FRAD. |
| HostSap | Destination SAP on LLC2 frames sent to the CIP or LAN-attached AS/400. This SAP will be identical to FrLsap unless the **hsap** parameter is configured on the **fras-host bnn** command. |

**Table 45 Show FRAS Host Field Descriptions (Continued)**

| Field | Description |
|---|---|
| VMac | MAC Address associated with the remote FRAD for this LLC2 session. |
| HostMac | Mac Address associated with the host for this LLC2 session. |

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**fras-host ban**
**fras-host bnn**
**fras-host dlsw-local-ack**

# show fras map

Use the **show fras map** privileged EXEC command to display the mapping and connection state of FRAS.

**show fras map**

## Syntax Description

This command has no arguments or keywords.

## Command Mode

Privileged EXEC

## Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

## Sample Display

The following is sample output from the **show fras map** command:

```
Router# show fras map

Type Destination    Int   LSap   RSap   Role   State
tr   0800.5a8f.8802 tr0   4      4      P      ls_contacted
fr   200            s0    4      4      S      ls_contacted
```

Table 46 describes significant fields shown in the display.

**Table 46 Show FRAS Map Field Descriptions**

| Field | Description |
|---|---|
| Type | Interface type. |
| Destination | Destination address. |
| Int | Interface. |
| LSap | Local SAP. |
| RSap | Remote SAP. |
| Role | Local link station role; P means primary, S means secondary. |
| State | Link station protocol machine state. |

# source-bridge

Use the **source-bridge** interface configuration command to configure an interface for source-route bridging. Use the **no** form of this command to disable source-route bridging on an interface.

**source-bridge** *source-ring-number bridge-number target-ring-number* [**conserve-ring**]
**no source-bridge** *source-ring-number bridge-number target-ring-number* [**conserve-ring**]

## Syntax Description

| | |
|---|---|
| *source-ring-number* | Ring number for the interface's Token Ring or FDDI ring. It must be a decimal number in the range 1 to 4095 that uniquely identifies a network segment or ring within the bridged Token Ring or FDDI network |
| *bridge-number* | Number that uniquely identifies the bridge connecting the source and target rings. It must be a decimal number in the range 1 to 15. |
| *target-ring-number* | Ring number of the destination ring on this router. The number must be unique within the bridged Token Ring or FDDI network. The target ring can also be a ring group. It must be a decimal number. |
| **conserve-ring** | (Optional) Keyword to enable SRB over Frame Relay. When this option is configured, the SRB software does not add the ring number associated with the Frame Relay partner's virtual ring (PVC) to outbound explorer frames. This option is permitted for Frame Relay subinterfaces only. |

## Default

SRB is disabled.

## Command Mode

Interface configuration

## Usage Guidelines

This revised version of the **source-bridge** command to enable SRB over Frame Relay first appeared in Cisco IOS Release 11.2 F.

The parser automatically displays the word "active" in the **source-bridge** command in configurations that have SRB enabled. You do not need to enter the **source-bridge** command with the **active** keyword.

## Examples

In the following example, Token Rings 129 and 130 are connected via a router:

```
interface tokenring 0
 source-bridge 129 1 130
!
interface tokenring 1
 source-bridge active 130 1 129
```

In the following example, an FDDI ring on one router is connected to a Token Ring on a second router across a DLSw+ link:

```
dlsw local-peer peer-id 132.11.11.2
dlsw remote-peer 0 tcp 132.11.11.3
interface fddi 0
 no ip address
 multiring all
 source-bridge active 26 1 10
!
dlsw local-peer peer-id 132.11.11.3
dlsw remote-peer 0 tcp 132.11.11.2
interface tokenring 0
 no ip address
 multiring all
 source-bridge active 25 1 10
```

In the following example, a router forwards frames from a locally attached Token Ring over the Frame Relay using SRB:

```
source-bridge ring-group 200
!
interface Serial0
 encapsulation frame-relay
!
interface Serial0.30 point-to-point
 frame-relay interface-dlci 30 ietf
 source-bridge 100 1 200 conserve-ring
 source-bridge spanning
!
interface TokenRing0
 source-bridge 600 1 200
```

## Related Commands

You can use the master indexes or search online to find documentation of related commands.

**debug frame-relay packet**
**debug source bridge**
**debug source error**
**debug source event**
**encapsulation frame-relay**
**frame-relay interface-dlci**
**source-bridge ring-group**
**source-bridge transparent**