



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 *Cisco IOS 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

To configure BSTUN over Frame Relay when using Bisync local acknowledgment, use the **frame-relay map llc2** interface configuration command. Use the **no** form of this command to cancel the configuration.

frame-relay map llc2 *dcli*

no frame-relay map llc2 *dcli*

Syntax Description	<i>dcli</i>	Frame Relay DLCI number on which to support local acknowledgment.
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Defaults	No default behavior or values.
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines	Direct encapsulation over Frame Relay is supported only for an encapsulation type of cisco, configured using the encapsulation frame-relay command.
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Examples	The following example maps BSTUN traffic to DLCI number 16:
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```
frame-relay map DLCI 16
```

Related Commands	Command	Description
	bstun linsap	Configures a SAP on which to listen for incoming calls.
	bstun protocol-group	Defines a BSTUN group and the protocol it uses.
	encapsulation frame-relay	Enables Frame Relay encapsulation.

frame-relay map rsrb

To specify the DLCI number onto which the RSRB traffic is to be mapped, use the **frame-relay map rsrb** interface configuration command. Use the **no** form of this command to cancel the RSRB map.

frame-relay map rsrb *dcli-number*

no frame-relay map rsrb

Syntax Description	<i>dcli-number</i>	Frame Relay DLCI.				
Defaults	No default behavior or values.					
Command Modes	Interface configuration					
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.3</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	10.3	This command was introduced.	
Release	Modification					
10.3	This command was introduced.					
Usage Guidelines	Direct encapsulation over Frame Relay is supported only for an encapsulation type of cisco, configured using the encapsulation frame-relay command.					
Examples	<p>The following example shows RSRB traffic mapped to DLCI number 30:</p> <pre>frame-relay map rsrb 30</pre>					
Related Commands	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>encapsulation frame-relay</td> <td>Enables Frame Relay encapsulation.</td> </tr> </tbody> </table>	Command	Description	encapsulation frame-relay	Enables Frame Relay encapsulation.	
Command	Description					
encapsulation frame-relay	Enables Frame Relay encapsulation.					

fras backup dlsw

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 **fras backup dlsw** interface configuration command. 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		
	<i>virtual-mac-address</i>	12-digit hexadecimal string used as a source MAC address for all packets going to the host.
	<i>target-ring-number</i>	Number configured in the source-bridge ring-group command. This is a virtual ring. The valid range is 1 to 4095.
	<i>host-mac-address</i>	Destination MAC address of the host.
	retry <i>retry-number</i>	(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.

Defaults FRAS dial backup over DLSw+ is disabled. The default number of retries is 5.

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines 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).

Examples The following example configures FRAS dial backup over DLSw+:

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

Related Commands	Command	Description
	dlsw local-peer	Defines the parameters of the DLSw+ local peer.
	dlsw remote-peer tcp	Identifies the IP address of a peer with which to exchange traffic using TCP.
	frame-relay lmi-type	Selects the LMI type.
	frame-relay map llc2	Configures BSTUN over Frame Relay when using Bisync local acknowledgment.
	fras map llc	Associates an LLC connection with a Frame Relay DLCI.
	show fras	Displays notification that the FRAS dial backup over DLSw+ feature is active, information about the connection state in FRAS, and information about current BNN, BAN, and dial backup.
	source-bridge ring-group	Defines or removes a ring group from the configuration.

fras ban

To associate bridging over a Frame Relay network using boundary access node (BAN), use the **fras ban** interface configuration command. 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		
<i>local-ring</i>		Decimal number from 1 to 4095 describing the Token Ring interface.
<i>bridge-number</i>		Decimal number from 1 to 15 that uniquely identifies a bridge connecting two rings.
<i>ring-group</i>		Decimal number from 1 to 4095 representing a collection of Token Ring interfaces on one or more routers.
<i>ban-dlci-mac</i>		Frame Relay BAN PVC MAC address.
dlci <i>dlci#1 [dlci#2 ... dlci#5]</i>		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 <i>mac-addr</i>		(Optional) Boundary node identifier (BNI) MAC address of the NCP that receives frames from the router.

Defaults No default behavior or values.

Command Modes Interface configuration

Command History	Release	Modification
	11.1	This command was introduced.

Usage Guidelines Multiple **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.

Examples

The following example 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

Command	Description
source-bridge ring-group	Defines or removes a ring group from the configuration.

fras ddr-backup

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

fras ddr-backup interface *interface dlc-number*

no fras ddr-backup

Syntax Description	interface <i>interface</i>	Interface over which the backup connection is made.
	<i>dlc-number</i>	DLCI number of the session.

Defaults FRAS DLCI backup is disabled by default.

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

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

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

Related Commands	Command	Description
	show llc2	Displays the LLC2 connections active in the router.
	show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces
	show fras	Displays notification that the FRAS dial backup over DLSw+ feature is active, information about the connection state in FRAS, and information about current BNN, BAN, and dial backup.

fras-host ban

To enable the FRAS Host function for BAN, use the **fras-host ban** interface configuration command. 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		
	<i>(sub)interface</i>	Associated Frame Relay interface or subinterface.
	hmac <i>hmac</i>	MAC address of the CIP adapter or LAN-attached host.
	bni <i>bni</i>	(Optional) Boundary node identifier MAC address. The default <i>bni</i> is 4FFF.0000.0000.

Defaults The FRAS Host function for BAN is disabled for the Frame Relay subinterface. The default *bni* is 4FFF.0000.0000.

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Examples The following example enables the FRAS Host function for BAN:

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

Related Commands	Command	Description
	fras ban	Associates bridging over a Frame Relay network using BAN.
	fras-host bnn	Enables the FRAS Host function for BNN.
	fras-host dlsw-local-ack	Enables LLC2 local termination for FRAS Host connections using the virtual Token Ring.
	interface virtual-tokenring	Creates a virtual Token Ring interface.

fras-host bnn

To enable the FRAS Host function for BNN, use the **fras-host bnn** interface configuration command. 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		
	<i>(sub)interface</i>	Associated Frame Relay interface or subinterface.
	fr-lsap <i>sap</i>	LLC2 service access point (SAP). The destination SAP on inbound BNN frames received from Frame Relay.
	vmac <i>virt-mac</i>	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 <i>hmac</i>	MAC address of the CIP adapter or LAN-attached host.
	hsap <i>hsap</i>	(Optional) Host SAP. If this parameter is not specified, the host SAP value used will match fr-lsap .

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

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Examples 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	Command	Description
	fras-host ban	Enables the FRAS Host function for BAN.
	fras-host dlsw-local-ack	Enables LLC2 local termination for FRAS Host connections using the virtual Token Ring.
	fras map sdlc	Associates an SDLC link with a Frame Relay DLCI.
	interface virtual-tokenring	Creates a virtual Token Ring interface.

fras-host dlsw-local-ack

To enable LLC2 local termination for FRAS Host connections using the virtual Token-Ring, use the **fras-host dlsw-local-ack** interface configuration command. 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.

Defaults The default state is FRAS Host LLC2 local termination disabled.

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

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

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

Related Commands	Command	Description
	dlsw local-peer	Defines the parameters of the DLSw+ local peer.
	fras-host ban	Enables the FRAS Host function for BAN.
	fras-host bnn	Enables the FRAS Host function for BNN.
	interface virtual-tokenring	Creates a virtual Token Ring interface.

fras map llc

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

fras map llc *lan-lsap* **serial** *interface* **frame-relay dlc** *dlci* *fr-rsap*

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

Syntax Description		
	<i>lan-lsap</i>	LLC2 LAN SAP that is the local SAP address of the router.
	serial <i>interface</i>	Serial interface on which Frame Relay is configured.
	frame-relay dlc <i>dlci</i>	Frame Relay DLCI.
	<i>fr-rsap</i>	LLC2 Frame Relay SAP that is the destination SAP of the router on the Frame Relay side.

Defaults The default state is FRAS BNN enhancement is disabled.

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines 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.

Examples 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 dlc 16 04
```

Related Commands	Command	Description
	show fras	Displays notification that the FRAS dial backup over DLSw+ feature is active, information about the connection state in FRAS, and information about current BNN, BAN, and dial backup.
	show llc2	Displays the LLC2 connections active in the router.

fras map sdlc

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

fras map sdlc *sdlc-address* **serial** *port* **frame-relay** *dcli* *fr-lsap* *fr-rsap* [**pfid2** | **afid2** | **fid4**]

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

Syntax Description		
<i>sdlc-address</i>		SDLC address of the downstream SNA device in hexadecimal.
serial <i>port</i>		Serial interface on which Frame Relay is configured.
frame-relay <i>dcli</i>		Frame Relay DLCI.
<i>fr-lsap</i>		Local SAP address of the logical link connection on the Cisco Frame Relay Access Device (CFRAD).
<i>fr-rsap</i>		Destination SAP address on the host.
pfid2		(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.

Defaults No default behavior or values.

Command Modes Interface configuration

Command History	Release	Modification
	10.3	This command was introduced.

Usage Guidelines You can map multiple SDLC links to a DLCI.

Examples 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	Command	Description
	frame-relay map llc2	Configures BSTUN over Frame Relay when using Bisync local acknowledgment.

interface virtual-tokenring

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

interface virtual-tokenring *number*

no interface virtual-tokenring

Syntax Description	<i>number</i>	Number of the virtual Token Ring.
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Defaults	No default behavior or values.
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.2 F	This command was introduced.

Examples The following example configures the virtual Token Ring interface:

```
interface virtual-tokenring 0
```

Related Commands	Command	Description
	source-bridge	Configures an interface for SRB.
	fras ban	Associates bridging over a Frame Relay network using BAN.
	fras-host bnn	Enables the FRAS Host function for BNN.

llc2 dynwind

To enable dynamic window congestion management, use the **llc2 dynwind** interface configuration command. 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 <i>nw-number</i>	(Optional) Specifies a number of frames that must be received to increment the working window value by 1. The default is 4.
dwc <i>dwc-number</i>	(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 Modes Interface configuration

Command History	Release	Modification
	10.3	This command was introduced.

Examples

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

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, use the **show fras** privileged EXEC command.

show fras

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples 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    0000.f63a.2f50   To0   4     4     S     ls_reset (Backup is enabled)
  llc   0000.f63a.2f50   To0   4     4     P     ls_contacted
```

Table 41 describes significant fields shown in the display.

Table 41 *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 41 *show fras* Field Descriptions (continued)

Field	Description
State	<p>Link station protocol machine state. This value may be one of the following states:</p> <ul style="list-style-type: none"> • <code>ls_reset</code>—Initial state. • <code>ls_RqOpnStnSent</code>—TEST frame sent; request to open a connection endpoint. • <code>ls_ExchgXid</code>—XID negotiation taking place. • <code>ls_ConnRqSent</code>—SABME sent (connecting side). • <code>ls_SigStnWait</code>—Waiting for signal to clean up the congestion and respond to polling with an RNR. • <code>ls_ConnRspWait</code>—Wait for the other connection end point to bring up the link. • <code>ls_ConnRspSent</code>—A UA has been sent and the router is waiting for a RR to clear up the flow. • <code>ls_Contacted</code>—Everything is connected • <code>ls_DiscWait</code>—Wait for acknowledge to disconnect request.
Backup is enabled	Notification displayed when the FRAS dial backup feature is configured.

show fras-host

To display the status of LLC2 sessions using FRAS Host, use the **show fras-host** EXEC command.

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

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

Command Modes EXEC

Command History	Release	Modification
	11.2 F	This command was introduced.

Examples

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

PortDLCITypeFrRsapFrLSapHostSapVMacHostMac
Se016BNN0408044000.ABBA.001E4000.3000.2000
Se137BAN0404044000.0223.00194000.3000.2000
```

Table 42 describes significant fields shown in the display.

Table 42 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.

Table 42 *show fras-host Field Descriptions (continued)*

Field	Description
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.
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

Command	Description
fras-host ban	Enables the FRAS Host function for BAN.
fras-host bnn	Enables the FRAS Host function for BNN.
fras-host dlsw-local-ack	Enables LLC2 local termination for FRAS Host connections using the virtual Token Ring.

show fras map

To display the mapping and connection state of FRAS, use the **show fras map** privileged EXEC command.

show fras map

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	10.3	This command was introduced.

Examples 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 43 describes significant fields shown in the display.

Table 43 *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.