

# IBM Network Media Translation Commands

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Use the commands in this chapter to configure and monitor QLLC or SDLLC connections. For QLLC conversion or SDLLC parameter configuration information and examples, refer to the “Configuring IBM Network Media Translation” chapter in the *Router Products Configuration Guide*.

## qllc largest-packet

Use the **qllc largest-packet** interface configuration command to indicate the maximum size of the SNA packet that can be sent or received on an X.25 interface configured for QLLC conversion. Use the **no** form of this command to restore the default largest packet size.

**qllc largest-packet** *virtual-mac-addr max-size*  
**no qllc largest-packet** *virtual-mac-addr max-size*

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration commands. This address is written as a dotted triple of four-digit hexadecimal numbers.
<i>max-size</i>	Maximum size, in bytes, of the SNA packet that can be sent or received on the X.25 interface configured for QLLC conversion. This value agrees with the value configured in the remote SNA device. The valid range is 0 through 1024.

### Default

265 bytes

### Command Mode

Interface configuration

### Usage Guidelines

SNA packets that are larger than the largest value allowed on the X.25 connection and are received on the LLC2 interface are segmented before being sent on the X.25 interface. When a segmented packet is received on the X.25 interface, it is passed immediately to the LLC2 interface, and no effort is made to wait for the segment to be completed.

When the remote X.25 device has a limit on the maximum total length of recombined X.25 segments it will support, you can use the **qllc largest-packet** command to ensure the length is not exceeded. For example, a device whose maximum SNA packet size is limited to 265 bytes might not be able to handle a series of X.25 packets that it has to recombine to make a 4, 8, or 17 KM SNA packet, such as one often encounters in an LLC2 environment.

You use the **qllc largest-packet** command in conjunction with the **x25 map qllc** and **qllc srb** commands.

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**Note** Do not configure the maximum SNA packet size on an X.25 interface to be larger than the maximum SNA packet size allowed on the LLC2 interface.

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Consult your IBM documentation to set the maximum packet size on the remote X.25 device.

## Example

In the following example, the maximum packet size that has been established for the virtual circuit is used as the maximum packet size that can be sent or received on the X.25 interface:

```
interface serial 0
encapsulation x25
x25 address 31102120100
x25 map qllc 0100.0000.0001 31104150101
qllc srb 0100.0000.0001 201 100
!
qllc partner 0100.0000.0001 4000.0101.0132
qllc xid 0100.0000.0001 01720001
qllc largest-packet 0100.0000.0001 521
```

## Related Commands

**qllc srb**

**x25 map qllc**

**x25 pvc qllc**

## qllc npsi-poll

Use the **qllc npsi-poll** interface configuration command to enable a connection between a PU 2.0 on the LAN side and a FEP running NPSI on the X.25 side. Use the **no** form of this command to disable this capability.

```
qllc npsi-poll virtual-mac-addr  
no qllc partner virtual-mac-addr
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration commands. This address is written as a dotted triple of four-digit hexadecimal numbers.
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### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

The **qllc npsi-poll** command is necessary only when the upstream device is a FEP running NPSI and the downstream device is a PU 2.0.

This command is necessary because in a Token Ring or RSRB environment the LAN attached devices start up by sending a null XID packet upstream. If the router forwards this null XID to an X.25-attached FEP, the FEP responds as if it were connecting to an PU2.1 device, and breaks the connection when the PU 2.0 next sends an XID Format 0 Type 2. The **qllc npsi-poll** command intercepts any null XID packet that the router receives on the LAN interface, and returns a null XID response to the downstream device. It continues to allow XID Format 3 and XID Format 0 packets through the X.25 device.

### Example

The following example facilitates a connection between a FEP running NPSI and a downstream PU 2.0.

```
qllc npsi-poll 0100.0000.0001
```

### Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
qllc srb  
sdhc qllc-prtnr †  
x25 map qllc  
x25 pvc qllc
```

## qllc partner

Use the **qllc partner** interface configuration command to enable a router configured for QLLC conversion to open a connection to the local Token Ring device on behalf of the remote X.25 device when an incoming call is received. Use the **no** form of this command to disable this capability.

```
qllc partner virtual-mac-addr mac-addr
no qllc partner virtual-mac-addr mac-addr
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration commands. This address is written as a dotted triple of four-digit hexadecimal numbers.
<i>mac-addr</i>	48-bit MAC address of the Token Ring host that will communicate with the remote X.25 device.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

When the router receives an incoming call from the designated X.121 address, it opens an LLC2 connection with the device at the given MAC address. Both the MAC address of the Token Ring device and the virtual MAC address for the remote X.25 device with which it is to communicate are required in order for the router to initiate connections with the Token Ring device. This allows the Token Ring host to be permanently ready to accept a connection rather than requiring operator action at the host to initiate the connection with the X.25 device.

You must issue the **qllc partner** command for each remote X.25 device that will communicate with the local Token Ring host through this interface.

You use the **qllc partner** command in conjunction with the **x25 map qllc** and **qllc srb** commands.

### Example

In the following example, the **qllc partner** command is used to associate the virtual MAC address 0100.0000.0001, as defined in the previous **x25 map qllc** entry, with the MAC address of the Token Ring host that will communicate with the remote X.25 device:

```
interface serial 0
 encapsulation x25
 x25 address 31102120100
 x25 map qllc 0100.0000.0001 31104150101
 qllc srb 0100.0000.0001 201 100
 !
 qllc partner 0100.0000.0001 4000.0101.0132
 qllc xid 0100.0000.0001 01720001
```

## Related Commands

A dagger (†) indicates that the command is documented in another chapter.

**qllc srb**  
**sdlc qllc-prtnr** †  
**x25 map qllc**  
**x25 pvc qllc**

## qllc sap

Use the **qllc sap** interface configuration command to associate a SAP value other than the default SAP value with a serial interface configured for X.25 communication and QLLC conversion. The **no** form of this command returns this SAP value to its default state.

```
qllc sap virtual-mac-addr ssap dsap
no qllc sap virtual-mac-addr ssap dsap
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration commands. This address is written as a dotted triple of four-digit hexadecimal numbers.
<i>ssap</i>	Source SAP value. It can be a decimal number in the range 2 through 254.
<i>dsap</i>	Destination SAP value. It can be a decimal number in the range 2 through 254.

### Default

The default source SAP value is 04.  
The default destination SAP value is 04.

### Command Mode

Interface configuration

### Usage Guidelines

A SAP can be viewed as a port through which a higher-layer application can communicate with its counterpart (peer) operating on another system. While the standard SAP value for IBM devices is 04, other values are allowed.

You use the **qllc sap** command in conjunction with the **x25 map qllc** and **qllc srb** interface configuration commands.

### Example

In the following example, source SAP and destination SAP values of 02 are specified for the remote X.25 device at the X.121 address 31370054065:

```
interface serial 0
x25 map qllc 31370054065 4000.0122.0001
qllc srb 9 100
qllc sap 4000.0122.0001 02 02
```

Related Commands

**qlc srb**

**x25 map qlc**

**x25 pvc qlc**

## qllc srb

Use the **qllc srb** interface configuration command to enable the use of QLLC conversion on a serial interface configured for X.25 communication. The **no** version of this command disables QLLC conversion on the interface.

```
qllc srb virtual-mac-addr srn trn  
no qllc srb srn trn
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration commands. It can be 1 to 15 digits long.
<i>srn</i>	Source ring number. This value defines a virtual ring for all of the remote X.25 devices attached to the QLLC interface. Any number of QLLC conversion connections using the same X.25 serial interface can share a common source ring. However, this source ring must be a unique hexadecimal ring number within the source-bridged network.
<i>trn</i>	Target ring number. It must be a virtual ring group that has been defined with the <b>source-bridge ring-group</b> global configuration command. If the router has only one Token Ring interface and is bridging from the remote X.25 devices to this interface, then <i>trn</i> is the number of the ring on that Token Ring interface. If the router has several Token Ring interfaces and interconnects them by means of the <b>source-bridge ring-group</b> command, then <i>trn</i> is the number of that virtual ring group, as assigned using the <b>source-bridge ring-group</b> global configuration command.

### Default

QLLC conversion is not enabled.

### Command Mode

Interface configuration

### Usage Guidelines

Use the **qllc srb** command to associate the ring number and bridge number that have been assigned to the interface with a virtual ring group of which the interface will be a part. The serial interface appears to be a ring, or source ring number, on a source-route bridge network, and ties in to the virtual ring group, or target ring number. The target ring number provides access to other real rings that have been designated using the **source-bridge** global configuration command. Note that you can configure QLLC conversion on a router containing no Token Ring interface cards, such as a router connecting a serial-attached device to an X.25 PDN.

The **qlc srb** command automatically turns on the LLC2 process with default values. To change any of the LLC2 parameters (described in the “LLC2 and SDLC Commands” chapter), apply their values to the serial interface that has been configured for QLLC conversion. This is done on the serial interface, even though LLC2 does not technically run on the serial interface, but on the virtual ring associated with the serial interface.

You use the **qlc srb** command in conjunction with the **x25 map qlc** command.

### Example

In the following example, the **qlc srb** command is used to define a virtual ring number of 201 for the remote X.25 device, and an actual or virtual ring number of 100 for the Token Ring interface:

```
interface serial 0
encapsulation x25
x25 address 31102120100
x25 map qlc 0100.0000.0001 31104150101
qlc srb 0100.0000.0001 201 100
```

### Related Commands

**source-bridge**  
**source-bridge ring-group**  
**x25 map qlc**  
**x25 pvc qlc**

## qllc xid

Use the **qllc xid interface configuration** command to associate an XID value with the remote X.25 device that communicates through the router using QLLC conversion. The **no** form of this command disables XID processing for this address.

```
qllc xid virtual-mac-addr xid
no qllc xid virtual-mac-addr xid
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address associated with the remote X.25 device, as defined using the <b>x25 map qllc</b> or <b>x25 pvc qllc</b> interface configuration command. This address is written as a dotted triple of four-digit hexadecimal numbers.
<i>xid</i>	Combined XID IDBLK and XID IDNUM you are associating with the X.25 device at this X.121 address. This hexadecimal value must be four bytes (eight digits) in length.

### Default

XID processing is not enabled.

### Command Mode

Interface configuration

### Usage Guidelines

Most QLLC installations do not need the **qllc xid** configuration command. It is only needed if the remote X.25 device is not configured to send its own XID. This is only possible for a device that is attached via a PVC. Even so, most devices that are connected via X.25 will send their own XIDs. Use the **qllc xid** command when the Token Ring host requires login validation for security purposes and the remote X.25 device does not send an XID. The XID value is used to reply to XID requests received on the Token Ring (LLC2) side of the connection. XID requests and responses are usually exchanged before sessions are started. The XID response to the XID request from the Token Ring host will contain the information you configure using the **qllc xid** command. The host will check the XID response it receives with the IDBLK and IDNUM parameters (configured in VTAM). If they match, the Token Ring host will initiate a session with the router. If they do not match, the host will not initiate a session with the router.

You use the **qllc xid** command in conjunction with the **x25 map qllc** and the **qllc srb** commands.

### Example

In the following example, the X.25 device at X.121 address 31104150101 must use an XID IDBLK of 017 and XID IDNUM of 20001 to access the Token Ring host whose MAC address is associated with the remote X.25 device, as applied using the **sdllc partner** command:

```
interface serial 0
 encapsulation x25
 x25 address 31102120100
 x25 map qllc 0100.0000.0001 31104150101
```

```
qlc srb 0100.0000.0001 201 100
!  
qlc partner 0100.0000.0001 4000.0101.0132  
qlc xid 0100.0000.0001 01720001
```

### Related Commands

**qlc srb**  
**x25 map qlc**  
**x25 pvc qlc**

## sdlc partner

Use the **sdlc partner** interface configuration command to enable device-initiated connections for SDLLC. This command must be specified for the serial interface that links to the serial line device. Use the **no** form of this command to cancel the original instruction.

```
sdlc partner mac-address sdlc-address
no sdlc partner mac-address sdlc-address
```

### Syntax Description

<i>mac-address</i>	48-bit MAC address of the Token Ring host.
<i>sdlc-address</i>	SDLC address of the serial device that will communicate with the Token Ring host.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

Both the MAC address of the Token Ring host and the SDLC serial line address are required to initiate connections with the Token Ring host.

The Token Ring host and the serial device communicate with each other through the router. Although the device is said to initiate connections, the router actually initiates connections with the Token Ring host on behalf of the serial device. As part of Cisco's SDLLC implementation, the serial device "thinks" that it is communicating with a host also on a serial line. It is actually the router that does all the frame and protocol conversions between serial and Token Ring devices.

There are two conditions under which a router will attempt to initiate a connection to a host on behalf of a serial device:

- When the serial device attached to the router is powered on. In this case, the router attached to the serial line detects a change in interface signals and initiates a connection with the Token Ring hosts by exchanging explorer and eXchange ID (XID) packets.
- When a previously shut down serial interface is brought back on-line. When the **no shutdown** command is issued, the router will detect a change in the serial line state from down to up and initiate a session with the Token Ring host by exchanging explorer and XID packets.

The router will continue trying once a minute to initiate a connection whenever one of these two conditions is met, until the host responds to its requests. When you no longer want the router to initiate connections with a host, use the **no sdlc partner** command.

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**Note** For device-initiated sessions, the host will check the IDBLK and IDNUM parameters of the serial device it receives in the XID packet against the information configured on the host. If the information in the XID packet does not match with what is configured on the host, the host will drop the session. Therefore, for device-initiated connections, always specify the correct IDBLK and IDNUM parameters on the router serial interfaces with the **sdllc xid** command.

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### Example

In the following example, a serial device at SDLC address c2 wants to initiate a connection with a Token Ring host at MAC address 4000.0122.0001. The router initiates the connection on behalf of a serial device:

```
! sample global command
source-bridge ring-group 100
!
interface serial 0
! router initiates connections with Token Ring host at MAC address
! 4000.0122.0001 on behalf of serial device c2
sdllc partner 4000.0122.0001 c2
```

### Related Command

**sdllc xid**

## sdllc ring-largest-frame

Use the **sdllc ring-largest-frame** interface configuration command to indicate the largest I-frame size that can be sent to or received from the LLC2 primary station. Use the **no** form of this command to return to the default.

**sdllc ring-largest-frame** *value*  
**no sdllc ring-largest-frame** *value*

### Syntax Description

*value* Frame size in bytes. Possible values include 516, 1500, 2052, 4472, 8144, 11407, and 17800.

### Default

516 bytes

### Command Mode

Interface configuration

### Usage Guidelines

Possible values for the *value* argument match those that are possible for the **If size** of the various **source-bridge remote-peer** commands. You must ensure that your remote peer connection can support this largest frame size. Possible values for the *value* argument include 516, 1500, 2052, 4472, 8144, 11407, and 17800.

Faster screen updates to 3278-style terminals often can be obtained by allowing the Token Ring FEP to send as large a frame as possible and by allowing the router to segment the frame into multiple SDLC I-frames.

### Example

In the following example, the router can send or receive a frame as large as 11407 bytes from the LLC2 primary station. Any frames larger will be fragmented by the router:

```
! sample global command
source-bridge ring-group 100
!
interface serial 3
! largest frame sent or received on serial 3 is 11407 bytes
sdllc ring-largest-frame 11407
```

### Related Commands

**source-bridge remote-peer fst**  
**source-bridge remote-peer interface**  
**source-bridge remote-peer tcp**

## sdlc sap

Use the **sdlc sap** interface configuration command to associate a service access point (SAP) value other than the default SAP value with a serial interface configured for SDLLC. Use the **no** form of this command to return this SAP value to its default state.

```
sdlc sap sdlc-address ssap dsap  
no sdlc sap sdlc-address ssap dsap
```

### Syntax

<i>sdlc-address</i>	Virtual MAC address associated with the remote SDLC device.
<i>ssap</i>	Source SAP value. It must be in the range 1 through 254.
<i>dsap</i>	Destination SAP value. It must be in the range 1 through 254.

### Default

The default SAP value for IBM SNA devices is 4.

### Command Mode

Interface configuration

### Usage Guidelines

You use the **sdlc sap** command in conjunction with the **sdlc traddr** interface configuration commands. A SAP can be viewed as a port through which a higher-layer application can communicate with its counterpart (peer) operating on another system. While the standard SAP value for IBM SNA devices is 4, and NetBIOS devices is xF0, other values are allowed.

### Example

In the following example, source SAP and destination SAP values of 2 are specified for the remote SDLC device at the SDLC address C1 02 02:

```
interface Serial0  
sdlc sap C1 02 02
```

### Related Command

**sdlc traddr**

## sdllc sdlc-largest-frame

Use the **sdllc sdlc-largest-frame** interface configuration command to indicate the largest information frame (I-frame) size that can be sent or received by the designated SDLC station. Use the **no** form of this command to return to the default value.

```
sdllc sdlc-largest-frame address value  
no sdllc sdlc-largest-frame address value
```

### Syntax Description

<i>address</i>	Address of the SDLC station that will communicate with the Token Ring host.
<i>value</i>	Largest frame size that can be sent or received by this SDLC station.

### Default

265 bytes

### Command Mode

Interface configuration

### Usage Guidelines

Most SDLC devices are limited to frames of 265 bytes. I-frames received from the Token Ring station that are larger than this size will be properly fragmented.

### Example

In the following example, the router can send or receive a frame as large as 265 bytes (the default) from the SDLC station at address c6. Any frames larger will be fragmented by the router.

```
! sample global command  
source-bridge ring-group 100  
!  
interface serial 4  
! largest frame sent or received on serial 4 is 265 bytes  
sdllc sdlc-largest-frame c6 265
```

## sdllc traddr

Use the **sdllc traddr** interface configuration command to enable the use of SDLLC media translation on a serial interface. The address specified is a MAC address to be assigned to the serial station. Use the **no** form of this command to disable SDLLC media translation on the interface.

```
sdllc traddr xxxx.xxxx.xx00 lr bn tr
no sdllc traddr xxxx.xxxx.xx00 lr bn tr
```

### Syntax Description

<i>xxxx.xxxx.xx00</i>	MAC address to be assigned to the serial interface.
<i>lr</i>	SDLLC virtual ring number.
<i>bn</i>	SDLLC bridge number.
<i>tr</i>	SDLLC target ring number.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

Every control unit hooked off the serial line requires a virtual Token Ring MAC address (VTRA). This usually is assigned by the system administrator as a locally administered address (unique across the network).

When you enable SDLLC Media Translation by specifying the **sdllc traddr** command on a serial interface, you must specify a virtual Token Ring address (VTRA) for each serial station attached to the serial line. The last two hexadecimal digits. (that is, the last byte) of the VTRA *must* be 00. The router uses this byte to represent the SDLC address of a station on the serial link. That is, addresses in the range *xxxx.xxxx.xx00* to *xxxx.xxxx.xxFF* are reserved for use by the router. It is very important that you adhere to this addressing requirement. If you do not, there may be a conflict between the VTRA and the addresses reserved by the router for the SDLC link.

The variables *lr*, *bn*, and *tr* represent the SDLLC virtual ring number, bridge number, and target ring number, respectively, that you assign to the interface. In design, the serial interface appears to be a ring, *lr*, on a source-route bridged network, and ties in through the bridge, *bn*, to the virtual ring-group, *tr*. This provides access to other, real rings through remote source-route bridging **source-bridge remote-peer** commands. Note that SDLLC can be configured on a router containing no Token Ring interface cards.

The **sdllc traddr** command automatically turns on the LLC2 process with default values. To change any of the LLC2 parameters, specify their values on the serial interface that is being enabled for SDLLC. This is done on the serial interface, even though LLC2 does not technically run on the serial interface, but on the SDLLC virtual ring associated with the serial interface. LLC2 commands can be configured after specifying the **sdllc traddr** command.

## Example

In the following example, SDLLC media translation is enabled off the serial 0 interface to a serial station at MAC address 0110.2222.3300. The SDLLC virtual ring number is 8, the bridge number is 1, and the target ring number is 100:

```
! global command to apply commands to the ring group
source-bridge ring-group 100
! remote peer at IP address 131.108.1.1 belongs to ring group 100 and uses
! tcp as the transport
source-bridge remote-peer 100 tcp 131.108.1.1
source-bridge remote-peer 100 tcp 131.108.2.2
!
interface serial 0
encapsulation sdllc-primary
! establish address of SDLC station off serial-0 as c1
sdllc address c1
! enable SDLLC media translation to serial station 0110.2222.3300
! on virtual ring 8, bridge 1, to target ring 100
sdllc traddr 0110.2222.3300 8 1 100
```

## Related Commands

**sdllc sap**

**source-bridge remote-peer fst**

**source-bridge remote-peer interface**

**source-bridge remote-peer tcp**

## sdlc xid

Use the **sdlc xid** interface configuration command to specify an eXchanged ID (XID) value appropriate for the designated SDLC station associated with this serial interface. Use the **no** form of this command to disable XID processing for this address.

```
sdlc xid address xxxxxxxx  
no sdlc xid address xxxxxxxx
```

### Syntax Description

<i>address</i>	Address of the SDLC station associated with this interface.
<i>xxxxxxx</i>	XID the router will use to respond to XID requests the router receives on the Token Ring (LLC2) side of the connection. This value must be 4 bytes (8 digits) in length and is specified with hexadecimal digits.

### Default

Disabled

### Command Mode

Interface configuration

### Usage Guidelines

XID requests and responses are usually exchanged before sessions are started. Be sure that the XID value configured on the router matches the IDBLK and IDNUM parameters configured on the host. The XID response to an XID request from the Token Ring host will contain the information you configured in the **sdlc xid** command. The host will check the XID response it receives with the IDBLK and IDNUM parameters (that are configured in the VTAM). If they match, the Token Ring host will initiate a session with the router. If they do not match, the host will not initiate a session with the router.

### Example

The following example specifies an XID value of 01720002 at address c2:

```
! sample global command  
source-bridge ring-group 100  
!  
interface serial 0  
! sdlc exchange identification value of 01720002 at address c2  
sdlc xid c2 01720002
```

### Related Command

**sdlc partner**

## show interfaces

Use the **show interfaces** privileged EXEC command to display the SDLC information for a given SDLC interface.

### show interfaces

### Syntax Description

This command has no arguments or keywords.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output from the **show interfaces** command for an SDLC primary interface supporting the SDLLC function:

```
Router# show interfaces

Serial 0 is up, line protocol is up
Hardware is MCI Serial
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation SDLC-PRIMARY, loopback not set
  Timers (msec): poll pause 100 fair poll 500. Poll limit 1
  [T1 3000, N1 12016, N2 20, K 7] timer: 56608 Last polled device: none
  SDLLC [ma: 0000.0C01.14--, ring: 7 bridge: 1, target ring: 10
    largest token ring frame 2052]
SDLC addr C1 state is CONNECT
  VS 6, VR 3, RCNT 0, Remote VR 6, Current retransmit count 0
  Hold queue: 0/12 IFRAMES 77/22 RNRs 0/0 SNRMs 1/0 DISCs 0/0
  Poll: clear, Poll count: 0, chain: p: C1 n: C1
  SDLLC [largest SDLC frame: 265, XID: disabled]
Last input 00:00:02, output 00:00:01, output hang never
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
Five minute input rate 517 bits/sec, 30 packets/sec
Five minute output rate 672 bits/sec, 20 packets/sec
  357 packets input, 28382 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  926 packets output, 77274 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets, 0 restarts
  2 carrier transitions
```

Table 29-1 shows the fields relevant to all SDLC connections.

**Table 29-1 Show Interfaces Serial Fields and Descriptions when SDLC is Enabled**

Field	Description
Timers (msec)	List of timers in milliseconds.
poll pause, fair poll, Poll limit	Current values of these timers, as described in the individual commands in this chapter.
T1, N1, N2, K	Current values for these variables, as described in the individual commands in this chapter.

Table 29-2 shows other data given for each SDLC secondary configured to be attached to this interface.

**Table 29-2 SDLC Field Descriptions**

Field	Description
addr	Address of this secondary.
State	Current state of this connection. The possible values are: <ul style="list-style-type: none"> <li>• DISCONNECT—No communication is being attempted to this secondary.</li> <li>• CONNECT—A normal connect state exists between this router and this secondary.</li> <li>• DISCSENT—This router has sent a disconnect request to this secondary and is awaiting its response.</li> <li>• SNRMSENT—This router has sent a connect request (SNRM) to this secondary and is awaiting its response.</li> <li>• THEMBUSY—This secondary has told this router that it is temporarily unable to receive any more information frames.</li> <li>• USBUSY—This router has told this secondary that it is temporarily unable to receive any more information frames.</li> <li>• BOTHBUSY—Both sides have told each other that they are temporarily unable to receive any more information frames.</li> <li>• ERROR—This router has detected an error, and is waiting for a response from the secondary acknowledging this.</li> </ul>
VS	Sequence number of the next information frame this station sends.
VR	Sequence number of the next information frame from this secondary that this station expects to receive.
RCNT	Number of correctly sequenced I-frames received when the router was in a state in which it is acceptable to receive I-frames.
Remote VR	Last frame transmitted by this station that has been acknowledged by the other station.
Current retransmit count	Number of times the current I-frame or sequence of I-frames has been retransmitted.
Hold queue:	Number of frames in hold queue/Maximum size of hold queue.
IFRAMEs, RNRs, SNRMs, DISCs	Sent/received count for these frames.
Poll:	“Set” if this router has a poll outstanding to the secondary; “clear” if it does not.
Poll count:	Number of polls, in a row, given to this secondary at this time.
chain:	Shows the previous (p) and next (n) secondary address on this interface in the round robin loop of polled devices.

## show qllc

Use the **show qllc** EXEC command to display the current state of any QLLC connections.

```
show qllc
```

### Syntax Description

This command has no arguments or keywords.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output from the **show qllc** command.

```
Router# show qllc

QLLC Connections:
Serial2: 1000.5a35.3a4f->1000.5a59.04f9. SAPs 4 4. Rings Src 200, Tgt 100.
State Connect
Remote DTE 1002. QLLC Protocol State NORMAL lci 1 (PVC)
```

In the display, the first two lines of the **show qllc** command show that there is a QLLC session between a Token Ring device and an X.25 remote device. The X.25 device has a virtual MAC address of 1000.5a35.3a4f with a SAP of 04. It is using a PVC with logical channel number 1. The Token Ring device has a MAC address of 1000.5a59.04f9 with a SAP of 04. The state of the QLLC session is CONNECTED.

Table 29-3 describes the fields shown in the display.

**Table 29-3 Show QLLC Field Descriptions**

Field	Description
Serial2	Serial interface for the X.25 link.
1000.5a35.3a4f	Virtual MAC address for the X.25 attached device.
1000.5a59.04f9	MAC address of the Token Ring attached device with which the X.25 attached device is communicating. This device might be on a local Token Ring or attached via SRB or RSRB.
SAPs 4 4	Source SAP value at the virtual MAC address and destination SAP value at the Token Ring station.
Rings Src 200	Ring number for the source virtual ring defined by the <b>qllc srb</b> command.
Tgt 100	Ring number for the target virtual ring defined by the <b>source-bridge ring-group</b> command.
<b>State</b>	State of the QLLC-LLC2 conversion. This can be any of the following:
DISCONNECT	No connection exists.
NET DISC WAIT	The X.25 device is disconnecting. The QLLC conversion is waiting for the Token Ring device to disconnect.
QLLC DISC WAIT	The Token Ring device is disconnecting. The QLLC conversion is waiting for the X.25 device to disconnect.
QLLC PRI WAIT	Connection is being established. The Token Ring device is ready to complete the connection, and the router is establishing the QLLC connection with the X.25 device.

<b>Field</b>	<b>Description</b>
NET CONTACT REPLY WAIT	Remote X.25 device is a FEP, and has made contact with the router. The router is attempting to reach Token Ring device.
QLLC SEC WAIT	Connection is being established.
NET UP WAIT	Connection is being established. QLLC connection to X.25 device has been established; awaiting completion on the connection to the Token Ring attached device.
CONNECT	Connections from the router to X.25 and Token Ring devices are established. Data can flow end to end.
Remote DTE 1002	X.121 address of X.25 connected device.
QLLC Protocol State	State of the QLLC protocol between the router and the X.25 attached device. These states are different from the state of the underlying X.25 virtual circuit. The following are possible values:
ADM	Asynchronous Disconnected Mode.
SETUP	Router has initiated QLLC connection, awaiting confirmation from the X.25 device.
RESET	Router has initiated QLLC Reset, awaiting confirmation from the X.25 device.
DISCONNECTING	Router has initiated QLLC Disconnect, awaiting confirmation from the X.25 device.
NORMAL	QLLC connection has been completed. SNA data can be transmitted and received.
lci 1 (PVC)	Logical channel number used on the X.25 interface.

## show sdllc local-ack

Use the **show sdllc local-ack** privileged EXEC command to display the current state of any current Local Acknowledgment connections, as well as any configured Passthrough Rings.

**show sdllc local-ack**

### Syntax Description

This command has no arguments or keywords.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output from the **show sdllc local-ack** command:

```
Router# show sdllc local-ack

local 1000.5a59.04f9, lsap 04, remote 4000.2222.4444, dsap 04
llc2 = 1798136, local act state = connected
Passthrough Rings: 4 7
```

In the display, the first two lines of the **show sdllc local-ack** command show that there is a Local Acknowledgment session between two Token Ring devices. The device on the local ring has a MAC address of 1000.5a59.04f9 with a SAP of 04. The remote device has a MAC address of 4000.2222.4444 with a SAP of 04. The state of the Local Acknowledgment session is connected.

The Passthrough Rings display is independent of the rest of the **show sdllc local-ack** command. The Passthrough Rings display indicates that there are two rings, 4 and 7, configured for Passthrough. This means that stations on these rings will not have their sessions locally acknowledged but will instead have their acknowledgments end-to-end.

Table 29-4 describes significant fields shown in the display.

**Table 29-4 Show SDLLC Local-Ack Field Descriptions**

Field	Description
local	MAC address of the local Token Ring station with which the router has the LLC2 session.
lsap	Local SAP value of the Token Ring station with which the router has the LLC2 session.
remote	MAC address of the remote Token Ring station on whose behalf the router is providing acknowledgments. The remote Token Ring station is separated from the router via the TCP backbone.
dsap	Destination SAP value of the remote Token Ring station on whose behalf the router is providing acknowledgments.
llc2	Pointer to an internal data structure used by technical support staff for debugging.

**show sdlc local-ack**

---

<b>Field</b>	<b>Description</b>
local-ack state:	The current state. Possible values are as follows: <ul style="list-style-type: none"><li>• disconnected—No session between the two end hosts.</li><li>• connected—Full data transfer possible between the two end hosts.</li><li>• awaiting connect—This router is waiting for the other end to confirm a session establishment with the remote host.</li></ul>
Passthrough Rings	Ring number of the start ring and destination ring for the two IBM machines when you do not have local acknowledgment for LLC2 configured for your routers using RSRB.

## source-bridge fst-peername

Use the **source-bridge fst-peername** global configuration command to set up a Fast-Sequenced Transport (FST) peer name. Use the **no** form of this command to disable the IP address assignment.

**source-bridge fst-peername** *local-interface-address*  
**no source-bridge fst-peername** *local-interface-address*

### Syntax Description

*local-interface-address*            IP address to assign to the local router.

### Default

Disabled

### Command Mode

Global configuration

### Usage Guidelines

Using this command is the first step to configuring a remote source-route bridge to use FST.

### Example

The following example shows the use of the **source-bridge fst-peername** command:

```
source-bridge fst-peername 150.136.64.98
```

### Related Command

**source-bridge remote-peer fst**

## source-bridge qlc-local-ack

Use the **source-bridge qlc-local-ack** global configuration command to enable or disable QLLC local acknowledgment for all of the router's QLLC conversion connection. The **no** form of this command disables this capability.

**source-bridge qlc-local-ack**  
**no source-bridge qlc-local-ack**

### Syntax Description

This command has no arguments or keywords.

### Default

QLLC local acknowledgment is disabled.

### Command Mode

Global configuration

### Usage Guidelines

In a remote source-route bridged topology, QLLC local acknowledgment is used to configure the QLLC conversion router (connecting the remote X.25 devices) to exchange local acknowledgment information with the Token Ring router (on the Token Ring side of the cloud). (This Token Ring router has been configured for LLC2 local acknowledgment using the **source-bridge remote peer tcp local-ack** command.)

You only have to issue the **source-bridge qlc-local-ack** command on the QLLC conversion router. When this command is issued, all of the router's QLLC conversion sessions are locally acknowledged at the Token Ring interface of the Token Ring router with which it is communicating using QLLC conversion.

### Example

The following configuration indicates that the local router (131.108.2.2) QLLC conversion sessions will be locally acknowledged at the remote router:

```
source-bridge ring-group 100
source-bridge remote-peer 100 tcp 131.108.1.1 local-ack
source-bridge remote-peer 100 tcp 131.108.2.2
source-bridge qlc-local-ack
```

### Related Command

**source-bridge ring-group**

## source-bridge remote-peer fst

Use the **source-bridge remote-peer fst** global configuration command to specify a Fast-Sequenced Transport (FST) encapsulation connection. Use the **no** form of this command to disable the previous assignments.

```
source-bridge remote-peer ring-group fst ip-address [if size] [version number]  
no source-bridge remote-peer ring-group fst ip-address
```

### Syntax Description

<i>ring-group</i>	Ring group number. This ring group number must match the number you have specified with the <b>source-bridge ring-group</b> command. The valid range is 1 through 4095.
<i>ip-address</i>	IP address of the remote peer with which the router will communicate.
<b>if</b> <i>size</i>	(Optional) Maximum size frame to be sent to this remote peer. The router negotiates all transit routes down to this size or lower. Use this argument to prevent timeouts in end hosts by reducing the amount of data they have to transmit in a fixed interval. The legal values for this argument are 516, 1500, 2052, 4472, 8144, 11407, and 17800 bytes.
<b>version</b> <i>number</i>	(Optional) Forces RSRB protocol version number for the remote peer. Because all FST peers support version 2 RSRB, the <b>version</b> keyword is always specified.

### Default

No FST encapsulation connection is specified.

### Command Mode

Global configuration

### Usage Guidelines

The two peers using the serial-transport method will only function correctly if there are routers/bridges at the end of the serial line that have been configured to use the serial transport. The peers must also belong to the same ring group.

### Example

In the following example the **source-bridge fst-peername** command specifies an IP address of 150.136.64.98 for the local router. The **source-bridge ring-group** command assigns the router to a ring group. The **source-bridge remote-peer fst** command specifies ring group number 100 for the remote peer at IP address 150.136.64.97.

```
source-bridge fst-peername 150.136.64.98
source-bridge ring-group 100
source-bridge remote-peer 100 fst 150.136.64.97 version 2 RSRB
```

### Related Commands

**source-bridge**

**source-bridge fst-peername**

**source-bridge remote-peer interface**

**source-bridge remote-peer tcp**

## source-bridge remote-peer interface

Use the **source-bridge remote-peer interface** global configuration command when specifying a point-to-point direct encapsulation connection. Use the **no** form of this command to disable previous interface assignments.

```
source-bridge remote-peer ring-group interface interface-name [mac-address] [If size]  
no source-bridge remote-peer ring-group interface interface-name
```

### Syntax Description

<i>ring-group</i>	Ring group number. This ring group number must match the number you have specified with the <b>source-bridge ring-group</b> command. The valid range is 1 through 4095.
<i>interface-name</i>	Name of the router's serial interface over which to send source-route bridged traffic.
<i>mac-address</i>	(Optional) MAC address for the interface you specify using the <i>interface-name</i> argument. This argument is required for nonserial interfaces. You can obtain the value of this MAC address by using the <b>show interfaces</b> command, and then scanning the display for the interface specified by <i>interface-name</i> .
<b>If</b> <i>size</i>	(Optional) Maximum size frame to be sent to this remote peer. The router negotiates all transit routes down to this size or lower. This argument is useful in preventing timeouts in end hosts by reducing the amount of data they have to transmit in a fixed interval. The legal values for this argument are 516, 1500, 2052, 4472, 8144, 11407, and 17800 bytes.

### Default

No point-to-point direct encapsulation connection is specified.

### Command Mode

Global configuration

### Usage Guidelines

Use this command to identify the interface over which to send source-route bridged traffic to another router/bridge in the ring group. A serial interface does not require that you include a MAC-level address; all other types of interfaces do require MAC addresses.

It is possible to mix all types of transport methods within the same ring group.

---

**Note** The two peers using the serial-transport method will only function correctly if there are routers/bridges at the end of the serial line that have been configured to use the serial transport. The peers must also belong to the same ring group.

---

### Example

The following example shows how to send source-route bridged traffic over interfaces serial 0 and Ethernet 0:

```
! send source-route bridged traffic over serial 0
source-bridge remote-peer 5 interface serial 0
! specify MAC address for source-route bridged traffic on Ethernet 0
source-bridge remote-peer 5 interface Ethernet 0 0000.0c00.1234
```

### Related Commands

**show interfaces**

**source-bridge remote-peer tcp**

**source-bridge remote-peer tcp**

## source-bridge remote-peer tcp

Use the **source-bridge remote-peer tcp** global configuration command to identify the IP address of a peer in the ring group with which to exchange source-bridge traffic using TCP. Use the **no** form of this command to remove a remote peer for the specified ring group.

```
source-bridge remote-peer ring-group tcp ip-address [If size] [local-ack] [priority]
no source-bridge remote-peer ring-group tcp ip-address
```

### Syntax Description

<i>ring-group</i>	Ring group number. This ring group number must match the number you have specified with the <b>source-bridge ring-group</b> command. The valid range is 1 through 4095.
<i>ip-address</i>	IP address of the remote peer with which the router will communicate.
<b>If</b> <i>size</i>	(Optional) Maximum size frame to be sent to this remote peer. The router negotiates all transit routes down to this size or lower. Use this argument to prevent timeouts in end hosts by reducing the amount of data they have to transmit in a fixed interval. The valid values for this argument are 516, 1500, 2052, 4472, 8144, 11407, and 17800 bytes.
<b>local-ack</b>	(Optional) LLC2 sessions destined for a specific remote peer are to be locally terminated and acknowledged. Local Acknowledgment should be used for LLC2 sessions going to this remote peer.
<b>priority</b>	(Optional) Enables prioritization over a TCP network. You must specify the keyword <b>local-ack</b> earlier in the same <b>source-bridge remote-peer</b> command. The keyword <b>priority</b> is a prerequisite for features such as SNA class of service and SNA LU address prioritization over a TCP network.

### Default

No IP address is identified.

### Command Mode

Global configuration

### Usage Guidelines

If you configure one peer for LLC2 local acknowledgment, you need to configure both peers for LLC2 local acknowledgment. If only one peer is so configured, unpredictable (and undesirable) results will occur.

The two peers using the serial-transport method will only function correctly if there are routers/bridges at the end of the serial line that have been configured to use the serial transport. The peers must also belong to the same ring group.

### Example

In the following example, the remote peer with IP address 131.108.2.291 belongs to ring group 5. It also uses LLC2 Local Acknowledgment, priority, and RSRB protocol version 2:

```
! identify the ring group as 5
source-bridge ring-group 5
! remote peer at IP address 131.108.2.291 belongs to ring group 5, uses
! tcp as the transport, is set up for local acknowledgment, uses
! priority, and uses RSRB protocol form of this command 2
source-bridge remote-peer 5 tcp 131.108.2.291 local-ack priority form of this command 2
```

The following example shows how to locally administer and acknowledge LLC2 sessions destined for a specific remote peer:

```
! identify the ring group as 100
source-bridge ring-group 100
! remote peer at IP address 1.1.1.1 does not use local acknowledgment
source-bridge remote-peer 100 tcp 1.1.1.1
! remote peer at IP address 1.1.1.2 uses local acknowledgment
source-bridge remote-peer 100 tcp 1.1.1.2 local-ack
!
interface tokenring 0
source-bridge 1 1 100
```

Sessions between a device on Token Ring 0 that must go through remote peer 1.1.1.2 use local acknowledgment for LLC2, but sessions that go through remote peer 1.1.1.1 do *not* use local acknowledgment (that is, they “pass through”).

### Related Commands

**source-bridge remote-peer fst**

**source-bridge remote-peer interface**

## source-bridge ring-group

Use the **source-bridge ring-group** global configuration command to define or remove a ring group from the router configuration. Use the **no** form of this command to cancel previous assignments.

```
source-bridge ring-group ring-group  
no source-bridge ring-group ring-group
```

### Syntax Description

*ring-group* Ring group number. The valid range is 1 through 4095.

### Default

No ring group is defined.

### Command Mode

Global configuration

### Usage Guidelines

To configure a source-route bridge with more than two network interfaces, the *ring-group* concept is used. A ring group is a collection of Token Ring interfaces in one or more routers that are collectively treated as a virtual ring. The ring group is denoted by a ring number that must be unique for the network. The ring group's number is used just like a physical ring number, showing up in any route descriptors contained in packets being bridged.

To configure a specific interface as part of a ring group, its target ring number parameter is set to the ring group number specified in this command. You should not use the number 0, because it is reserved to represent the local ring.

### Example

In the following example, multiple Token Rings are source-route bridged to one another through a single router/bridge. These Token Rings are all part of ring group 7.

```
! all token rings attached to this bridge/router are part of ring group 7  
source-bridge ring-group 7  
!  
interface tokenring 0  
source-bridge 1000 1 7  
!  
interface tokenring 1  
source-bridge 1001 1 7  
!  
interface tokenring 2  
source-bridge 1002 1 7  
!  
interface tokenring 3  
source-bridge 1003 1 7
```

### Related Command

**source-bridge**

## source-bridge sdllc-local-ack

Use the **source-bridge sdllc-local-ack** global configuration command to activate local acknowledgment for SDLLC sessions on a particular interface. Use the **no** form of this command to deactivate local acknowledgment for SDLLC sessions.

**source-bridge sdllc-local-ack**  
**no source-bridge sdllc-local-ack**

### Syntax Description

This command has no keywords or arguments.

### Default

Disabled

### Command Mode

Global configuration

### Usage Guidelines

This command must be issued only on the router with the serial interface(s). Once the command is issued, *all* SDLLC sessions between the two routers will be locally acknowledged. You cannot selectively choose which SDLLC sessions are to be locally acknowledged and which are not. Also, local acknowledgment is not supported when the LLC2 station is attached to Ethernet rather than to Token Ring.

---

**Note** You must use the TCP encapsulation option if you use local acknowledgment for SDLLC.

---

### Example

The following example activates local acknowledgment for SDLLC sessions:

```
source-bridge ring-group 100
source-bridge remote-peer 100 tcp 131.108.1.1 local-ack
source-bridge remote-peer 100 tcp 131.108.2.2

source-bridge sdllc-local-ack
```

## x25 map qllc

Use the **x25 map qllc** interface configuration command to specify the X.121 address of the remote X.25 device with which you plan to communicate using QLLC conversion. The **no** form of this command disables QLLC conversion to this X.121 address.

```
x25 map qllc virtual-mac-addr x121-addr [x25-map-options]
no x25 map qllc virtual-mac-addr x121-addr [x25-map-options]
```

### Syntax Description

<i>virtual-mac-addr</i>	Virtual MAC address.
<i>x121-addr</i>	X.121 address of the remote X.25 device you are associating with this virtual MAC address. It can be from 1 to 15 digits long.
<i>x25-map-options</i>	(Optional) See the <b>x25 map</b> command in the <i>Router Products Command Reference</i> publication for a table of supported values.

### Default

No association is made.

### Command Mode

Interface configuration

### Usage Guidelines

The central notion that binds the QLLC conversion interface to the X.25 and SRB facilities is the X.25 address map. For each remote client an X.121 address is associated with a virtual MAC address. The rest of the configuration is specified by using the virtual Token Ring address to refer to the connection.

When a Token Ring device wishes to open communications with another device, it will send the request to the address it knows, which is the MAC address. The router accepts this connection request and must transform it into a known X.121 address. The **x25 map qllc** command matches the MAC address with the X.121 address.

You must enter a mapping for each X.25 device with which the router will exchange traffic.

All QLLC conversion commands use the *virtual-mac-addr* parameter that you define with the **x25 map qllc** command to refer to the connection.

You use the **x25 map qllc** command in conjunction with the **qllc srb** command.

### Example

In the following example, the **x25 map qllc** command is used to associate the remote X.25 device at X.121 address 31104150101 with the virtual MAC address 0100.000.0001:

```
interface serial 0
encapsulation x25
x25 address 31102120100
x25 map qllc 0100.0000.0001 31104150101
```

```
qlc srb 0100.0000.0001 201 100
```

### Related Commands

**qlc srb**

**x25 map qlc**

## x25 pvc qllc

Use the **x25 pvc qllc** interface configuration command to associate a virtual MAC address with a permanent virtual circuit (PVC) for communication using QLLC conversion. The **no** form of this command removes the association.

```
x25 pvc circuit qllc x121-address[x25-map-options]
no x25 pvc circuit qllc x121-address [x25-map-options]
```

### Syntax Description

<i>circuit</i>	PVC you are associating with the virtual MAC address. This must be lower than any number assigned to switched virtual circuits.
<i>x121-address</i>	X.121 address.
<i>x25-map-options</i>	(Optional) See the x25 map command in the <i>Router Products Command Reference</i> publication for a table of supported values.

### Default

No association is made.

### Command Mode

Interface configuration

### Usage Guidelines

When a Token Ring device wishes to communicate with another device, it will send the request to the address it knows, which is the MAC address. The router accepts this connection request and transforms it into the known X.121 address and virtual circuit. You must use the **x25 map qllc** command to specify the required protocol-to-X.121 address mapping before you use the **x25 pvc qllc** command. The **x25 map qllc** command associates the MAC address with address with the X.121 address, and the **x25 pvc qllc** command further associates that address with a known pvc.

You use the **x25 pvc** command in conjunction with the **x25 map qllc** and **qllc srb** commands.

### Examples

In the following example, the **x25 pvc qllc** command associates the virtual MAC address 0100.0000.0001, as defined in the previous **x25 map qllc** command entry, with PVC 3:

```
interface serial 0
encapsulation x25
x25 address 31102120100
x25 map qllc 0100.0000.0001 31104150101
x25 pvc 3 qllc 0100.0000.0001
```

Related Commands

**qlc srb**

**x25 lic**

**x25 loc**

**x25 ltc**

**x25 map qlc**