Teldat Router

LAN Interfaces

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INDEX

Chapter 1
Configuring Token Ring Interfaces

1. INTRODUCTION

This chapter describes the Token Ring configuration commands. It includes:

- Displaying the Token Ring Configuration Prompt
- Token Ring Configuration Commands
- LLC Configuration Commands

1.1. DISPLAYING THE TOKEN RING CONFIGURATION PROMPT

To display the *TKR Config>* prompt

1. Enter **LIST DEVICES** at the *Config>* prompt to display a list of interfaces and its interface number.
2. Enter **NETWORK** followed by the number of the Token Ring interface.

Example:

```
Config>NETWORK 0

-- Token Ring Config --
TKR config>
```

1.2. TOKEN RING CONFIGURATION COMMANDS

Table 1 summarizes and the following sections explain the Token Ring configuration commands. Enter the commands at the *TKR Config>* prompt.

You must restart the router for configuration changes to take effect.

Table 1. Token Ring Configuration Commands.

Command	Function
? (HELP)	Displays available commands or options.
LIST	Displays the selected Token Ring interface configuration.
LLC	Displays the LLC configuration prompt.
MEDIA-TYPE	Sets the media-type as shielded or unshielded.
PACKET-SIZE	Changes packet-size for all Token Ring networks.
SET	Sets the aging timer for the RIF cache and the MAC address.
SOURCE-ROUTING	Enables or disables source-routing on the interface.
SPEED	Sets the interface speed in Mbps.
EXIT	Returns to the *config>* prompt.

The letters typed **in bold** are the minimum number of characters which need to be keyed in order to activate the command.

a) ? (HELP)

Lists available commands or lists the command´s options.

Syntax:

```
TKR config>?
```

Example:

```
TKR config>?
LIST
LLC
MEDIA-TYPE
PACKET-SIZE
SET
SOURCE-ROUTING
SPEED
EXIT
TKR config>
```

b) LIST

Displays the current configuration for the Token Ring interface.

Syntax:

```
TKR config>LIST
```

Example:

```
TKR config>LIST

Packet size :   2052
Speed:          16 Mbps
Media:          UTP media

RIF aging:      120
Source Routing: Enabled
MAC address:    00:00:00:00:00:00

TKR config>
```

c) LLC

Displays the LLC configuration prompt (*LLC config>*). LLC configuration is required to pass packets over an SNA network. See the "LLC Configuration Commands" section for description of these commands.

Syntax:

```
TKR config>LLC
```

Example:

```
TKR config>LLC
LLC user configuration
LLC Cfg>
```

d) MEDIA-TYPE

Changes the network media type. The options are Shielded Twisted Pair (STP) and Unshielded Twisted Pair (UTP). The default is Unshielded Twisted Pair (UTP).

Syntax:

```
TKR config>MEDIA-TYPE <media type>
```

Example:

```
TKR config>MEDIA-TYPE STP
TKR config>
```

e) PACKET-SIZE

Changes packet-size for all Token Ring networks. Changing packet-size can greatly increase buffer memory requirements.

Next table shows valid packet-size for 4Mbps and 16 Mbps networks.

Table 2. Valid Token Ring Packet Sizes.

Speed	Values (# of bytes)
4 Mbps	1470,2052,4399*
16 Mbps	1470,2052,4399
	8130,11407,177749

Configuring a packet size greater than 4,399 bytes forces the program to adjust the packet size at 4,399

Syntax:

```
TKR config>PACKET-SIZE <packet size>
```

Example:

```
TKR config>PACKET-SIZE
Packet Size (1470,2052,4399,8130,11407,17749)[2052]? 4399
TKR config>
```

If you enter a wrong value the following text is displayed:

```
Wrong packet size
```

f) SET

Sets the Routing Information Field (RIF) timer and the interface physical (MAC) address.

Syntax:

```
TKR config>SET ?
MAC-ADDRESS
RIF-TIMER
TKR config>
```

SET MAC-ADDRESS

The interface can adopt locally administered addresses or tose given by the device manufacturer (universal administration). Through this command, only locally administrated address are given. Entering **00:00:00:00:00:00** causes the router to use the default factory station address. This last MAC address is used by default.

Example:

```
TKR config>SET MAC-ADDRESS
MAC address  [00:00:00:00:00:00]?
TKR config>
```

SET RIF-TIMER

Amount of time in seconds the router maintains information in the RIF before it is refreshed. The default value is 120 seconds.

Example:

```
TKR config>SET RIF-TIMER
RIF aging[120]?150
TKR config>
```

g) SOURCE-ROUTING

Enables or disables end station source routing. This is the process by which end stations determine the source route to use to cross source routing bridges. It allows the IP protocol to reach nodes on the other side of the source routing bridge.

This option is completely independent of whether this interface is providing source routing via the SRT forwarded. The default value is enabled.

Syntax:

```
TKR config>SOURCE-ROUTING ?
DISABLED
ENABLED
TKR config>
```

Example:

```
TKR config>SOURCE-ROUTING DISABLED
```

h) SPEED

Changes the data speed. The options are 4 or 16 Mbps. The default value is 4 Mbps. If a speed/rate value is not specified, the device will request this.

Syntax:

```
TKR config>SPEED <speed>
```

Example:

```
TKR config>SPEED
Speed (16/4 Mbps)[4]? 16
TKR config>
```

i) EXIT

Returns to the *Config>* prompt.

Syntax:

```
TKR config>EXIT
```

Example:

```
TKR config>EXIT
Config>
```

1.3. LLC CONFIGURATION COMMANDS

LLC configuration is required to pass packets over an SNA network. Enter these commands at the *LLC config>* prompt, which you display by entering **LLC** at the *TKR Config>* prompt.

Table 3 summarizes and the following sections explain the LLC subcommands.

Table 3 LLC Configuration Commands.

Command	Function
? (HELP)	Displays all the LLC commands or lists subcommand options for specific commands.
LIST	Displays the selected LLC configuration.
SET	Sets the timers associated with LLC, and the size of the transmit and receive windows.
EXIT	Returns to the *TKR Config>* prompt.

The letters typed **in bold** are the minimum number of characters which need to be keyed in order to activate the command.

a) ? (HELP)

Lists available commands or lists the command´s options.

Syntax:

```
LLC Cfg>?
```

Example:

```
LLC Cfg>?
LIST
SET
EXIT
LLC Cfg>
```

b) LIST

Displays the current LLC configuration.

Syntax:

```
LLC Cfg>LIST
```

Example:

```
LLC Cfg>LIST
No LLC configuration record found for this interface.
Default values are used.
  Reply Timer(T1):                1 seconds
  Receive ACK Timer(T2):          1 100miliseconds
  Inactivity Timer(Ti):           30 seconds
  Max Retry value(N2):            8
  Rcvd I-frames before Ack(N3):   1
  Transmit Window(Tw):            2
  Receive Window(Rw):             2
  Acks needed to increment Ww(Nw): 1
LLC Cfg>
```

c) SET

Configures the LLC.

> ***CAUTION!!!!!***
>
> ***Changing LLC parameters from the defaults can affect how the LLC protocol works.***

Syntax:

```
LLC Cfg>SET ?
N2-MAX-RETRY
N3-FRAMES_RCVD-BEFORE-ACK
NW-ACKS-TO-INC-WW
RW-RECEIVE-WINDOW
T1-REPLY-TIMER
T2-RECEIVE-ACK-TIMER
TI-INACTIVITY-TIMER
TW-TRANSMIT-WINDOW
LLC Cfg>
```

SET N2-MAX-RETRY

Maximum number of times the LLC transmits an RR without receiving an acknowledgment when the inactivity timer expires. The range is 1 to 127. The default is 8.

Example:

```
LLC Cfg>SET N2-MAX-RETRY
Max Retry value(N2)[8]?
LLC Cfg>
```

SET N3-FRAMES_RCVD-BEFORE-ACK

This counter works with the T2 timer to reduce acknowledgment traffic for received I-frames. Each time the router receives an I-frame, this value decreases by one. When this counter reaches 0 or when the T2 timer expires, the router sends an acknowledgement. The range is 1 to 255. The default is 1.

Example:

```
LLC Cfg>SET N3-FRAMES_RCVD-BEFORE-ACK
Number I-frames received before sending ACK(N3)[1]?
LLC Cfg>
```

SET RW-RECEIVE-WINDOW

Maximum number of unacknowledged sequentially numbered I-frames that an LLC can receive from a remote LLC peer. This value must be equal to or less than 127.

Example:

```
LLC Cfg>SET RW-RECEIVE-WINDOW
Receive Window(Rw), 127 Max.[2]?
LLC Cfg>
```

SET NW-ACKS-TO-INC-WW

When the ability to send I-frames is not working, LLC goes into a mode where the working window (Ww) i set back to 1, and then slowly increased back to its normal size (Tw). This is known as the dynamic window algorithm. This value is the number of I-frames that the LLC must receive before incrementing Ww by 1. The range is 1 to 127. The default is 1.

Example:

```
LLC Cfg>SET NW-ACKS-TO-INC-WW
Acks needed to increment Ww(Nw)[1]?
LLC Cfg>
```

SET T1-REPLY-TIMER

This timer expires when the LLC fails to receive a required acknowledgment or response from the other LLC station. When this timer expires, an RR is sent with the poll bit set and T1 is started again. If the LLC receives no response after the configured maximum number of retries (N2), the link underneath is declared inoperative. The range is 1 to 256. The default is 1.

Example:

```
LLC Cfg>SET T1-REPLY-TIMER
Reply Timer(T1) in sec. [1]?
LLC Cfg>
```

SET T2-RECEIVE-ACK-TIMER

Delays acknowledging an I-format frame. This timer starts when the router receives an I-frame, and it is reset when the router sends an acknowledgment. If this timer expires, LLC2 sends an acknowledgment as soon as possible. Set T2 to a value less than T1 to insure that the remote LLC2 peer receives the delayed acknowledgment before the T1 timer expires. The range is 1 to 2,560. The default is 1 (100 ms), which disables the timer.

Example:

```
LLC Cfg>SET T2
Receive Ack timer(T2) in 100millisec.[1]?
LLC Cfg>
```

SET TI-INACTIVITY-TIMER

This timer expires when the LLC does not receive a frame for a specified time period. When this timer

expires, the LLC transmits an RR until the other LLC responds or the N2 retry count is exceeded. The range is 1 to 256. Default is 30 seconds.

Example:

```
LLC Cfg>SET TI-INACTIVITY-TIMER
Inactivity Timer(Ti) in sec.[30]?
LLC Cfg>
```

SET TW-TRANSMIT-WINDOW

Maximum number of I-frames that can be sent before receiving an RR. Assuming that the other end of the LLC session can actually receive this many consecutive I-frames, and the router has enough heap memory to keep copies of these frames until an acknowledgment is received, increasing this value may increase the throughput. The range is 1 to 127. The default is 2.

Example:

```
LLC Cfg>SET TW-TRANSMIT-WINDOW
Transmit Window(Tw), 127 Max.[2]?
LLC Cfg>
```

d) EXIT

Returns to the *TKR Config>* prompt.

Syntax:

```
LLC Cfg>EXIT
```

Example:

```
LLC Cfg>EXIT
TKR config>
```

Chapter 2
Monitoring Token Ring Interfaces

1. INTRODUCTION

This chapter describes the commands you can use to monitor Token Ring interfaces. It includes the following sections:

- Displaying the Token Ring Monitoring prompt
- Token Ring Monitoring Commands
- LLC Monitoring Commands
- Token Ring Interfaces and the Monitoring Interface Command

1.1. DISPLAYING THE TOKEN RING MONITORING PROMPT

To display the *TKR>* prompt

1. Enter **DEVICE** at the (+) prompt to display a list of interfaces configured on the router.
2. Enter **NETWORK** followed by the number of the Token Ring interface at the (+) prompt. For example:

```
*P 3

+DEVICE

                                    Auto-test   Auto-test     Maintenance
Ifc  Interface     CSR    Vect       valids     failures        failures
0    TKR/0     9000000      1c            1            0               0
1    R->N/0          0       0            1            0               0
+NETWORK 0

-- Token Ring Console --
TKR>
```

1.2. TOKEN RING MONITORING COMMANDS

Table 4 summarizes and the following sections explain the Token Ring monitoring commands. Enter these commands at the *TKR>* prompt.

Table 4. Token Ring Monitoring Commands

Command	Function
?(HELP)	Displays available commands or options.
LLC	Displays the LLC monitoring prompt.
RIF-DUMP	Displays a dump of the RIF cache.
EXIT	Returns to the (+) prompt.

The letters typed **in bold** are the minimum number of characters which need to be keyed in order to activate the command.

a) ? (HELP)

Lists available commands or lists the command´s options.

Syntax:

```
TKR>?
```

Example:

```
TKR>?
LLC
RIF-DUMP
EXIT
TKR>
```

b) LLC

Displays the LLC monitoring prompt. Enter LLC monitoring commands at this prompt. See the "LLC monitoring commands" section for a description of these commands.

Syntax:

```
TKR>LLC
```

Example:

```
TKR>LLC
LLC user Monitoring
LLC>
```

c) RIF-DUMP

When source routing is enabled (see Token Ring configuration commands) on the Token Ring interface, **RIF-DUMP** requests a dump of the RIF cache contents. The **RIF-DUMP** command applies to protocols only. It does not apply to DLSw or bridging.

Syntax:

```
TKR>RIF-DUMP
```

Example:

```
TKR>RIF-DUMP

 MAC Address                    RIF
=============          ============================
00:00:C9:1E:ED:5C   0620 0011 0020

TKR>
```

The meaning of each field is:

MAC Address Mac address of the Token Ring interface.

RIF Displays a code that indicates the RIF in hexadecimal.

d) EXIT

Returns to the (+) monitoring prompt.

Syntax:

```
TKR>EXIT
```

Example:

```
TKR>EXIT
+
```

1.3. LLC MONITORING COMMANDS

Table 5 lists and the following sections explain the LLC monitoring commands.

Table 5. Token Ring LLC monitoring commands.

Command	Function
? (HELP)	Displays the LLC command or options for specific commands.
CLEAR-COUNTERS	Clears all statistical counters.
LIST	Displays interface, SAP, and session information.
SET	Allows you to dynamically configure LLC parameters that are valid for the life of the session.
EXIT	Exits the LLC monitoring process.

a) ? (HELP)

Lists available commands or lists the command´s options.

Syntax:

```
LLC>?
```

Example:

```
LLC>?
CLEAR-COUNTERS
LIST
SET
EXIT
LLC>
```

b) CLEAR-COUNTERS

Clear all the LLC statistical counters.

Syntax:

```
LLC>CLEAR-COUNTERS
```

Example:

```
LLC>CLEAR-COUNTERS
LLC>
```

c) LIST

Displays interface, service access point (SAP), and session information.

Syntax:

```
LLC>LIST ?
INTERFACE
SAP
SESSION
LLC>
```

LIST INTERFACE

Displays all SAPs opened on this interface.

Syntax:

```
LLC>LIST INTERFACE
```

Example:

```
LLC>LIST INTERFACE
SAP        Number of Sessions
0          0
4          1
8          0
c          0
f0         0
LLC>
```

LIST SAP

Display information for the specified SAP on the interface.

Syntax:

```
LLC>LIST SAP <SAP #>
```

Example:

```
LLC>LIST SAP
SAP value in hex(0-FE)[0]? 4
Interface:                      0,TKR/0
Reply Timer(T1):                1 sec
Receive ACK Timer(T2):          1 100milisec (note: not used when N3=1)
Inactivity Timer(Ti):           30 sec
MAX Retry Value(N2):            8
MAX I-Field Size(N1):           0
Rcvd I-frames before Ack(N3):   1
Transmit Window Size(Tw):       2
Acks Needed to Inc Ww(Nw):      1
```

```
Frame Type          Xmt      Rcvd
UI-frames:            0         0
TEST-frames:          0        24
XID-frames:           0        58
I-frames:            16        17
RR-frames:          687       677
RNR-frames:           2         0
REJ-frames:           0         0
SABME-frames:         0         2
UA-frames:            2         1
DISC-frames:          1         0
DM-frames:            0         0
FRMR-frames:          0         0
I-frames Discarded by LLC:      0
I-frames Refused by LLC user:   0

Cumulative number of sessions:  13
Number of active sessions:      1
Session ID                                          Remote
(int-sap-id)  Local MAC          Remote MAC         SAP     State
00-04-000c    00:05:24:a7:a3:99  00:05:24:3e:d7:28  04      LINK_OPENED
LLC>
```

The meaning of each field is:

SAP value in hex(0-FE)	The SAP value of the session (hexadecimal value).
Interface	The interface number and type over which the session is running.
Reply Timer (T1)	Time it takes for this timer to expire when the LLC fails to receive an acknowledgment or response from the other LLC station.
Receive ACK Timer (T2)	Time delay the LLC uses before sending an *ACK* for a received I-frame.
Inactivity Timer (Ti)	Time the LLC waits during inactivity before issuing an RR.
MAX Retry Value (N2)	Maximum number of retries by the LLC protocol.
MAX I-Field Size (N1)	Data (in bytes) allowed in the I-field of an LLC2 frame.
Rcvd I-frame before Ack (N3)	Value that is used with T2 timer to reduce acknowledgment traffic for received I-frames.
Transmit Window Size (Tw)	I-frames that can be sent before receiving an RR.
Acks Needed to Inc Ww (Nw)	I-frames that the LLC must receive before incrementing Ww by 1.
Frames_Xmt and Rcvd	Frame types transmitted (Xmt) and (Rcvd).
I-frames Discarded by LLC	I-frames discarded by the LLC, usually because the sequence number is out of sequence.

I-frames Refused by LLC user	I-frames discarded by the software above the LLC. For example: LNM (LAN Network Manager) and DLSw (Data Link Switching).
Cumulative number of sessions	Sessions that were opened over this SAP.
Number of active sessions	Currently active sessions running over the interface.
Session ID (int-sap-id)	Session ID for the interface.
Local MAC	Router´s LLC MAC address.
Remote MAC	Remote router´s LLC MAC addresss.
Remote SAP	Remote router´s SAP address for the LLC connection.

Remote State

The finite state(s) that results from interaction between the LLC peers. There are 21 states that are described below.

LINK_CLOSED	The remote LLC peer is not know to the local LLC peer and is considered as not existing.
DISCONNECTED	The local LLC peer is known to the other peer . This LLC peer can send and receive XID, TEST, SABME, and DISC commands; and XID TEST, UA, and DM responses.
LINK_OPENING	The state of the local LLC peer after sending a SABME or UA in response to a received SABME.
DISCONNECTING	The state of the local LLC after sending a DISC command to the remote LLC peer.
FRMR_SENT	The local LLC peer has entered the frame reject exception state and has sent a FRMR response across the link.
LINK_OPENED	The local LLC peer is in the data transfer phase.
LOCAL_BUSY	The local LLC peer is unable to receive additionaI-frames.
REJECTION	A local LLC peer that has received one or more out-of-sequence I-frames.

CHECKPOINTING	The local LLC peer has sent a poll to the remote LLC peer and is waiting for an appropiate response.
CKPT_LB	Combination of checkpointing and local busy states.
CKPT_REJ	Combination of checkpointing and rejection states.
RESETTING	The local LLC peer has received a SABME and is reestablishing the link.
REMOTE_BUSY	The state that occurs when an RNR is received from the remote LLC peer.
LB_RB	Combination of Local_Busy and Remote_Busy states.
REJ_LB	Combination of rejection and Local_Busy states.
REJ_RB	Combination of rejection and Remote_Busy states.
CKPT_REJ_LB	Combination of checkpointing, rejection, and Local_Busy states.
CKPT_CLR	Combination state resulting from the termination of a Local-Busy condition while the LLC peer is CKPT_LB.
CKPT_REJ_CLR	Combination state resulting from the transfer of an unconfirmed Local_Busy clear while the link station is in the CKPT_REJ_LB state.
REJ_LB_RB	Combination of the rejection, Local_Busy, and Remote_Busy states.
FRMR_RECEIVED	The local LLC peer has received an FRMR response from the remote LLC peer.

LIST SESSION

Displays information on the specified LLC session that is open on the interface.

Syntax:

```
LLC>LIST SESSION <session id>
```

Example:

```
LLC>LIST SESSION
Session Id: [0]? 07-04-000c
Session ID:                      07-04-000c
Interface:                       07,BDG/0
Remote MAC addr:                 00:05:24:3e:d7:28
Source MAC addr:                 00:05:24:a7:a3:99
Remote SAP:                      04
Local SAP:                       04
RIF:                             None
Access Priority:                 0
State:                           LINK_OPENED
Reply Timer(T1):                 1 sec
Receive ACK Timer(T2):           1 100milisec (note: not used when N3=1)
Inactivity Timer(Ti):            30 sec
MAX I-Field Size(N1):            0
MAX Retry Value(N2):             8
Rcvd I-frames before Ack(N3):    1
Transmit Window Size(Tw):        4
Working Transmit Size(Ww):       4
Acks Needed to Inc Ww(Nw):       1
Current Send Seq (Vs):           7
Current Rcv Seq (Vr):            7
Last ACK'd sent frame(Va):       7
No. of frames in ACK pend q:     0
No. of frames in Tx pend q:      0
Local Busy:                      NO
Remote Busy:                     NO
Poll Retry count:                8
Appl output flow stopped:        NO
Send process running:            YES

Frame Type          Xmt      Rcvd
I-frames:             7         7
RR-frames:           19        15
RNR-frames:           1         0
REJ-frames:           0         0
I-frames Discarded by LLC:       0
I-frames Refused by LLC user:    0
LLC>
```

The meaning of each field is:

Session id — Session id number.

Interface — Interface over which this session is running.

Remote MAC addr — MAC address of the remote LLC peer.

Source MAC addr — MAC address of the local LLC.

Remote SAP — Remote router´s SAP address for the LLC.

Local SAP — SAP local del router para conexión LLC.

RIF — RIF of the frame.

Access Priority — Priority of the packet. 0-7 for upper layer control.

State — The finite state(s) that results from interaction between the LLC peers.

	Refer to the **LIST SAP** command previously described in this chapter for more information.
Receive ACK timer (T2)	Time delay the LLC uses before sending an acknowledgment for a received I-frame.
Inactivity Timer (Ti)	Time delay the LLC waits during inactivity before issuing an RR.
MAX I-Field size (N1)	Maximum size of the data field (in bytes) of a frame. Default is the size of the interface.
MAX Retry value (N2)	Number of times the LLC transmits an RR without receiving an acknowledgment.
Rcvd I-frames before Ack (N3)	Value that is used with T2 timer to reduce acknowledgement traffic for received I-frames.
Transmit Window Size (Tw)	Number of I-frames that can be sent before receiving an RR.
Working Transmit Size (Ww)	Number of I-frames that are sent before receiving an RR. This can be less than Tw during the dynamic window algorithm.
Acks Needed to Inc Ww(Nw)	Number of I-frames that the LLC must receive before incrementing Ww by 1.
Current Send seq (Vs)	Send state variable (Ns value for the next I-frame to be transfer).
Current Rcv seq (Vr)	Receive state variable (next in-sequence Ns to be accepted).
Last ACK'd sent frame (Va)	Acknowledged state variable (last valid Nr received).
No. of frames in ACK pend q	Transmitted I-frames waiting for acknowledgment.
No. of frames in Tx pend q	Number of frames waiting to be transmitted.
Local Busy	The local router´s LLC connection is sending RNRs.
Remote Busy	The remote router´s LLC is receiving RNRs.
Poll Retry Count	Current value of the retry of the counter (counts down) in the LLC protocol.

Appl outout flow stopped	LLC has told the application to stop giving it outgoing data frames.
Send process running	This process runs concurrently with all other frame actions and takes I-frames in the transmit queue and sends them.
Frame Type(Xmt, Rcvd)	Displays the total number of frame types transmitted (Xmt) and (Rcvd).
I-frames Discarded by LLC	I-frames discarded by the LLC, usually because the sequence number is wrong.
I-frames Refused by LLC user	I-frames discarded by the software above the LLC. For example, LNM (LAN Network Manager) and DLSw (Data Link Switching).

d) SET

Dynamically configures the LLC parameters on a current LLC session. Changes that you make to the parameters are effective for the life of session. These parameters are the same as those in Chapter 1 "Configuring Token Ring Interfaces", in this manual.

> ***CAUTION!***
>
> ***Changing LLC parameters from the default can affect how the LLC protocol works***

Syntax:

```
LLC Cfg>SET ?
N2-MAX-RETRY
N3-FRAMES_RCVD-BEFORE-ACK
NW-ACKS-TO-INC-WW
T1-REPLY-TIMER
T2-RECEIVE-ACK-TIMER
TI-INACTIVITY-TIMER
TW-TRANSMIT-WINDOW
LLC Cfg>
```

SET N2-MAX-RETRY

The maximum number of times the LLC protocol transmits an RR without receiving an acknowledgment when the inactivity timer expires. The range is 1 to 127. Default is 8.

Syntax:

```
LLC>SET N2-MAX-RETRY <session ID, value>
```

Example:

```
LLC>SET N2-MAX-RETRY
Session Id: [0]? 07-04-000c
Max Retry value(N2)[8]?
LLC>
```

SET N3-FRAMES-RCVD_BEFORE-ACK

This value is used with the T2 timer to reduce acknowledgment traffic for received I-frames. Set this counter to a specified value. Each time an I-frame is received, this value is decremented. When this counter reaches 0, or the T2 timer expires, an acknowledgment is sent. The range is 1 to 255. Default is 1.

Syntax:

```
LLC>SET N3-FRAMES_RCVD-BEFORE-ACK <session ID, value>
```

Example:

```
LLC>SET N3-FRAMES_RCVD-BEFORE-ACK
Session Id: [0]? 07-04-011f
Number I-frames received before sending ACK(N3)[1]?
LLC>
```

SET NW-ACKS-TO-INC-WW

When the ability to send I-frames is not working, the LLC protocol goes into a mode where the working window (Ww) is set back to 1, and is then slowly increased back to its normal size (Tw). This is know as the dynamic window algorithm. This value is the number of I-frames that the LLC must receive before incrementing Ww by 1. The range is 1 to 127. Default is 1.

Syntax:

```
LLC>SET NW-ACKS-TO-INC-WW <session ID, value>
```

Example:

```
LLC>SET NW-ACKS-TO-INC-WW
Session Id: [0]? 07-04-00ac
Acks needed to increment Ww(Nw)[1]?2
LLC>
```

SET T1-REPLY-TIMER

This timer expires when the LLC fails to receive a required acknowledgment from the other LLC station. When this timer expires, an RR is sent with the poll bit set and T1 is started again. If the LLC receives no response after the configured maximum number of retries (N2), the link underneath is declared inoperative. The range is 1 to 256. Default is 1.

Syntax:

```
LLC>SET T1-REPLY-TIMER <session ID, value>
```

Example:

```
LLC>SET T1-REPLY-TIMER
Session Id: [0]? 07-04-000c
Reply Timer(T1) in sec. [1]?
LLC>
```

SET T2-RECEIVE-ACK-TIMER

This timer is used to delay sending of an acknowledgment for a received I-format frame. This timer is started when an I-frame is received and reset when an acknowledgment is sent. If this timer expires, LLC2 sends an acknowledgment as soon as possible. Set this value so that it is less than that of T1.

This insures that the remote LLC2 peer receives the delayed acknowledgment before the T1 timer expires. The range is 1 to 2,560. Default is 1 (100 ms).

Syntax:

```
LLC>SET T2-RECEIVE-ACK-TIMER <session ID, value>
```

Example:

```
LLC>SET T2-RECEIVE-ACK-TIMER
Session Id: [0]? 07-04-000c
Receive Ack timer(T2) in 100millisec.[1]?
LLC>
```

Note: If this timer is set to 1 (the default) it will not run (e.g., N3-FRAMES_RCVD-BEFORE-ACK=1)

SET TI-INACTIVITY-TIMER

This timer expires when the LLC does not receive a frame for a specified time period. When this timer expires the LLC transmits an RR until the other LLC responds or the N2 timer expires. Default is 30 seconds. The range is 1 to 256.

Syntax:

```
LLC>SET TI-INACTIVITY-TIMER <session ID, value>
```

Example:

```
LLC>SET TI-INACTIVITY-TIMER
Session Id: [0]? 07-04-000c
Inactivity Timer(Ti) in sec.[30]?
LLC>
```

SET TW-TRANSMIT-WINDOW

Sets the maximum number of I-frames that can be sent before receiving an RR. Assuming that the other end of the LLC session can actually receive this many consecutive I-frames, and the router has enough heap memory to keep copies of these frames until an acknowledgment is received, increasing this value may increase the throughput. The range is 1 to 127. Default is 2.

Syntax:

```
LLC>SET TW-TRANSMIT-WINDOW <session ID, value>
```

Example:

```
LLC>SET TW-TRANSMIT-WINDOW
Session Id: [0]? 07-04-000c
Transmit Window(Tw), 127 Max.[2]?
LLC>
```

e) EXIT

Use the exit command to return to the LAN (Ethernet: *ETH>* or Token Ring : *TKR>)* prompt.

Syntax:

```
LLC>EXIT
```

Example:

```
LLC>EXIT
TKR>
```

1.4. TOKEN RING INTERFACES AND THE MONITORING INTERFACE COMMAND

The router displays statistics for network interfaces when you enter **DEVICE** at the monitoring prompt (+).

a) *DEVICE*

The following statistics display when you enter the **DEVICE** command at the monitoring prompt (+) for Token Ring interfaces.

Syntax:

```
+DEVICE <TKR interface number>
```

Example:

```
+DEVICE 0

                                  Auto-test   Auto-test     Maintenance
Ifc  Interface     CSR    Vect      valids    failures        failures
0    TKR/0     9000000      1c           1           0               0

Physical Address: 00:05:64:02:D0:25
PROM Address:     00:05:64:02:D0:25
Speed:            16 Mbps

Max. packet size:     4399
Handler state:        Available ring
Ring status:          OK

  Number of Signal lost           0  'beacon' packets              0
  Fatal errors                    0  Lobe errors                   0
  'auto-remove' errors            0  'Removes' packets             0
  Ring recovery                   0

  Line errors                     0  'burst' errors                0
  ARI/FCI errors                  0  Input drops                   0
  Frame copy errors               0  'token' errors                0
  Lost frames                     0  Too big frames                0
MAC code version: EMAC 2.28 512K
+
```

The following section describes these statistics:

Ifc — Interface number.

Interface — Interface name and ocurrence index.

CSR — Control/status/data Register Address.

Vect — Interrupt vector associated to the interface, written in hexadecimal.

Auto-test Valids — Number of successful self-tests.

Auto-test Failures — Number of unsuccessful self-tests.

Maintenance Failures	Number of maintenance failures.
Physical address	MAC address of the Token Ring interface in NON canonical format. Is the address used in this moment by the interface. Can be a local managed address or an universal address.
PROM address	MAC address provided by the manufacturer for the Ethernet interface. This is a universal address.
Speed	Transmit speed, in Mbps, of the Token Ring network connected to the interface.
Max packet size	Maximum packet size, in bytes, configured for this interface.
Handler state	Token Ring interface present state. Is the interface status after a self-test have been done.
Ring status	Information that shows the present status of the ring that contains the interface. Possible values are:

OK	ok	ARMV	Auto removal
SIGERR	Signal loss	RXRMV	Remove received
HERR	Hard error	COVF	Counter overflow
SERR	Soft error	SGST	Single station
TXBCM	Transmit beacom	RNGREC	Ring recovery
LWFAULT	Lobe wire fault		

Some of this values (the error ones) incrementing the following counters:

Number of Signal lost	The router was unable to transmit a packet due to loss of signal.
Fatal errors	The interface transmits or received beacon frames from the network.
'auto-remove' errors	The interface, due to the beacon auto-removal process, fails the lobe wrap test and removes itself from the ring.
Ring recovery	The interface detects MAC frames of Token Ring requests.
'beacon' packets	Number of beacon frames transmitted by the interface to the network.
Lobe errors	The network detects an open circuit or a short circuit in the cable between the interface and the MAU (Multistation Access Unit).

'Removes' packets	The interface receives a remove ring station MAC frame request and removes itself from the network.
Line errors	Increments when a frame is repeated or copied, and the Error Detected Indicator (EDI) bit is 0 for the incoming frame and one of the following conditions must also exist: 1. A Token with a code violation exists. 2. A frame has a code violation between the starting and ending delimiter. 3. A Frame Check Sequence (FCS) error occurs.
ARI/FCI errors	The ARI/FCI (Address Recognized Indicator/Frame Copied Indicator) Errors counter increments if the interface receives either of the following: a) An Active Monitor Present (AMP) MAC frame with the ARI/FCI bits equal to 0 and a Standby Monitor Present (SMP) MAC frame with the ARI/FCI bits equal to 0. b) More than one SMP MAC frame with the ARI/FCI bits equal to 0, without an intervening AMP MAC frame. c) This condition indicates that the upstream neighbor copied the frame but is unable to set the ARI/FCI bits.
Frame copy errors	The interface in receive/copy mode recognizes a frame addressed to its specific address but finds the Address Recognize Indicator (ARI) bits not equal to 0. This error indicates a possible line hit or duplicate address.
Lost frames	The interface is in transmit mode and fails to receive the end of a transmitted frame.
'burst' errors	The interface detects the absence of transitions for five half-bits times between the start delimiter (SDEL) and the end delimiter (EDEL) or between the EDEL and the SDEL.
Input drops	The interface in repeat mode recognizes a frame addressed to it but has no buffer space available to copy the frame.
'token' errors	Increments when the active monitor detects a token protocol with any of the following errors: a) The MONITOR_COUNT bit of token with nonzero priority equals one. b) The MONITOR_COUNT bit of a frame equals one. c) No token or frame is received within a 10ms window.

d) The starting delimiter/token sequence has a code violation in an area where code violations must not exist.

Too big frames Number of received frames with a bigger data field than the one supported by the interface.

Chapter 3
Configuring Ethernet Interfaces

1. INTRODUCTION

This chapter describes the Ethernet configuration commands. It includes the following sections:

- Displaying the Ethernet Configuration Prompt
- Ethernet Configuration Commands

1.1. DISPLAYING THE ETHERNET CONFIGURATION PROMPT

To display the Ethernet configuration prompt, follow the next steps:

1. Enter **LIST DEVICES** at the *Config>* prompt to display a list of interfaces.
2. Enter the **NETWORK** command followed by the number of the Ethernet interface.

Example:

```
*P 4

Config>LIST DEVICES

Con    Ifc Type of interface                  CSR     CSR2  int
---      7 Router->Node                         0             0
---      8 Node->Router                         0             0
ISDN 1   3 ISDN                            F001640  F000E00   9C
ISDN 1   5 B channel: FR                       0             0
ISDN 1   9 ISDN D channel: X25             A000000           1B
ISDN 2   4 ISDN                            F001660  F000F00   9B
ISDN 2   6 B channel: PPP                      0             0
ISDN 2  10 ISDN D channel: X25             A200000           1B
LAN      0 Ethernet                        9000000           1C
WAN1     1 Frame Relay                     F001600  F000C00   9E
WAN2     2 Frame Relay                     F001620  F000D00   9D
Npl2-B1 Config>NETWORK 0

-- Config of the Ethernet Interface --
ETH config>
```

1.2. ETHERNET CONFIGURATION COMMANDS

This section summarizes and then explains the Ethernet configuration commands. Enter this commands at the *ETH config>* prompt.

Table 6. Ethernet Configuration Commands.

Command	Function
? (HELP)	Lists available commands or lists the command´s options.
CONNECTOR type	Sets the connector type.
IP encapsulation	Sets the IP encapsulation as Ethernet type 8137 or Ethernet 802.3.
LIST	Displays the connector type and the IP encapsulation.
LLC	Displays the LLC configuration prompt.
MAC address	Sets the MAC address used by the interface.
EXIT	Returns to the *Config*> prompt.

The letters typed **in bold** are the minimum number of characters which need to be keyed in order to activate the command.

a) ? (HELP)

List available commands or lists the command´s options.

Syntax:

```
ETH config>?
```

Example:

```
ETH config>IP ?
Ethernet
IEEE-802.3
ETH config>
```

b) CONNECTOR type

Sets the connector type. Possible types are: AUI (10Base5), RJ45 (10BaseT) and AUTO. With the last option the device detects by itself the used connector type. Default option is AUTO.

Syntax:

```
ETH config>CONNECTOR <tipo conector>
```

Example:

```
ETH config>CONNECTOR ?
AUI (10Base5)
RJ45 (10BaseT)
AUTO_CONFIG
ETH config>
```

Example:

```
ETH config>CONNECTOR AUTO_CONFIG
ETH config>
```

c) IP encapsulation

Selects the IP transportation mode in the data field of the Ethernet frames. Possible formats are: Ethernet (Ethernet type 8137) or IEEE-802.3 (Ethernet 802.3 "raw" without 802.2). Default option is ETHERNET configuration.

Syntax:

```
ETH config>IP <encapsulation type>
```

Example:

```
ETH config>IP ?
Ethernet
IEEE-802.3
ETH config>
```

Example:

```
ETH config>IP IEEE-802.3
ETH config>
```

d) LIST

Displays the current configuration of the Ethernet interface. This includes the MAC address used by interface, the type of conector and IP encapsulation.

Syntax:

```
ETH config>LIST
```

Example:

```
ETH config>LIST

MAC address: 000000000000
Connector type: Self-configurable
IP encapsulation:   IEEE-802.3
ETH config>
```

e) LLC

Displays the LLC configuration prompt (LLC config>). LLC configuration is required to pass packets over an SNA network. See "LLC Configuration Commands" section for a description of this commands.

Syntax:

```
ETH config>LLC
```

Example:

```
ETH config>LLC
LLC Cfg>
```

f) MAC address

The interface can adopt locally administered addresses or those given by the device manufacturer. Through this command, only locally administrated address are given. Entering **00:00:00:00:00:00** (default value) causes the router to use the default factory station address. This last MAC address is used by default.

Sintaxis:

```
ETH config>MAC <MAC address>
```

Ejemplo:

```
ETH config>MAC
MAC address [00-00-00-00-00-00]?
ETH config>
```

g) EXIT

Returns to the *Config>* prompt.

Syntax:

```
ETH config>EXIT
```

Example:

```
ETH config>EXIT
Config>
```

Chapter 4
Monitoring Ethernet Interfaces

1. INTRODUCTION

This chapter describes the commands you can use to monitor Ethernet interfaces. It includes the following sections:

- Displaying the Ethernet Monitoring Prompt
- Ethernet Monitoring Commands
- Ethernet Interfaces and the Monitoring Interface Command

1.1. DISPLAYING THE ETHERNET MONITORING PROMPT

To display the *ETH>* prompt:

1. Enter **DEVICE** at the monitoring (+) prompt to display a list of interfaces configured on the router.
2. Enter **NETWORK** followed by the number of the Ethernet interface at the GWCON (+) prompt.

Example:

```
*P 3

+DEVICE

                                    Auto-test   Auto-test     Maintenance
Ifc  Interface     CSR     Vect       valids    failures        failures
0    Eth/0     9000000      1c            1           0               0
1    FR/0      F001600      9e            1           2               0
2    FR/1      F001620      9d            2           0               0
3    ISDNB/0   F001640      9c            0           0               0
4    ISDNB/1   F001660      9b            0           0               0
5    FR/2            0       0            1           0               0
6    PPP/0           0       0            2           0               0
7    R->N/0          0       0            1           0               0
+NETWORK 0

--  Ethernet Console  --
ETH>
```

1.2. ETHERNET MONITORING COMMANDS

Table 7 summarizes and the following sections explaining the Ethernet monitoring commands. Enter commands at the ETH> prompt.

Table 7. Ethernet Monitoring Commands.

Command	Function
? (HELP)	Displays available commands or options.
COLLISIONS	Displays collision statistics for the specified Ethernet interface.
LLC	Dsiplays the LLC monitoring prompt.
EXIT	Returns to the monitoring GWCON (+) prompt.

The letters typed **in bold** are the minimum number of characters which need to be keyed in order to activate the command.

a) ? (HELP)

List available commands or lists the command´s options.

Syntax:

```
ETH>?
```

Example:

```
ETH>?
COLLITION
LLC
EXIT
ETH>
```

b) COLLITION

Displays the counts of transmissions frames that incurred collisions before successfull transmission. The counters tally the count of frames succesfully sent after the specified number of collisions for the range of 1 to 15 collisions. Increasing numbers of packets transmitting with collisions and higher numbers of collision per packets are signs of transmitting onto a busy Ethernet.

Clear these counters using the **CLEAR statistics** command at the monitoring (+) prompt. This data is exported via SNMP.

Syntax:

```
ETH>COLLITION
```

Example:

```
ETH>COLLITION
Transmitted with  1 collitions:        341
Transmitted with  2 collitions:        281
Transmitted with  3 collitions:         94
Transmitted with  4 collitions:         26
Transmitted with  5 collitions:          5
Transmitted with  6 collitions:          4
Transmitted with  7 collitions:          4
Transmitted with  8 collitions:          4
Transmitted with  9 collitions:          2
Transmitted with 10 collitions:          2
Transmitted with 11 collitions:          0
Transmitted with 12 collitions:          0
Transmitted with 13 collitions:          0
Transmitted with 14 collitions:          0
Transmitted with 15 collitions:          0
ETH>
```

c) LLC

Displays the *LLC>* monitoring prompt. The LLC monitoring commands must be entered here. For a detailed description of these commands, please consult the "LLC Monitoring Commands" section.

Syntax:

```
ETH>LLC
```

Example:

```
ETH>LLC
LLC user Monitoring
LLC>
```

d) EXIT

Returns to the monitoring (+) prompt.

Syntax:

```
ETH>EXIT
```

Example:

```
ETH>EXIT
+
```

1.3. ETHERNET INTERFACES AND THE MONITORING INTERFACE COMMAND

The router displays statistics for network interfaces when you enter **DEVICE** at the momitoring (+) prompt.

a) DEVICE

On entering the DEVICE command followed by the number of the interface associated to Ethernet, the router displays a series of statistics associated to this.

Syntax:

```
+DEVICE <ETH interface number>
```

Example:

```
+DEVICE 0

                                  Auto-test   Auto-test     Maintenance
Ifc  Interface     CSR    Vect      valids    failures        failures
0    Eth/0     9000000      1c           2           1               1

Physical address:  00A026400BA4
PROM address:      00A026400BA4

 Input statistics:
  failed, frame too long             0  failed, FCS error                0
  failed, alignment error            0  failed, FIFO overrun             0
  internal MAC rcv error             0  packets missed                   0
 Output statistics:
  deferred transmission              0  single collision                 0
  multiple collisions                0  total collisions                 0
  failed, excess collisions          0  failed, FIFO underrun            0
  failed, carrier sense err          0  SQE test error                  0
  late collision                     0  internal MAC trans errors        0
  Ethernet MAC code release EF 1.07 512K
+
```

The meaning of each field is:

Ifc	Interface number.
Interface	Interface name and its instance number.
CSR	Command and status register addresses.
Vect	Interrupt vector associated to the interface, written in hexadecimal.
Auto-test valids	Number of successful self-tests.
Auto-test failures	Number of unsuccessful self-tests.
Maintenance failures	Number of maintenance failures.
Physical address	The MAC address used in the Ethernet interface in canonical format.
PROM address	MAC address for the Ethernet interface provided by the manufacturer.

Input statistics:

failed, frame too long	The interface received a frame that is larger than the maximum size of 1,518 bytes for an Ethernet frame. This data is exported via SNMP as the dot3StatsFrameTooLongs counter.
failed, FCS error	The interface received a packet with a CRC error. This data is exported via SNMP as the dot3StatsFCSErrors counter.
failed, alignment error	The interface received a frame whose length in bits is not a multiple of eight.
failed, FIFO overrun	The Ethernet chipset is unable to store bytes in the local packet buffer as fast as they come off wire.
packets missed	The interface tries to receive a packet, however the local packet buffer is full. This indicates that the network has more traffic than the interface can andel with.
internal MAC rcv errors	Receive errors that are not late, excessive, or carrier check collisions.

	This data is exported via SNMP as the dot3StatsInternalMacReceive Errors counter.
Output statistics:	
deferred transmission	The carrier sense mechanism detected line activity causing the interface to defer transmission. This data is exported via SNMP as the dot3StatsDeferredTransmission counter.
single collisions	Increments when a frame has a collision on the first transmission attempt, and then succesfully sends the frame on the second transmission attempt. This data is exported via SNMP as the dot3StatsSingleCollisionFrames counter.
multiple collisions	Increments when a frame has multiple collisions before being succesfully transmitted. This data is exported via SNMP as the dot3StatsMultipleCollisionFrames counter.
total collisions	Increments by the number of collisions a frame incurs.
failed, excess collisions	Increments when a frame transmission fails due to 16 succesive collisions. This error indicates a high volume of network traffic or hardware problems with the network. This data is exported via SNMP as the dot3StatsExcessiveCollisions counter.
failed, FIFO underrun	Increments when packet transmission fails due to the inability of the interface to retreive packets from the local packet buffer fast enough to transmit them onto the network.
failed, carrier sense err	Increments when a frame collides because the carrier detector is disabled. This error indicates a problem between the interface and it's Ethernet transceiver. This data is exported via SNMP as the dot3StatsCarrierSenseErrors counter.
SQE test error	Increments when the interface sends a frame but detects that the transceiver has no heartbeat. The packet is treated as successfully transmitted because some transceivers do not generate heartbeats. This data is exported via SNMP as the dot3StatsSQETTestErrors counter.
late collisions	Increments when a frame collides after transmitting at least 512 bits. This error indicates that an interface on the network failed to defer, or that the network has too many stations. This data is exported via SNMP as the dot3StatsLateCollisions counter.
internal MAC trans errors	Transmit errors that are not late, excessive, or carrier check collisions. This data is exported via SNMP as the dot3StatsInternalMacTransmit Errors counter.
Ethernet MAC code release	Microcode release working at the Ethernet communications processor.