



Collage 740 LAN Emulation Services User Guide

Software Release 1.1

U.S. Department of Defence & U.S. civilian agencies

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Collage 740 LAN Emulation Services User Guide

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Before you start

This guide explains how to use the LAN Emulation Services of the Collage 740 Backbone ATM Switch. It does not provide information about installing the Collage 740 or any of the option cards. For information about installing the Collage 740 and option cards, refer to the manuals provided with the switch and the option cards.

Audience

This guide is for network administrators. It assumes you are familiar with:

- Local Area Network (LAN) concepts and technical terminology.
- Asynchronous Transfer Mode (ATM) networking concepts and technical terminology.

Structure

This user guide is organized as follows:

- Chapter 1 Describes the new features and standards that this software release implements.
- Chapter 2 Describes the components in LAN Emulation.
- Chapter 3 Explains how to setup LANE Services in a Collage 740.
- Chapter 4 Explains how to connect a Collage 740 to another Madge ATM device.
- Chapter 5 Explains how to manage LANE services in a Collage 740.
- Appendix A Lists the default LANE settings on a new Collage 740.

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Introduction

This chapter provides information about the LANE Services provided by the Collage 740 Backbone ATM Switch.

Software revision history

Release 1.0

The Collage 740 software release 1.0 provided the following features:

- A full LAN Emulation (LANE) suite consisting of a LECS (LAN Emulation Configuration Server), a combined LES (LAN Emulation Server) and BUS (Broadcast Unknown Server), and a management LEC (LAN Emulation Client)
- A “smart” LES.

Release 1.1

The Collage 740 software release 1.1 provides the following features:

- up to 16 combined, resident LES/BUS
- A default Token-Ring ELAN and a default Ethernet ELAN
- A standby LES facility
- Resilient LES/BUS support
- A LECS that supports up to 64 ELANs.

Components in LANE

This chapter gives a basic overview on the components of LANE.

LAN Emulation

The principles of LAN Emulation

LAN Emulation (LANE) enables legacy LAN applications to use an ATM transport medium transparently. Therefore, end-stations on existing Token Ring and Ethernet LANs can communicate with ATM end-stations.

Components of LAN Emulation

- **LAN Emulation Client (LEC)**
Every device on an ELAN has one or more LECs. This interfaces with the ATM network and performs most of the work of LAN emulation.
- **LAN Emulation Server (LES)**
There is only one active LES allocated to each Emulated LAN (ELAN). The LES maintains a list containing both the LAN address (MAC address) and/or the route descriptor, and the ATM address for every LEC that is active on the ELAN.
- **Broadcast Unknown Server (BUS)**
There is only one active BUS on an ELAN. The BUS is normally part of the same software module as the LES and provides the ELAN with broadcast and multicast facilities. It has direct connections to every LEC on the ELAN.

- **LAN Emulation Configuration Server (LECS)**
There is only one active LECS in the network. The LECS maintains a list of all LESes. The LECS provides each LEC that contacts it with the ATM address of the LES hosting the ELAN that it should join. The LECS is usually located locally or remotely at the following ATM Forum Well-Known Address (WKA) 47.00.79.00.00.00.00.00.00.00.00.00.00.a0.3e.00.00.01.

Communication on an Emulated LAN

It is the LEC in an ATM device that will perform most of the work of LAN emulation. To do this it must join an ELAN.

Discovering the ATM address of the LES

Before a LEC can join an ELAN, it typically gets the ATM address of the LES from the LECS. The LECS decides which LES to direct a LEC to, on the basis of the information that the LEC gives it. For example, the LEC may provide the name of the ELAN it expects to join. Alternatively, the LECS may be configured to associate a particular LEC with a specific ELAN.

Discovering the ATM address of another LEC

Every LEC has one or more LAN addresses (for example, MAC address) and an ATM address associated with it. When the network operating system passes a frame to a LEC to transmit, the LEC checks whether it already has a connection set up to that frame's LAN destination address. If there is no existing connection, the LEC must discover the ATM address for that destination end-station, signal to the network for a connection, and then transmit the data.

To discover an ATM address, the LEC consults its list of ATM stations that it has communicated with. If the LEC cannot find the address it requires from its own list, it will communicate with the LES for the required address.

When a LEC needs an ATM address, it sends a LANE ARP (Address Resolution Protocol) request to the LES. If the LES knows the ATM address, it sends it to the LEC. If it does not know the ATM address, the LES may forward the address request to any LECs that are registered with it so that they can respond directly to the LES. The LES will then forward the response to the LEC.

Setting up the connection

When the LEC has discovered the ATM address of the required LEC, it signals to the ATM network for a Virtual Circuit Connection (VCC) to that LEC.

Transmitting the data

When the VCC is set up, the LEC transmits its data through the ATM network to the destination LEC.

Locating the LECS, LES, and BUS services

An ATM network may contain several ELANs. The network must only have one LECS, and each ELAN must have one active LES and one BUS.

The LECS, LES, and BUS constitute the LANE Services. These elements must reside on hosts that all the LECs on a network can access. They can be located on the same host or on different hosts, which may be one of the following:

- An ATM switch
- A dedicated workstation
- An existing or dedicated server. For example, the services could be implemented as NetWare Loadable Modules (NLMs) on a NetWare server.

Getting started with LAN Emulation

This chapter describes how to set up LAN Emulation (LANE) services in a Collage 740.

For step by step instructions on how to connect a Collage 740 to other Madge ATM devices, see Chapter 4 “Connecting to another Madge ATM device”.

Setting up LAN Emulation

If LANE services are to be hosted on the Collage 740 then you must determine the following:

- Determine whether this Collage 740 will host the LECS. If the LECS is local you will need to consider the ELANs that the LECS is in charge of. For information about commands you can use to change the location of the LECS, see “Configuring the LECS” in Chapter 5 “Managing LANE Services using the command-line interface”.
- Determine what ELANs this Collage 740 will host and create LESes to host the required ELANs. For information about configuring the local LES, see "Configuring the LES" in Chapter 5 “Managing LANE Services using the command-line interface”.
- Determine if secure ELANs are required. If secure ELANs are required then set up an ELAN client database in the Collage 740. For information about setting up ELAN clients, see “Managing ELAN clients” in Chapter 5 “Managing LANE Services using the command-line interface”.



Note: If you are not using Madge Proprietary Dynamic Routing (PDR), you will need to set up static routing entries in the Collage 740 routing table to access a remote LECS. For more information about PDR and setting up static routing entries, refer to the *Collage 740 Backbone ATM Switch User Guide* (part number: 100-239).

Connecting to another Madge ATM device

This chapter describes how to connect a Collage 740 to other Madge ATM devices.

It is assumed that all the Madge devices that are being attached to the Collage 740 are in their factory default states and that port and routing configurations have been completed, as required. For more information about the port and routing configuration that is required, refer to the *Collage 740 Backbone ATM Switch User Guide* (part number: 100-239).

Default state of a Collage 740

- **Default port configuration**
For a list of all the Collage 740 default port settings, see Appendix A “Default settings on a new Collage 740” of the *Collage 740 Backbone ATM Switch User Guide* (part number: 100-239).
- **Default routing table configuration**
No routes are held in the routing table on a Collage 740.
By default, the Madge Proprietary Dynamic Routing (PDR) is enabled on all Collage 740s to communicate routing information.
- **Default LAN Emulation configuration**
For a list of all the Collage 740 default LANE services settings, see Appendix A “Default settings on a new Collage 740”.

Connecting a Collage 740 to a Madge 155 NIC Workstation

Assumptions

The LECS, LES and BUS are situated in the Collage 740.

The Madge 155 NIC Workstation:

- is running software version 1.1 or later.
- is configured for a LEC.
- is configured for a remote LECS using the WKA.

Configuration	Commands
LAN Emulation	Set the Collage 740 to host the LECS locally, by typing: C740: />lane lecs location local wka

For more information, refer to the *Madge LAN Emulation Software Installation Guide* (100-190).

Connecting a Collage 740 to a Collage 540

Assumptions

The LECS, LES and BUS are situated in the Collage 740.

On the Collage 540 Token Ring-ATM Access Switch:

- the LECS is not advertising its internal LECS at the WKA
- the LECS location is remote and is using the WKA.

Configuration	Commands
LAN Emulation	Set the Collage 740 to host the LECS locally, by typing: C740: />lane lecs location local wka

Connecting a Collage 740 to another Collage 740

Assumptions

The LECS, LES and BUS are situated in the Collage 740 (switch one).

Configuration	Commands to be executed on switch one
LAN Emulation	Set switch one to host the LECS locally, by typing: C740:~/>lane lecs location local wka

Configuration	Commands to be executed on switch two
LAN Emulation	No LANE changes required on the Collage 740 (switch two). This will give you a resilient LES/BUS for the Collage740ElanTrn ELAN and the Collage740ElanEth ELAN.

Connecting a Collage 740 to a Collage 250 or a Collage 280

Assumptions

The LECS, LES and BUS are situated in the Collage 740 and the ELAN name is that of the Collage 250/280. By default, a Collage 250/280 Workgroup ATM Switch will request to join an ELAN with the same name.

The Collage 250/280 Workgroup ATM Switch is running software version 2.1.2 or later.

The LECS location of the Collage 280 Workgroup ATM Switch is set to remote.

Configuration	Commands
LAN Emulation	Set the Collage 740 to host the LECS locally, by typing: C740:~/>lane lecs location local wka

Connecting a Collage 740 to a Collage 530

Assumptions

The LECS, LES and BUS are situated in the Collage 740.

The Collage 530 Ethernet-ATM Access Switch is running software version H2.1S or later.

Configuration	Commands
LAN Emulation	Set the Collage 740 to host the LECS locally, by typing: C740:/>lane lecs location local wka Create a 'default' LES/BUS on the Collage 740, by typing: C740:/>lane les create default auto ethernet 5 6

Managing LANE Services using the command-line interface

This chapter describes the features of the LAN Emulation (LANE) components in a Collage 740 and how to use the command-line interface to manage these components using the Collage 740. For information about how to access and use the command-line interface, see Chapter 4 “How to use the command-line interface” in the *Collage 740 Backbone ATM Switch User Guide* (100-239).

The Collage 740 can host one LECS, one management LEC, and multiple combined LES and BUS. The Collage 740 LES can be disabled and does not have to reside in the same device as the LECS. The following sections list the default settings and properties of the LECS, LES, BUS, and LEC in a Collage 740.



Note: It is recommended that, if the Collage 740 LANE Services are to be used, then the LECS, LES, and BUS reside in a Collage 740 that is running software release 1.1 or later.

LANE commands

List of commands

LANE command	Page	LANE command	Page
lane elan client create alias	45	lane lec laa	54
lane elan client create atm	44	lane lec restart	56
lane elan client create mac	45	lane lec show	49
lane elan client delete	47	lane lec statistics	58
lane elan client show	46	lane lec type	53
lane elan create	32	lane lecs default	35, 37
lane elan delete	33	lane lecs location	20, 21
lane elan les	38	lane les create	23
lane elan rename	34	lane les delete	30
lane elan ring	39	lane les elan	27
lane elan security	40	lane les mode	28
lane elan show	31	lane les restart	30
lane lec arpcache	57	lane les show	24, 25
lane lec elan	51		

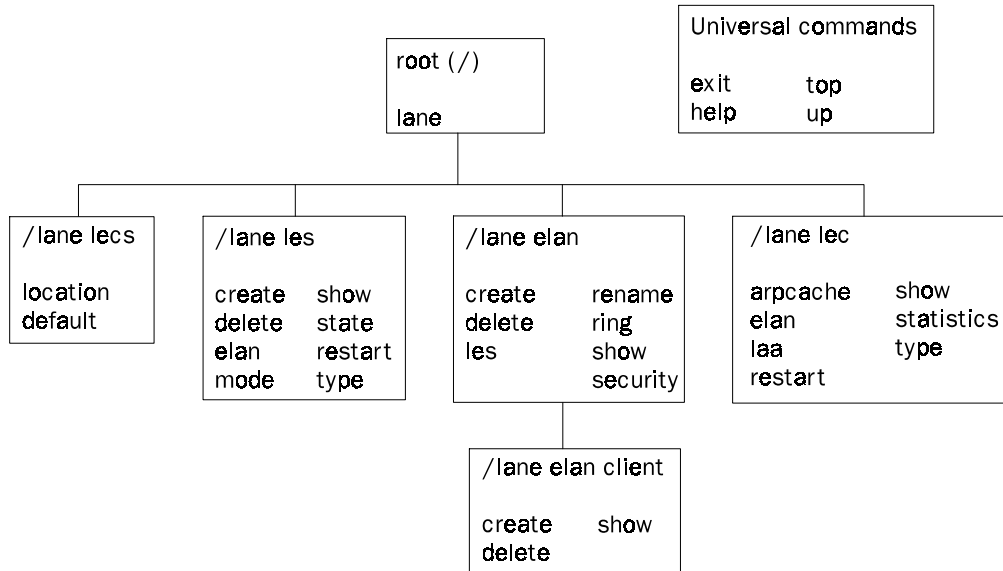
Command hierarchy

Figure 5.1 displays the hierarchy of the LANE commands in the command-line interface. To locate information about a specific LANE command, use the list of commands at the beginning of this chapter.



Note: Certain functional groups in the hierarchy are also commands in their own right. For example, the `vport show` functional group is also a command when entered on its own.

Figure 5.1 Hierarchy of LANE commands from the root LANE directory



Collage 740 LANE Services

The LECS in a Collage 740

- By default, the Collage 740 LECS location is set to “remote at WKA”.
- The Collage 740 LECS can support up to 64 ELANs.
- The Collage 740 pre-defines three ELANs:
 - A Token-Ring ELAN named "Collage740ElanTrn".
 - An Ethernet ELAN named "Collage740ElanEth".
 - An Ethernet ELAN named “default”. This is used when a Collage 530 Ethernet-to-ATM Access Switch is being hosted.
- The Collage 740 has default ELANs that will be used if the LEC does not specify an ELAN name but does specify the ELAN type:
 - The default Token-Ring ELAN named "Collage740ElanTrn".
 - The default Ethernet ELAN named "Collage740ElanEth".

In a Collage 740 LECS, you can define a default ELAN that will be used when a LEC does not specify the ELAN name or the ELAN type.

- The Collage 740 LECS supports the proprietary “Madge automatic LES address determination method” (ALD) to locate a suitable LES for an ELAN. All Madge LES will automatically register with the LECS and the benefit of this is when a LES is re-located, you do not have to reconfigure the LECS with the LES new address.

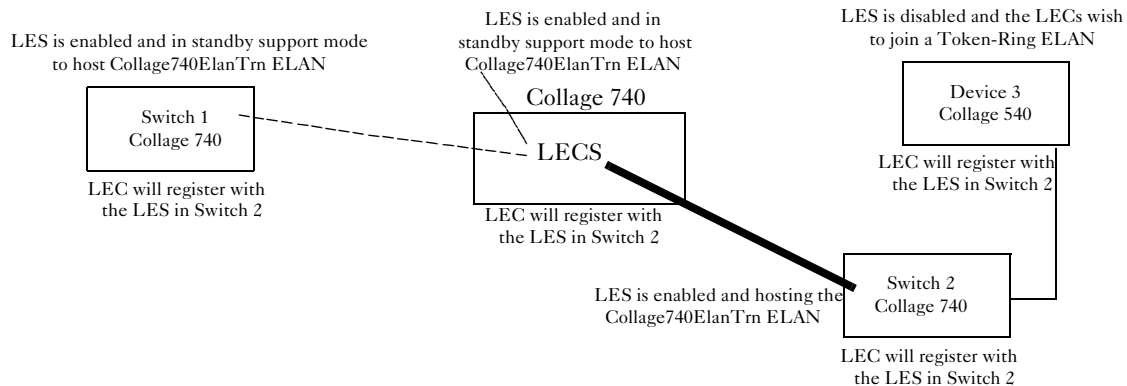
The LES and BUS in a Collage 740

- The Collage 740 can provide up to 16 combined LES/BUS, each of which can operate either in Token-Ring or Ethernet mode.
- By default, all Collage 740s on the network have two LES/BUS that will try to register with the LECS. The default Token-Ring ELAN named “Collage740ElanTrn” and the default Ethernet ELAN named “Collage740ElanEth”.
- All Madge LESes (excluding LESes on the Collage 280 Workgroup ATM Switch) support the proprietary Madge ALD. Therefore, all Madge LESes can automatically register with a Madge LECS. The benefit of this is that a LES can be re-located without reconfiguring the LECS or the LECs on the ELAN hosted by the re-located LES.
- Software release 1.1 enables the LECS to support standby LESes. The benefit of this can be seen on a network where you have several Collage 740s (all with software version 1.1 or later) and the LECS is located in one of these Collage 740s.

You can leave all the LESes in all the other Collage 740s enabled and requesting to host the same ELAN name (for example, Collage740ElanTrn). The first LES to contact the LECS will host the Collage740ElanTrn ELAN; all the other LESes will provide standby support for the ELAN. Should the original LES fail for any reason, one of the standby LESes will become the main LES and host the Collage740ElanTrn ELAN. This ensures that the ELAN remains up and available to all LECs on the ELAN.

An example on the next page further explains LES resilience in detail.

Example:



When all Madge LESes are enabled and trying to host the same ELAN name, the first LES on the network to register with the Collage 740 LECS will host the “Collage740ElanTrn” ELAN. (By default, all Collage 740 LESes will try to host this Token-Ring ELAN).

In the example above, the Madge LES in Collage 740 (switch 2), is the first to register with the Collage 740 LECS. The other Madge LES in Collage 740 (switch 1) tries to register with the Collage 740 LECS, but is unsuccessful and remains in standby support mode. All LECs will register with the Madge LES in switch 2.

Should the registered Madge LES in switch 2 fail, or you wish to remove switch 2 from the network then the Madge LES in switch 1 (with the same ELAN name and ELAN type) on the network will try to re-register with the LECS. The first Madge LES to register with the Collage 740 LECS will host the Collage740ElanTrn ELAN. As soon as the Madge LES in switch 2 is de-activated, all of the LECs immediately communicate with the LECS, which points them to the Madge LES in switch 1. The LECs then re-register with the Madge LES in switch 1.

The management LEC in a Collage 740

- The Collage 740 has one management LEC for managing the Collage 740. It supports several high-level protocols such as:
 - Telnet for a command-line interface.
 - UDP for SNMP management and TFTP software upgrades.
 - BOOTP for obtaining Collage 740's IP address from a server.
 - ICMP for PING inward and outward for IP network configuration diagnosis.
- By default, the Collage 740 management LEC uses the Burnt-In Address (BIA) as its MAC address. This address can be overridden and a Locally Administered Address (LAA) can be assigned. The management LEC will register this address with the LES that is hosting the ELAN that the LEC wishes to join.
- The Collage 740 management LEC can be assigned to register with a Token-Ring or an Ethernet ELAN. By default, it is assigned to a Token-Ring ELAN.

Configuring the LECS

Any ATM network using LANE must have one (and only one) LECS that acts as a central co-ordinator, making sure that all LECs join the correct ELANs. The Collage 740 can host this LECS, or it can use a LECS in another switch, or in an end-station such as a NetWare server.

Viewing the location of the LECS

The LECS can be active at one of the following locations:

- Its own local internal LECS at the WKA (Well-Known Address)
- Its own local internal LECS at a specific address.
- A remote LECS at the WKA.
- A remote LECS at a specific ATM address on the network.



Note: If you are not using Madge Proprietary Dynamic Routing (PDR), you will need to set up static routing entries in the Collage 740 routing table to access a remote LECS. For more information about PDR and setting up static routing entries, refer to the *Collage 740 Backbone ATM Switch User Guide* (part number: 100-239).

For information on how to change the location of the LECS, see “Changing the location of the LECS” later in this chapter.

By default, the Collage 740 management LEC and LES/BUS ignore the local LECS and seek a remote LECS at the WKA. The ATM Forum defines this address as 47.00.79.00.00.00.00.00.00.00.00.00.00.A0.3E.00.00.01.

To view the current location of the LECS, use the `lane lecs location` command:

Command: `C740: />lane lecs location`

Output: The LECS is local, at the ATM Forum Well-Known Address.

Changing the location of the LECS

For information on the different locations of the LECS, see “Viewing the location of the LECS” earlier in this chapter.

To change the location of the LECS, use the `lane lecs location` command:

Command: `C740: />lane lecs location <location>`

Parameters: `<location>` The location of the LECS. This can be one of the following:

<code>local wka</code>	The local LECS at the WKA.
<code>local <selector></code>	The local LECS at a specific address. The LECS will advertise the Collage 740 address plus this selector.
<code>remote wka</code>	A remote LECS at the WKA.
<code>remote <atm-addr></code>	A remote LECS at a specific ATM address on the network.



Note: Changing the LECS location may disrupt all LANE connections and any change will take effect immediately.

Configuring the LES

This section describes the commands used to manage a LES in the Collage 740.

Creating a new LES

The Collage 740 can provide up to 16 combined LES/BUS, each of which can operate either in Token-Ring or Ethernet mode.

When creating a new LES you should note the following:

- If the LECS is hosted in a Collage 740 that is currently running software version 1.1 then the mode should be set to “auto”. This will use the proprietary Madge ALD to locate the LES to host the ELAN. Software version 1.1 will also support standby LESEs. For more information about the proprietary method and support for standby LESEs, see “Collage 740 LANE Services” earlier in this chapter.
- If the LECS is hosted in a Collage 740 that is currently running software version 1.0 then the mode should be set to “single”. This will use the proprietary Madge ALD to locate the LES to host the ELAN, but does not support standby LESEs. For more information about the proprietary method, see “Collage 740 LANE Services” earlier in this chapter.
- If the LECS is hosted in a non-Madge device, the mode should be set to “manual”. If the LES address determination method is set to “manual” and you move the LES then you will need to manually re-configure the LECS to find the LES.



Note: You should treat the following devices as non-Madge devices for the purpose of creating a LES: Collage 250/280.

To create a new LES in the switch, use the `lane les create` command.

Command: C740:/>lane les create <elan-name> <mode> <type> <les-selector> <bus-selector>

Example: C740:/>lane les create suraya auto token-ring 10 11

Parameters:	<elan-name>	Enter the name of the ELAN that the new LES will host. The ELAN name should be unique within the ATM network. This parameter is case-sensitive.
	<mode>	Enter the mode type is either “auto”, “single”, or “manual”. See explanation in the above text for correct mode usage.
	<type>	Enter the type of LES ELAN is either “token-ring” or “ethernet”.
	<les-selector>	Enter the 1 or 2 digit hexadecimal ATM selector for the LES.
	<bus-selector>	Enter the 1 or 2 digit hexadecimal ATM selector for the associated BUS functions.



Note: Each selector entered, when creating a LES, must be unique on the switch. You can use the `lane les show` command to view a list of all selector currently in use.

Viewing all LESes

For all LESes that are currently held in the Collage 740 database, you can list the name of a LES, the type of LES, and whether or not it is enabled. All selectors that are currently in use are also displayed.

To list all the LESes, use the `lane les show` command.

Command: C740: /> lane les show

Example: C740: /> lane les show

Output:

Name	Type	Enabled	Selectors	
			LES	BUS
Collage740ElanTrn	Token Ring	Yes	01	02
suraya	Token Ring	Yes	03	04
Collage740ElanEth	Ethernet	Yes	05	06
default	Ethernet	Yes	10	11
adam	Token Ring	Yes	23	28

Viewing LECs using a specific LES

You can list all LECs (clients) that are currently using a specific LES.

To list all the LECs currently using a specific LES, use the `lane les show` command.

Command: C740: /> lane les show [<elan-name>]

Example: C740: /> lane les show suraya

Parameter: <elan-name> Enter the name of the LES ELAN.

Output: Information for Emulated LAN 'suraya'
Type: Token Ring
Maximum frame size (bytes): 18190
LES address: 39.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.07.80.E0.01
BUS address: 39.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.07.80.E0.02
LES Registration mode: auto
- the LES can register automatically and can go standby
if there is already an active LES
The LES is actively running the elan
Client 1: 39.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.07.80.E0.81
Registered MAC addresses:
00.00.6F.07.80.E0
Client 2: 39.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.00.28.05.82
Registered MAC addresses:
00.00.F6.00.14.A3
Registered Route Descriptors:
1-618

The `lane les show` command displays the information described in Table 5.1.

Table 5.1 Output from the lane les show command

Field	Description
Information	The name of the ELAN hosted by the LES.
Type	The type of ELAN. This can be either Token-Ring or Ethernet.
Maximum frame size	The maximum frame size the ELAN can support.
LES address	The ATM address of the LES.
BUS address	The ATM address of the BUS.
Client	For each LEC that is registered with the LES, the ATM address and the MAC address of the LEC are displayed. If the LEC is a source-routing bridge then the Route Descriptor is also displayed.

Changing the ELAN name that the LES will host

You can change the name of the ELAN that the LES will host. The name must be that of an ELAN somewhere on the network that is known to the LECS that the local LES will host.

To change the ELAN name that the LES will host, use the `lane les elan` command.

Command: `C740:/>lane les elan <old-name> <new-name>`

Example: `C740:/>lane les elan suraya simon`

Parameters: `<old-name>` The current name of the ELAN hosted by the LES that you want to change.
This parameter is case-sensitive.

`<new-name>` The name of an ELAN somewhere on the network that is known to the LECS that the local LES will host. This parameter is case-sensitive.



Note: The above command will take immediate effect. The command must be used with care as all LECs will be thrown off the ELAN hosted by the LES.

Viewing the LES registration mode

To view the registration mode of a LES, use the `lane les mode` command.

Command: C740:./>lane les mode <elan-name>

Example: C740:./>lane les mode suraya

Output: LES "suraya" registers automatically
The LES can act as a standby LES

Changing the LES registration mode

Before you change the registration mode of a LES, you must be aware of the mode of the ELAN that it will be hosting. Refer to the table below for the compatible LES and ELAN modes that should be used.

Table 5.2 Compatible LES and ELAN modes

LES mode	LECS ELAN mode
single	auto
auto	auto
manual	manual

By default, for pre-defined ELANs the LES mode is auto and the LECS ELAN mode is auto.

To change the registration mode of the LES, enter the `lane les mode` command.

Command: C740:/>lane les mode <elan-name> {auto | single | manual}

Example C740:/>lane les mode suraya auto

Parameters:	<elan-name>	The name of the ELAN that the new LES will host. This parameter is case-sensitive.
	auto	The LES will register with the LECS using the proprietary Madge ALD. Standby LESes are supported in this mode.
	single	The LES will register with the LECS using the proprietary Madge ALD. Note, standby LESes are not supported in this mode.
	manual	The LES will use the ATM Forum-compliant method. This means that you must manually register the LES with the LECS.



Note: For information about the proprietary Madge ALD, see “Creating a new LES” earlier in this chapter.



Note: The above command will take immediate effect. The command must be used with care as all LECs will be thrown off the ELAN hosted by the LES.

Deleting a LES

To delete a LES from the switch, use the `lane les delete` command.

Command: C740: /> lane les delete <elan-name>

Example: C740: /> lane les delete adam
This will force all attached LECs off the ELAN - do you want to continue (Y/N)?
y
Done!



Note: When you delete a LES, all attached LECs are forced off the ELAN.

Restarting the LES

To restart the LES, use the `lane les restart` command.

Command: C740: /> lane les restart



Note: This command will force all clients off the LES.

Configuring an ELAN

Listing all ELANs known to the local LECS

In a Collage 740 LECS running software release 1.1, the LECS will support 64 ELANs and has three pre-defined ELAN names. These are “Collage740ElanTrn” that supports Token-Ring ELANs, “Collage740ElanEth” that supports Ethernet ELANs, and “default” ELAN that supports Ethernet ELANs. The “default” ELAN is used when your network includes a Collage 530 Ethernet-ATM Access Switch device. A Collage 530 will usually request to join an ELAN named “default”.

For each ELAN that is known to the LECS, the following information is displayed: the name, the type, and the mode of the LES that is hosting the ELAN. If the LES mode displays “Automatic” then the LES will use the proprietary Madge ALD to inform the LECS about the ELAN that it wishes to host. Otherwise the address of the LES must be entered manually for the LECS.

For Token-Ring ELANs, the ELAN's ring number is displayed. This is only relevant if there are source-routing bridges, such as the Token-Ring ports of the Collage 540, connected to the ELAN.

To display a list of ELANs that are known to the local LECS, enter the `lane elan show` command:

Command: C740:>lane elan show

```
Output:  Name                Security  Type      Ring
          LES Mode
-----
Collage740ElanTrn          Open      Token Ring  FF0
          Auto at 39.00.00.00.00.00.00.6F.07.00.0A.00.00.6F.07.00.0A.01
Collage740ElanEth          Open      Ethernet
          Auto at 39.00.00.00.00.00.00.6F.07.00.0A.00.00.6F.07.00.0A.03
default                    Open      Ethernet
          Auto at 39.00.00.00.00.00.00.6F.07.00.0A.00.00.6F.07.00.0A.05
```

Creating a new ELAN

You can define up to 64 ELANs that will be known to the LECS on a Collage 740.

If the LES mode displays “Automatic” then the LES will try to automatically register with the LECS using the proprietary Madge ALD. For more information about this proprietary method, see “Collage 740 LANE Services” earlier in this chapter.

To create a new ELAN, enter the `lane elan create` command:

Command:	C740:./>lane elan create <newname> <les-id> ethernet	
	or	
	C740:./>lane elan create <newname> <les-id> token-ring <ring-no>	
Parameters:	<newname>	The name of the new ELAN.
	<les-id> auto	If the LES is located in a Madge device (other than the Collage 280 or the Collage 250), you can use “auto”. See the explanation above.
	ATM address	If the LES is located in a non-Madge device or in a Collage 250 or a Collage 280 then you must enter a standard ATM address for the <les-id>.
	<ring-no>	The ring number for a Token Ring ELAN.



Note: The above change will take effect immediately.

Deleting an ELAN

When you delete an ELAN that is currently being used, no new LECs wishing to join the ELAN will be able to find it.

However, current LECs using this ELAN will not be affected until they lose connection to the LES and try to re-connect.

You must be aware of the following changes that will be required when you delete an ELAN:

- Any LECs that specified the deleted ELAN must now be configured to use a new ELAN.
- If the deleted ELAN was a default ELAN then you should define a new default ELAN to replace the deleted ELAN.
- Any LES or LESes that hosted the deleted ELAN should be deleted, wherever the LES may be located in the network.

To delete an ELAN, enter the `lane elan delete` command:

Command: `C740:/>lane elan delete <name>`

Parameters: `<name>` The name of the ELAN to be deleted.



Note: The above change will take effect immediately.

Renaming an ELAN

You can rename an existing ELAN. The `rename` command will change the name known to the LECS. Therefore, no changes are required if the renamed ELAN is also a default ELAN.

You must be aware of the following changes that will be required, when you rename an ELAN:

- Any LECs that specified the old ELAN name, must be configured to use the new ELAN name. Otherwise, if these LECs lose connection with the LES they will not be able to use the renamed ELAN.
- Any LES or LESes that used the old ELAN name should be renamed to use the new ELAN name, wherever the LES may be located in the network.

To rename an ELAN, enter the `lane elan rename` command:

Command: C740: />lane elan rename <oldname> <newname>

Parameters: <oldname> The current name of the ELAN.

<newname> The new name of the ELAN



Note: The above change will take effect immediately.

Viewing default ELANs

When a LEC contacts the LECS, it usually specifies the ELAN name or the ELAN type that it wants to join. The LECS in a Collage 740 will enable you to define up to 64 different ELAN names. You can also define default ELANs that the LEC should join should it only specify the ELAN type. However, in some cases the LEC may neither specify an ELAN name nor the ELAN type that it wishes to join. For these cases, you can set a default ELAN that will be used.

The following default ELAN types can be specified in the LECS. The default settings in a Collage 740 are also provided:

- Token Ring ELAN - A default ELAN name of “Collage740ElanTrn” is specified in a Collage 740 for this ELAN type.
- Ethernet type ELAN - A default ELAN name of “Collage740ElanEth” is specified in a Collage 740 for this ELAN type.
- Unspecified type ELAN - No default ELAN name is specified in a Collage 740. This ELAN name will be used when the LEC provides neither an ELAN name nor a specific ELAN type that it wants to join.

To display the default ELANs that have been specified in the LECS, use the `lane lecs default` command:

Command: C740: />lane lecs default

Output: Default Token Ring ELAN: Collage740ElanTrn
Default Ethernet ELAN: default
Default ELAN for unspecified type: default



Note: To change the ELAN names for the default ELAN names, see “Specifying default ELANs” later in this chapter.

Specifying default ELANs

For information on default ELANs, see “Viewing default ELANs” earlier in this chapter.

To specify a default ELAN, use the `lane lecs default` command:

Command: `C740:/>lane lecs default <type> <name>`

Example: `C740:/>lane lecs default token-ring Collage740ElanTrn`

Parameters: `<type>` The type of ELAN that a LEC or LES asks to join or host. You can select one of the following types:
“token-ring” - a Token-Ring ELAN type.
“ethernet” - an Ethernet ELAN type.
“unspecified” - This is used when neither an ELAN name nor a specific ELAN type has been specified.

`<name>` The name of the ELAN to use when a LEC does not specify the ELAN.
If you want to remove a default ELAN name enter none.

Changing the operating mode of an ELAN

You can change the way in which the LECS learns the location of the LES for an ELAN.

If the LES is hosted on a Madge device (excluding a Collage 280, and a Collage 250), enter “auto” instead of the ATM address of the LES. This will enable the Collage 740 to use the proprietary Madge ALD to locate a suitable LES for the specified ELAN. For more information about this proprietary method, see “Collage 740 LANE Services” earlier in this chapter.

To change the operating mode of the LES, enter the `lane elan les` command:

Command: C740:./>lane elan les <name> [auto | <atm-addr>]

Example: C740:./>lane elan les Collage740ElanTrn auto

Parameters:	<name>	The name of the ELAN.
	auto	The Madge LES will host the ELAN.
	<atm-addr>	The full ATM address of the LES that will host the ELAN.

Changing the ELAN ring number

The ring number is the unique identifier that applies only if the ELAN type is Token Ring.

You can change the ring number for a Token Ring ELAN. The change will not take effect until the next time that a LES registers with the LECS for the ELAN. Therefore, it does not affect any Token Ring ELANs whose LES is already registered with the LECS. When a new LES registers with the LECS for this ELAN, the LECS will tell it the new ring number value.

To change the ring number of a Token Ring ELAN, use the `lane elan ring` command:

Command: `C740:/>lane elan ring <name> <ringno>`

Example: `C740:/>lane elan Collage740ElanTrn AB7`

Parameters: `<name>` The name of the Token Ring ELAN.

`<ringno>` The new ring number. This is entered as one to three hexadecimal digit(s).

Changing the security of an ELAN

You can change the security of an ELAN. By default, all ELANs are open ELANs when they are created. This means that any LEC can request to join the open ELAN.

If an ELAN is closed then only LECs that have client mappings to the ELAN will be able to access the secure ELAN. For more information about setting up client mappings, see “Managing ELAN clients” later in this chapter.

To change the security of an ELAN, enter the `lane elan security` command:

Command:	<code>C740: />lane elan security <name> {open closed}</code>	
Parameters:	<code><name></code>	The name of the ELAN.
	<code>open</code>	Change the security of the named ELAN to open.
	<code>closed</code>	Change the security of the named ELAN to closed.



Note: The above change will take effect immediately, but will not affect LECs that are already on the ELAN.

Managing ELAN clients

A client is a LEC on a ELAN. You can set up ELAN client mappings:

- To enable you to map a LEC from one ELAN to another.
- To allow only the LECs that match the ELAN client mappings to join a specific secure ELAN. For more information about setting up a secure ELAN, see “Changing the security of an ELAN” earlier in this chapter.

ELAN client mappings are stored in the local LECS database. These mappings tell the LECS to assign a LEC or group of LECs to a specific ELAN. In total, up to 512 mappings can be stored in the local LECS database.

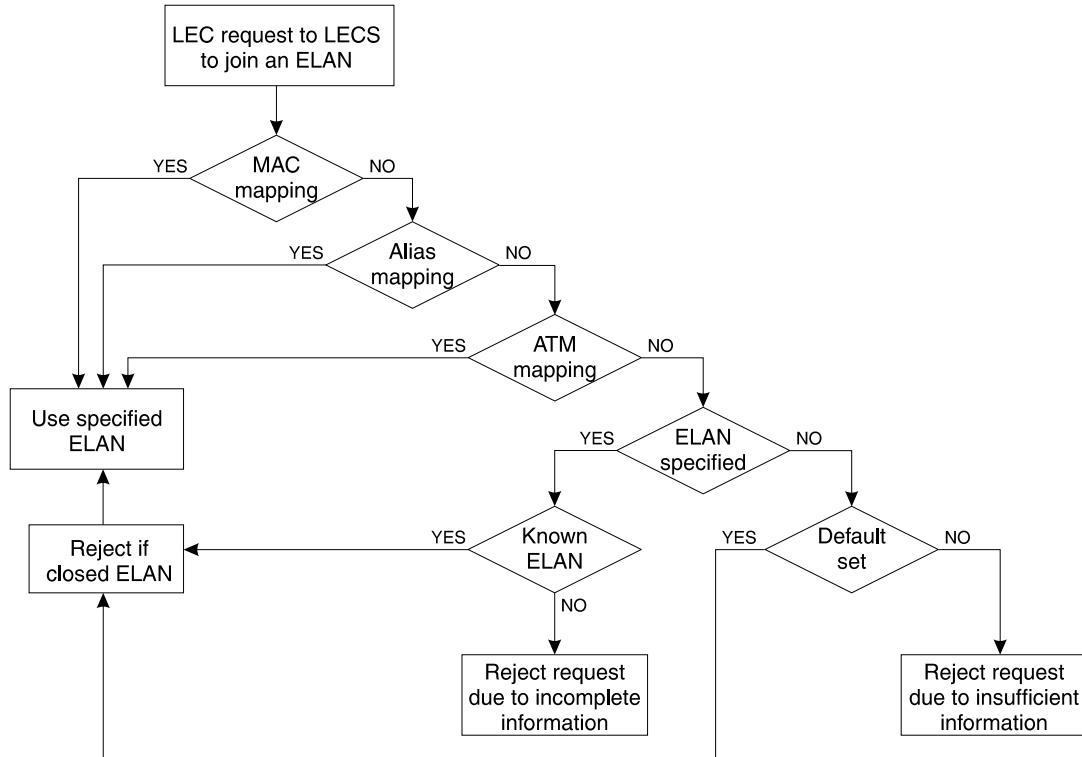
An ELAN client mapping allows you to map a LEC or group of LECs to a specific secure ELAN based on one of the following:

- An ATM address
- A MAC address
- An alias ELAN name. The alias is provided by the LEC in its configuration request to the LECS.

An ATM address or an alias ELAN name mapping usually refer to a group of LECs, whereas a MAC address mapping always refers to a specific LEC. In this way you can create generic mappings instead of a separate mapping for each and every LEC.

Figure 5.2 shows how client mappings are used when a LEC sends a request to the LECS to join an ELAN.

Figure 5.2 Flowchart showing how client mapping is used



When a LEC contacts the LECS, the LECS will search its mappings database. If more than one mapping matches the LEC, the first of each mapping type is considered.

If there are still multiple matches, the order of precedence is:

- MAC mapping
- Alias mapping
- ATM mapping

If there are no matches then the ELAN name in the LEC request message is used to match to a known ELAN:

- If a matching ELAN is found and it is an open ELAN then this ELAN is used. If it is a secure (closed) ELAN the LEC request is rejected.
- If the ELAN is not known then the LEC request is rejected due to incomplete information.
- If no matching ELAN is found then the LEC request is rejected due to insufficient information.

Creating an ELAN client mapping

When you create a new ELAN client mapping to a specific ELAN, first you must decide whether it is a single LEC or a group of LECs that is to be mapped.

You must then decide what type of ELAN mapping to use. Possible mapping types are:

- An ATM address: the mappings refer to a specific LEC or a group of LECs.
- An alias ELAN name: the mappings refer to a specific LEC or a group of LECs.
- A MAC address: the mappings always refer to a specific LEC.

To create a new client mapping for a LEC ATM address, use the `lane elan client create atm` command:

Command: C740:./>lane elan client create atm <address value> <address mask> <ELAN name>

Example: C740:./>lane elan client create atm 39.00.00.00.00.20.00.00.00.00.00.00.1.2.3.4.5.6.7.01
ff.ff.ff.ff.ff.ff.ff.ff.ff.ff.ff.00.00.00.01 adams_elan

Parameters:	<address value>	The full 20-byte ATM address.
	<address mask>	The portion of the <address value> that needs to match the LEC's ATM address for the mapping to apply.
	<ELAN name>	The name of the ELAN known to the LECs.

To create a new client mapping for a LEC MAC address, use the `lane elan client create mac` command:

Command: C740: />lane elan client create mac <MAC address> <ELAN name>

Example: C740: />lane elan client create mac 00.00.F6.11.2A.3 surayas_elan

Parameters: <MAC address> The MAC address of the LEC that needs to be mapped to the specified ELAN.

<ELAN name> The name of the ELAN known to the LECS.

To create a new client mapping for a LEC ELAN alias, use the `lane elan client create alias` command:

Command: C740: />lane elan client create alias <alias name> <ELAN name>

Example: C740: />lane elan client create alias arif dawn_s_elan

Parameters: <alias name> The name that the LEC provides in its configuration request to the LECS.

<ELAN name> The name of the ELAN known to the LECS.

Displaying ELAN client mappings

To display all ELAN client mappings, use the `lane elan client show` command:

Command: C740:./>lane elan client show [atm | mac | alias]

Parameters: If no parameter is supplied, all mappings will be listed.

atm Lists only LEC ATM address to ELAN mappings.

mac Lists only LEC MAC address to ELAN mappings.

alias Lists only LEC alias ELAN name to ELAN mappings.

Example: lane elan client show

```
Output: map_name(id)  addr_value          ELAN name
        addr_mask
        1          39.00.00.00.00.20.00.00.00.00.00.00.1.2.3.4.5.6.7.01
        ff.ff.ff.ff.ff.ff.ff.ff.ff.ff.ff.00.00.00.00.01
        --> adams_elan
        map_name(id)  mac_value          ELAN name
        2          00.00.F6.11.2A.3  --> dawns_elan
        map_name(id)  alias             ELAN name
        3          arif                --> surayas_elan
```

Deleting ELAN client mappings

To delete an ELAN client mapping, use the `lane elan client delete` command:

Command: `C740:/>lane elan client delete <mapping identifier>`

Example: `lane elan client delete 2`

Parameters: `<mapping identifier>` This is the identifier for the mapping you wish to delete.
Use the `lane elan client show` command to display the identifiers for the mappings. For more information about this command, see the section “Displaying ELAN client mappings” earlier in this chapter.



Note: The above command does not affect clients that are already registered and joined to the ELAN. If you want to make sure that any deleted clients are no longer using the ELAN then you must restart the LES for the ELAN. Use the `lane les restart` command. This will force all clients off the ELAN and all clients will have to re-register.

Configuring the management LEC

The Collage 740 has one management LEC for managing the Collage 740. It supports several high-level protocols such as:

- Telnet for a command-line interface.
- UDP for SNMP management and TFTP software upgrades.
- BOOTP for obtaining Collage 740's IP address from a server.
- ICMP for PING inward and outward for IP network configuration diagnosis.

By default, the Collage 740 management LEC uses the Burnt-In Address (BIA) as its MAC address. This address can be overridden and a Locally Administered Address (LAA) can be assigned. The management LEC will register this address with the LAN Emulation Server (LES) that is hosting the Emulated LAN (ELAN) the LEC wishes to join.

The Collage 740 management LEC can be assigned to register with a Token-Ring or an Ethernet ELAN. By default, it is assigned to a Token-Ring ELAN.

Viewing information about the management LEC

To view information about the management LEC, enter the `lane lec show` command.

Command: `C740:/>lane lec show`

The `lane lec` information command displays the information described in Table 5.3.

Table 5.3 Output from the `lane lec show` command

Field	Description
BIA	The switch's BIA, which will be used as the management LEC's MAC address, if the LAA address is not set.
LAA	The LAA, which will be used as the management LEC's MAC address if set. If zeros are displayed, the management LEC will use the BIA.
ELAN name (actual)	The name of the ELAN that the management LEC is currently registered with.
ELAN name (configured)	The name of the ELAN that the management LEC will attempt to register with when it is restarted.
LAN type (actual)	The type of ELAN that the management LEC is currently registered with.

Table 5.3 Output from the lane lec show command

Field	Description
LAN type (configured)	The type of ELAN that the management LEC will attempt to register with when the LEC is restarted.
LES address	The ATM address of the LES that is hosting the ELAN.
Maximum frame size (bytes)	The maximum frame size that the ELAN can support. The value is obtained from the LES.

Managing the ELAN for the management LEC

You can select the ELAN that the management LEC will attempt to join. By default, the management LEC leaves this decision to the LECS.

You can:

- Specify the ELAN that the management LEC will attempt to join.
- Set up the LECS to dictate which ELAN the management LEC will attempt to join.
- View the current ELAN that the management LEC will attempt to join.



Note: Any changes caused by the following commands will not take effect until the Collage 740 management LEC is restarted. To restart the Collage 740 management LEC, use the `lane lec restart` command.

To specify the ELAN that the management LEC will attempt to join, enter the `lane lec elan` command:

Command: `C740:/>lane lec elan <name>`

Example: `C740:/>lane lec elan Collage740ElanTrn`

Parameters: `<name>`

The name of the new ELAN that the management LEC will attempt to join. The ELAN must be somewhere on the network and known to the LECS.

To leave the decision about the ELAN that the management LEC joins, to the LECS, enter the `lane lec elan` command:

Command: C740: />lane lec elan -

Example: C740: />lane lec elan -

Parameters: - (hyphen) The decision about which ELAN the management LEC will attempt join is left to the LECS.

To view the name of the ELAN that the management LEC will try to join, enter the `lane lec elan` command:

Command: C740: />lane lec elan

Output: The management LEC will ask to join the default ELAN

Viewing or changing the ELAN type for the management LEC

You can view or change the type of ELAN that the management LEC will attempt to join. By default, the ELAN type is set to Token Ring in the Collage 740.

To view the ELAN type for the management LEC, enter the `lane lec type` command:

Command: C740:/>lane lec type

Output: The Management LEC will join a Token Ring ELAN
The Management LEC is currently joined to a Token Ring ELAN

To change the ELAN type for the management LEC, enter the `lane lec type` command:

Command: C740:/>lane lec type <type>

Parameters: <type> This can be set to either “ethernet” or
“token-ring”.



Note: The change caused by the above command will not take effect until the Collage 740 management LEC is restarted. To restart the Collage 740 management LEC, use the `lane lec restart` command.

Managing a Locally Administered Address for the management LEC

If you have an ELAN that uses its own block of MAC addresses, you may want the management LEC's MAC address to conform to this scheme by assigning a Locally Administered Address (LAA). When no LAA is defined, the management LEC will use the Collage 740's BIA.

You can:

- View the currently assigned LAA for the management LEC.
- Set the LAA to cause the management LEC to use the BIA as its MAC address.
- Assign a specific LAA to the management LEC.

To view the current management LEC address, use the `lane lec laa` command.

Command: C740: />lane lec laa

Output: The Management LEC will use the BIA

To force the management LEC to use the BIA, use the `lane lec laa` command.

Command: C740:/>lane lec laa [none | <laa>]

Examples: C740:/>lane lec laa none

Example: C740:/>lane lec laa 51.00.00.62.6A.3E

Parameters: none The management LEC will use the BIA.

<laa> A MAC address in the format appropriate to the management LEC's ELAN type.
 A MAC address consists of 6 hexadecimal bytes. For a Token-Ring ELAN, the first byte is 4x, 5x, 6x, or 7x.
 For an Ethernet ELAN, the first byte is x2, x6, xA, or xE.



Note: The change caused by the above command will not take effect until the Collage 740 management LEC is restarted. To restart the Collage 740 management LEC, use the `lane lec restart` command.

Restarting the management LEC

This command is used after changing the management LEC configuration.

To restart the management LEC, use the `lane lec restart` command.

Command: `C740:/>lane lec restart`



Note: The above command may disrupt Telnet and SNMP management sessions.

Displaying the LANE-ARP cache

You can display the management LEC's LANE-ARP (Address Resolution Protocol) cache. This is a list of all other LECs in the ELAN that have sent specifically-addressed LAN frames to the management LEC, or that the management LEC has sent frames to. These frames include Telnet session control and data frames, SNMP requests and responses, and PING requests and responses.

There are two kinds of entries that are displayed in the LANE-ARP cache:

- MAC addresses, which are normally other nodes on the ELAN.
- Route Descriptors (RDs), which occur only in a source-routed Token Ring ELAN and show either destinations for frames that must cross a source-routing bridge, or a device that bridges from ATM to physical Token-Ring networks, for example, a Collage 540.

To view the LANE ARP cache, use the `lane lec arpcache` command.

Command: C740:>lane lec arpcache

Output: MAC addresses:
Destination 00.00.F6.E0.01.07
ATM address 39.00.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.07.80.E0.81
Route Descriptors:
Destination 1-001
ATM address 39.00.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.00.28.05.8B
Destination 1-618
ATM address 39.00.00.00.00.00.00.00.00.6F.07.80.E0.00.00.6F.00.28.05.82

Viewing the management LEC statistics

To display statistics about the control and data planes of the management LEC, use the `lane lec statistics` command.

Command: C740:./>lane lec statistics

The control plane information for the `lane lec statistics` command is shown in Table 5.4.

Table 5.4 Output from the lane lec statistics command (control plane)

Field	Description
control packets	IN The number of ELAN control frames that this management LEC has received. OUT The number of ELAN control frames that this management LEC has sent. BAD The number of corrupted control frames that this management LEC has received.
arp requests	IN The number of LANE-ARP requests that this management LEC has received. OUT The number of LANE-ARP requests that this management LEC has sent to the LES.

Table 5.4 Output from the lane lec statistics command (control plane)

Field	Description
arp replies	IN The number of responses to LANE-ARP requests that this management LEC has received.
	OUT The number of LANE-ARP requests that this management LEC has responded to.
raw data	IN The total number of control bytes received.
	OUT The total number of control bytes sent.
SVCs	IN The number of incoming SVCs to the management LEC.
	OUT The number of outgoing SVCs from the management LEC.
	FAILURE OUT The number of outgoing SVCs that have failed to be set up.

The data plane information for the `lane lec statistics` command is shown in Table 5.5.

Table 5.5 Output from the lane lec statistics command (data plane)

Field	Description
unicasts	unicasts (in/out) The number of data frames sent to a single destination. multicasts (in/out) The number of data frames sent to a group MAC address. broadcasts (in/out) The number of data frames sent to all MAC addresses.
packets sent to BUS	The number of packets sent to the BUS by the management LEC.
BUS packets discarded	The number of packets sent to the BUS that have been discarded.
errors	IN The number of data frames discarded, for example, due to an unrecognised MAC address or an illegal data format. OUT The number of oversize data frames that have been discarded.
unknown protocols	The number of data frames received for unassigned Link Layer Control (LLC) protocols.
raw data (bytes)	IN The total number of data bytes received. OUT The total number of data bytes sent.

Default settings on a new Collage 740

The factory-configured default settings for the LANE Services parameters in a Collage 740 are shown in Table A.1.

Table A.1 Default settings for the LANE Services parameters in a Collage 740.

LANE Services parameters	Default value
LECS	Remote at WKA
Internal LES	Enabled
Token-Ring ELAN name	Collage740ElanTrn
Ethernet ELAN name	Collage740ElanEth
Management LEC location	Seek a remote LECS at the WKA.
Management LEC status	Enabled
Management LEC ELAN	Will join a default ELAN determined by the LECS.
Management LEC type	Token Ring
LES/BUS location	Seek a remote LECS at the WKA.

LANE Services parameters	Default value
Unspecified ELAN type	Not set

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