



# LAN Emulation Software Installation Guide

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## Special notices

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**Note:** A note icon indicates information that you should take particular notice of.

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**Caution:** A caution icon indicates the possibility of damage to data or equipment.

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**Warning:** A warning icon indicates the possibility of a threat to personal safety.

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## Before you begin

### This Guide

This guide tells you how to install the Madge LAN Emulation Software for the Madge range of Collage ATM adapters. It does not include information about installing the adapters. For this information, refer to the installation guide supplied with the adapter.

### Audience

The guide is for network administrators. It assumes you are familiar with the concepts and technical terminology of LAN operating systems and of ATM.

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**Note:** Before installing the software, install the Collage adapter into your computer. If you are using a DOS computer, run the diagnostics utility, ATMDIAG, to ensure that the adapter is working correctly.

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# Contents

Chapter 1	Introduction .....	1
Chapter 2	ATM and LAN emulation .....	5
Chapter 3	NetWare servers .....	13
Chapter 4	NetWare (DOS) workstations .....	19
Chapter 5	Windows NT .....	23
Chapter 6	Windows 95 .....	29
Chapter 7	Windows for Workgroups .....	31
Chapter 8	OS/2 Warp workstations .....	33
Chapter 9	Novell MultiProtocol Router 3.1 .....	37
Chapter 10	Local ATM management .....	39
Chapter 11	Troubleshooting .....	57
Appendix A	Migrating to ATM .....	59
Appendix B	Where to run LAN emulation services .....	69

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Appendix C	Increasing performance on a NetWare server .....	73
Appendix D	Technical support services .....	77
Index	.....	83



# Introduction

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The Madge LAN Emulation Software	2
Operating system support	2
Signaling support	3
Network inter-connectivity	3
Hardware requirements	3

## The Madge LAN Emulation Software

The Madge LAN Emulation Software enables you to:

- Run existing LAN applications over an ATM network.
- Connect the ATM network to existing LANs.

The software is fully ATM-Forum-compliant. Madge is an active member of both the ATM Forum and the ATM25 Desktop Alliance.

This manual tells you how to install the LAN Emulation Client (LEC) and service components onto networked PCs.

You can run the Madge service components either on a NetWare server or a Windows NT station. Before deciding whether to use the service components supplied with the Collage adapter, see Appendix B. (For a description of the client and service components, see Chapter 2.)

## Operating system support

The current release of the Madge LAN Emulation Software includes LAN emulation services for:

- NetWare version 3.12 and 4.x servers
- Windows NT servers

The current release also includes LAN emulation client software for:

- NetWare version 3.12 and 4.x servers
- NetWare (DOS) workstations
- Windows NT workstations and servers
- OS/2 Warp workstations and servers

Finally, the release includes a Madge Hardware Support Module (HSM) for:

- NetWare MultiProtocol Router 3.1



**Note:** The Madge ATM ODI client software also works on workstations running Windows 95 or Windows for Workgroups. Forthcoming releases of the LAN Emulation Software will include NDIS 3 support for Windows 95.

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## Signaling support

The Madge LAN Emulation Software supports the UNI 3.0 or 3.1 signaling protocol.

## Network inter-connectivity

To enable you to connect real and emulated LANs together, Madge supply the following products:

- The Madge Collage Connection. This includes network adapters from Madge, and MultiProtocol Router software from Novell. It enables you to use a NetWare server to perform source route bridging between emulated and real Token Ring LANs.
- The Collage 540 ATM-Token Ring Access Switch. This product supports source route bridging between emulated and real Token Ring LANs.
- The Collage 530 ATM-Ethernet Access Switch. This product supports transparent bridging between emulated and real Ethernet LANs.
- The Collage 280 Workgroup ATM Switch. This product supports transparent bridging between emulated and real Ethernet LANs.

For more information, see Appendix A.

## Hardware requirements

To run the Madge LAN Emulation Software you need:

- At least one ATM switch that has 155Mbps or 25Mbps ports (depending on the speed of the adapter you are installing the software for).
- A Collage adapter inside each computer that you intend to include on an emulated LAN.
- Cable to connect the adapter with the ATM switch.



**Note:** For further information about this release of the LAN Emulation Software, refer to the README file on Madge release disk 1.

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# ATM and LAN emulation

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Introduction	6
Virtual connections	6
LAN emulation	8
Source routing bridges	10
Transparent bridges	11

## Introduction

This chapter gives an overview of LAN emulation. It introduces the concept of virtual connections, and describes the virtual connections that exist between the components of the LAN Emulation Software.

It also describes how ATM end-stations communicate with real LANs over different LAN emulation bridges. For information about integrating emulated LANs with existing LANs, see Appendix A.

## Virtual connections

ATM end-stations need to be connected physically to an ATM switch, for example, the Collage 250 or 280 Workgroup ATM Switch. The switch then enables them to communicate with each other down dedicated virtual connections called VCCs (Virtual Channel Connections). VCCs can be permanent or switched.

### Permanent Virtual Channel Connections

Permanent connections have to be set up manually by the network administrator. They are complicated both to set up and to maintain. (The current release of the LAN Emulation Software does not include facilities for setting up permanent connections.)

### Switched Virtual Channel Connections

Switched connections are set up, and brought down, automatically by the ATM switch. Each end-station in a signaling environment has two VCCs to the switch that remain live even when they are not being used:

- **The Signaling VCC.** When an end-station needs to send ATM cells to another end-station, it uses the Signaling VCC to tell the ATM switch that it needs a VCC to that end-station. The switch replies by using the Signaling VCC to send the requesting end-station a Virtual Channel Identifier (VCI). This is the VCC's number. When the requesting end-station receives the VCI, it sends its ATM cells.
- **The ILMI (Interim Local Management Interface) VCC.** Before an end-station can join an ATM network, it needs an ATM address. In a signaling environment, the end-station gets its ATM address from the switch. The switch generates the ATM address by using the burnt-in address (BIA) of the end-station's ATM adapter. To discover the BIA, it interrogates the end-station by using the ILMI VCC. When it has generated the ATM address, it sends it to the end-station by using the ILMI VCC again. (The ATM address that the switch generates is a globally unique, 40-digit/20-byte, hexadecimal value.)

### Control VCCs used in LAN emulation

As well as the Signaling and ILMI VCCs, ATM end-stations running LAN emulation have other VCCs that remain constantly live. These are all Control VCCs.

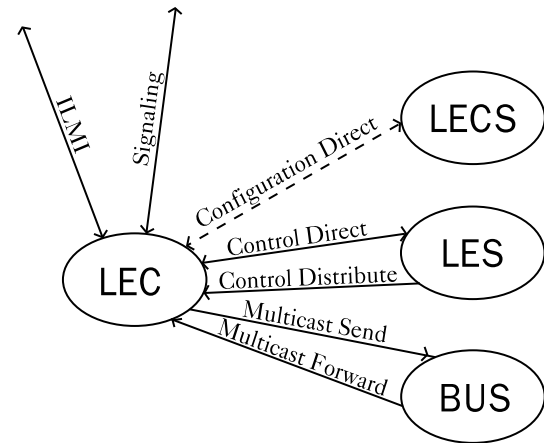
Control VCCs connect the LAN Emulation Client (LEC) to the service components: the LAN Emulation Server (LES), the Broadcast and Unknown Server (BUS), and the LAN Emulation Configuration Server (LECS). These components are described in the next section of this chapter.

Although the VCC connecting the LEC to the LECS (see Figure 2.1) is a Control VCC, it is not constantly live. The LEC normally uses the Configuration Direct VCC just once (to find out which emulated LAN to join). Therefore, it can release it when it has finished using it. If the LEC needs to join another emulated LAN, it just sets up another Configuration Direct VCC.

### Data Direct VCCs for linking LECs

When a LEC sends data to another LEC, it uses a Data Direct VCC. In a signaling environment, Data Direct VCCs exist between LECs only while they are specifically required: control VCCs exist all the time. In a non-signaling environment, all VCCs exist all the time (they must be set up manually).

Figure 2.1 ILMI, Signaling, and Control VCCs



## LAN emulation

### LAN Emulation Client (LEC)

Most of the work of LAN emulation is performed by the LAN Emulation Client (LEC). Every device on the emulated LAN has a LEC running on it. The LEC is the interface between an application and the ATM network. The type of interface it provides to the application might be, for example, ODI or NDIS.

The LEC takes a LAN frame from the LAN application on a PC. It then translates the frame's MAC address into an ATM address. (To do this, it needs to be able communicate with the service components described below.) When the LEC has an ATM address for the frame's destination, it signals to the switch for a VCC to that address.

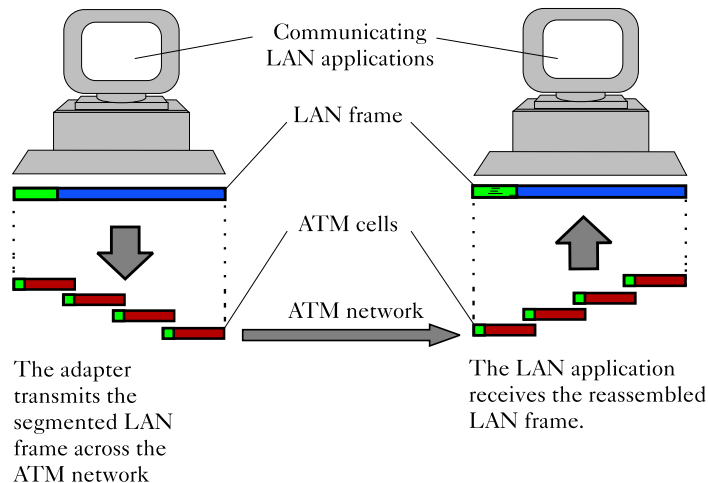
Once a VCC exists, the LEC passes the LAN frame to the adapter's AAL5 hardware. (AAL5 stands for ATM Adaptation Layer 5.) The AAL5 segments the LAN frame into the 53-byte ATM cells that the adapter puts onto the ATM network.

At the target station, the receiving adapter's AAL5 hardware reassembles the LAN frame, and the LEC passes it up to the LAN application.

### LAN Emulation Server (LES)

Each LEC keeps its own table of the MAC-to-ATM address mappings it has already used. However, when it needs to resolve an address for the first time, it uses the LES. This is an address resolution service running in the ATM switch or on an ATM end-station. The LES keeps an up-to-date database of all the MAC-to-ATM address mappings on the emulated LAN. It is up to date because each LEC registers its details with the LES when it joins the emulated LAN.

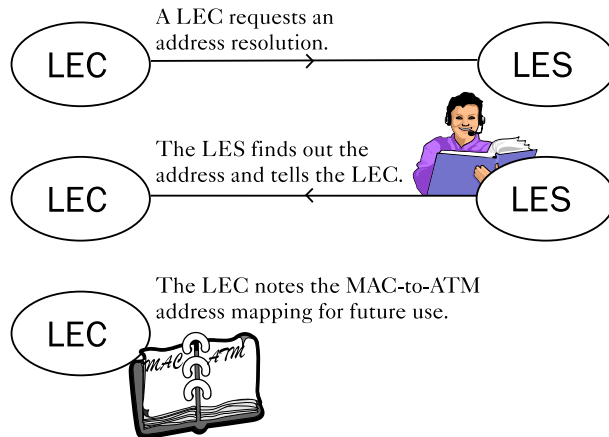
Figure 2.2 Sending a LAN frame over ATM





To request an address resolution from the LES, the LEC uses the LAN Emulation Address Resolution Protocol (LEARP). On emulated LANs with no connections to real LANs, the LES simply answers a LEARP request by sending the ATM address back to the LEC that requested it. Where LAN emulation bridges are involved the process is more complicated (see the last two sections of this chapter).

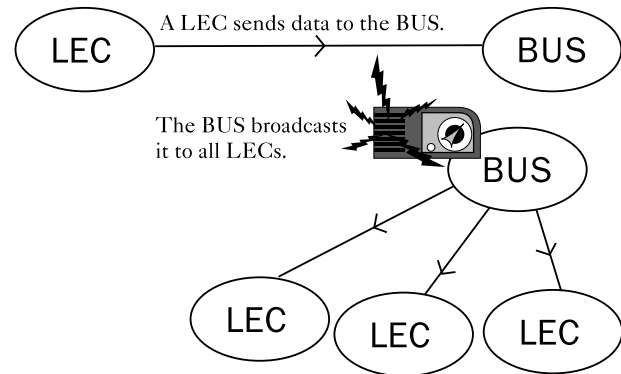
Figure 2.3 The LES is an address resolution service



### Broadcast and Unknown Server (BUS)

When a LEC needs to transmit a frame whose destination is the broadcast MAC address, it sends it down the Multicast Send VCC to the BUS. The BUS then forwards it down the Multicast Forward VCC to each LEC. When a frame contains multicast data, that is, data addressed to a group of specific end-stations (and not to *all* stations), some LECs will receive data not addressed to them. Whenever this happens, the LEC discards the frame without passing it to the LAN application. (For information about how the BUS helps resolve addresses that are unknown to the LES, see the last section of this chapter.)

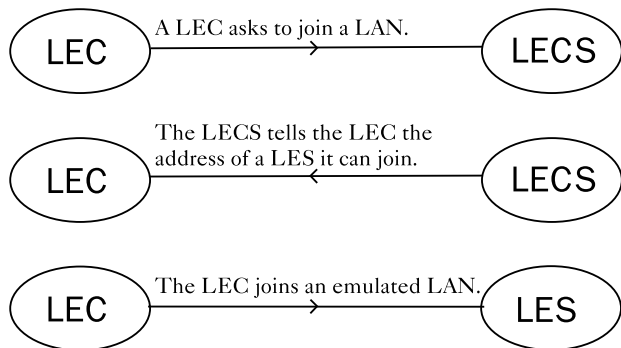
Figure 2.4 The BUS provides broadcast services



## LAN Emulation Configuration Server (LECS)

Before a LEC can join an emulated LAN, it needs the ATM address of the LES. Unless it is configured to use a particular LES address, it gets the LES address from the LECS. The LECS decides which LES to direct a LEC to on the basis of information the LEC gives it. For example, the LEC might give the name of the emulated LAN it expects to join, or it might give its own logical name (if it has one). If it gives its own name, the LECS checks whether that name appears on membership lists it has for any of the emulated LANs it services. If so, it directs the LEC to the emulated LAN on whose membership list the name appears.

Figure 2.5 The LECS tells a LEC which LES to use



## Source routing bridges



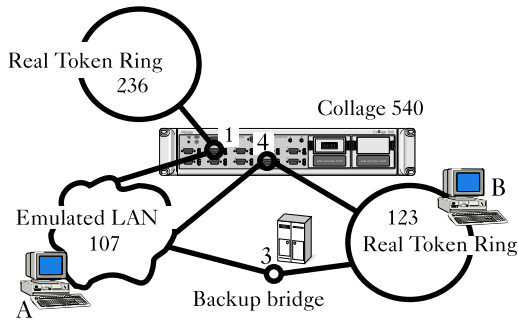
**Note:** The Collage 540 Token Ring-ATM Access Switch provides source route bridging on all its ports (see Appendix A).

If a LEC receives a frame that contains routing information, it makes a LEARP request to the LES. However, instead of requesting the ATM address that corresponds to the frame's destination MAC address, the LEC requests the ATM address of the first source routing bridge listed in the frame's Route Descriptor.

The Route Descriptor has been generated by a higher-level protocol that passes broadcast route-explorer frames to the LEC. The LEC sends these to the BUS as if they are ordinary broadcast frames, and the BUS simply broadcasts them. This means that the route determination process accords with the normal logic of source routing. Like other higher-level LAN processes, it is unaffected by LAN emulation.

In Figure 2.6, Station A is on an emulated LAN that is connected by three source routing bridges to two real LANs.

Figure 2.6 Source routing



In the diagram, source route bridging is performed by the Collage 540, and by the Collage Connection (a NetWare server running MultiProtocol Router).

Station A's LEC has a frame to send to Station B on ring 123. The source routing explorer process has determined that the best route to Station B is via the bridge with the number 4 that connects to ring 123. Station A's LEC therefore performs a LEARP request to the LES for the ATM address of bridge 4, ring 123.

Station A's LEC then requests a VCC to bridge 4, ring 123, and transmits its data. Finally, the bridge forwards the data onto ring 123, where it reaches its destination.

## Transparent bridges



**Note:** The Collage 530 Token Ring-ATM Access Switch provides transparent bridging on all its ports (see Appendix A).

If a station that is the subject of a LEARP request is on the other side of a transparent bridge, and the LES has not previously recorded an ATM address for it, the LES will be unable, immediately, to supply an ATM address for it.

Because of this possibility, when the LES cannot resolve addresses on its own it forwards LEARP requests down the Control Distribute VCCs of any LECs that are registered with it as Proxies.

Proxies are LECs running in transparent bridges and acting on behalf of many stations attached to real LANs. When a Proxy recognizes an address, it responds directly to the LEC that made the LEARP request. The LEC then sends the data to the Proxy, and the Proxy forwards it to its destination.

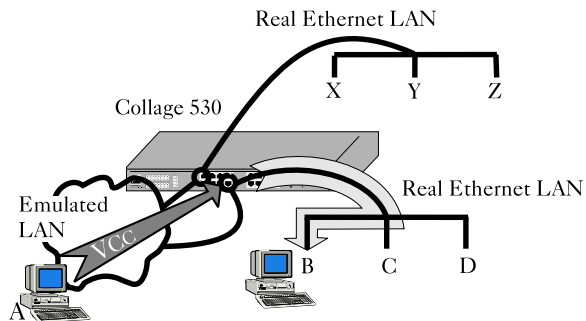
However, a Proxy will not recognize a MAC address if the station with that MAC address has not yet sent any frames across the bridge (A bridge only learns which stations are on its attached LANs when those stations send frames across the bridge). For this reason, whenever a LEC makes a LEARN request, it also sends the frame to the BUS.

The BUS has a Multicast Forward VCC which connects it to every LEC, including every Proxy, on the emulated LAN. When the BUS receives the frame from the LEC, it broadcasts it. Any Proxy that receives the broadcast data will forward it (because bridges always forward broadcast data).

Therefore, if the station to which the frame is addressed exists, it will receive the frame. When it replies, in accordance with whatever higher-level protocol the communication is using, the Proxy will learn its address and start to represent it too.

In Figure 2.7, the emulated LAN is connected to two Ethernet LANs. Station A has set up a VCC to the bridge attached to the LAN that contains Station B. It has set up this VCC because the Proxy in that bridge recognized B's MAC address when it received the frame from the LEC. Station A transmits its data, and the bridge forwards the data to Station B.

Figure 2.7 Transparent bridging



# NetWare servers

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Introduction	14
Using ATMSETUP	14
Command line options	17

## Introduction

This chapter tells you how to use the `ATMSETUP` program to install the Madge `ATMODI` driver (including the `LEC`) and the Madge service components onto a single adapter in a NetWare server.



**Note:** To install support for several adapters in a single server, run `ATMSETUP` first, then run the local ATM Manager (see Chapter 10).

---

Before following the instructions in this chapter:

- Connect the adapter to a working ATM switch.
- Test the adapter by running the `ATMDIAG` utility.
- Install NetWare version 3.12 or 4.x onto the server and bring the server up.



**Note:** To find out the ATM address of a Madge `LECS` that you have installed onto a server, see Chapter 10. If you are using ATM-Forum-compliant services, you do not need to know the address of the `LECS`; each `LEC` you install onto the emulated LAN will find the `LECS` automatically (see Appendix B).

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## Using `ATMSETUP`

If you intend to use the Madge service components on this NetWare server, and you are also using a Madge Collage 250 or 280 switch, you do not need to change any of the configuration information displayed by `ATMSETUP`.

### The control keys

If you want to change any user-configurable options in `ATMSETUP`, use the cursor keys to highlight the option you want to change, then press `[ENTER]`. Make your change, and then press `[ENTER]` again.

To move to a previous screen, use the `[ESCAPE]` key. To move to the next screen, press `[ENTER]` as prompted.

### Running the software

- 1 Insert the Madge disk containing the server software into the floppy drive, and type `LOAD A:ATMSETUP` at the server prompt.
- 2 Type the path of the directory you intend to install the Madge software into, or press `[ENTER]` to use the default directory, `SYS:SYSTEM\ATM`. If you choose not to use the default directory, use a directory that is, in any case, beneath `SYS:SYSTEM` (because the files are system files).

- 3 If the directory you specify already exists, the program asks you whether you want to back it up. Answer Yes or No. If the backup directory already exists, the program asks you if you want to back that up too.
- 4 In the Card Configuration window either accept automatic determination of the ATM address or specify an ATM address yourself. You can also change the signaling stack (The default stack is UNI 3.0).



**Note:** Always ensure that the signaling stack you configure the end-station to use is the same as the one that the ATM switch is configured to use. Most switches will not automatically reconfigure themselves in this respect.

- 5 The LANE Configuration window includes the following configuration options:

Network types:	The type(s) of network interface that you want the LEC to emulate (Token Ring and/or Ethernet). If you intend to connect the server to a real LAN, choose the type(s) of LAN you intend to connect it to.
----------------	---

Install  
LE Service:

LECS  
address:

TRN and  
Ethernet  
ELAN/  
Computer  
name:

Whether you want to install the Madge service components or not.

The location of the LECS. If you intend the LEC in the server to use a LECS other than the local one (in this server) or the “well known” one, type the LECS address here.

The name of the emulated LAN that you want the local LEC to join, or the name that you want the computer to use when it joins an emulated LAN. (If you chose to emulate Token Ring and Ethernet, you can give an ELAN/Computer name for each.)

To specify the emulated LAN that you want the LEC to join, type the ELAN name. If you type nothing, the LEC will attempt to join a default emulated LAN. If you type a Computer Name, the LECS will attach the LEC in the server to the emulated LAN whose membership list includes that name.

If you want to configure the LECS to use a default emulated LAN, or if you want to create a membership list for an emulated LAN, see the information in Chapter 10 about managing LECSs.

TRN ELAN name:	Type a name for the emulated Token Ring LAN.
Eth ELAN name:	Type a name for the emulated Ethernet LAN.
Ring number:	Type a ring number for the emulated Token Ring LAN. The number can be any 3-digit hexadecimal number, but the ring number for each ring must be unique across all the LAN segments and emulated LAN segments that are bridged together on the network.
Register “well known” address for LECS:	If you specified an ATM address for the LECS (above), choose No. Otherwise, choose Yes.



**Note:** The options enabling you to name the emulated LAN, to specify a ring number, and to choose whether to use the “well known” address for the LECS only appear if you choose to install the Madge LECS, LES, and BUS onto this server.

- 6 Press [ENTER] to leave the LANE Configuration window, and press [ENTER] again to install the files onto the server.
- 7 Type the path of the Madge files on the release disk. Press [ENTER] to use the default directory, A:\NETWARE. The program copies the LAN emulation files onto the server.
- 8 Exit ATMSETUP.
- 9 Edit AUTOEXEC.NCF so that it looks similar to the example in Figure 3.1. The LOAD and BIND lines in Figure 3.1 refer to:
  - **atmodi** for Token Ring LAN emulation.
  - **atmodie** for Ethernet LAN emulation.



10 If you told the program to copy files to a directory other than the default directory, give the

```
search add
```

command the path that you used instead of  
SYS:SYSTEM\ATM.

11 Bring down the server, and then bring it up again.



**Note:** The network numbers in Figure 3.1 are examples chosen for illustration only.

*Figure 3.1 Sample AUTOEXEC.NCF for Token Ring and Ethernet LAN emulation*

```
file server name SERVER1
ipx internal net 22
mount all
search add sys:system\atm
load matm
start atm
load atmodi
load atmodie
bind ipx to atmodi net = 3
bind ipx to atmodie net = 5
```

## Command line options

### Specifying a board name

If you have more than one adapter installed, use this option to specify the logical name of the adapter that you want the driver to load onto:

```
NAME = <BOARD NAME>
```

To give an adapter a name, see “Managing Adapters” in Chapter 10.

### Specifying a LEC name

If you have several LECs configured, use this option to specify the LEC you want the driver to use:

```
LEC = <LEC NAME>
```

To give a LEC a name, see “Managing LECs” in Chapter 10.

### Specifying a frame type

The ATMODI and ATMODIE drivers support a number of different types of frame:

- ATMODIE supports frames of type ETHERNET\_II, ETHERNET\_802.2 (default), ETHERNET\_802.3, and ETHERNET\_SNAP.
- ATMODI supports frames of type TOKEN-RING (default), and TOKEN-RING\_SNAP.

To specify a particular frame type for the driver to support, include the following on the command line:

```
FRAME = <FRAME TYPE>
```

# NetWare (DOS) workstations

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Introduction	20
Using ATMSETUP	20

## Introduction

This chapter tells you how to use the Madge ATMSETUP program to install the Madge ATMODI driver (including the LEC interface), onto a NetWare (DOS) workstation.



**Note:** To install support for several adapters in a single workstation, run ATMSETUP first, then run the ATM manager (see Chapter 10).

---

Before following the instructions in this chapter:

- Connect the adapter to a working ATM switch.
- Test the adapter, by using the ATMDIAG utility.

## Using ATMSETUP

If you intend to use the Madge service components supplied with the Collage adapter, and you are also using a Madge Collage 250 or 280 switch, you do not need to change any of the configuration information displayed by ATMSETUP.

### The control keys

If you want to change any user-configurable options in ATMSETUP, use the cursor keys to highlight the option you want to change, then press [ENTER]. Make your change, and then press [ENTER] again.

To move to a previous screen, use the [ESCAPE] key. To move to the next screen, press [ENTER] as prompted.

### Configuring the drivers

You can configure the ATMODI driver from NET.CFG by using standard NetWare parameters. If you want to do this, include a LINK DRIVER ATMODI section (for Token Ring emulation), and a LINK DRIVER ATMODIE section (for Ethernet emulation).

## Running the software

- 1 Insert the Madge disk containing the workstation software into the floppy drive, and type A:\ATMSETUP at the DOS prompt.
- 2 When asked the path of the directory you intend to install the files into, type a path, or press [ENTER] to use the default directory (C:\ATM).
- 3 If the directory you specify already exists, the program asks you whether you want to back it up. Answer Yes or No. If the backup directory already exists, the program asks you if you want to back that up too.
- 4 In the Card Configuration window, either accept automatic determination of the ATM address, or specify an ATM address yourself. In this window, you can also change the signaling stack (the default signaling stack is UNI 3.0)



**Note:** Always ensure that the signaling stack you configure the end-station to use is the same as the one that the ATM switch is configured to use. Most switches will not automatically reconfigure themselves in this respect.

- 5 The LANE Configuration window includes the following configuration options:

Network types:

The type (or types) of network interface that you want the LEC to emulate (Token Ring and/or Ethernet). If you intend to connect the workstation to a real LAN via a bridging device, choose the type or types of LAN you intend to connect it to.

LECS address:

The location of the LECS. If you intend the LEC to use a LECS other than the “well known” one, type the LECS address here.

TRN and Ethernet ELAN/Computer name:

The name of the emulated LAN that you want the LEC to join, or the name that you want the computer to use when it joins an emulated LAN. If you chose to emulate Token Ring and Ethernet, you can give an ELAN/Computer name for each.

To specify the emulated LAN that you want the LEC to join, type the ELAN name.

If you type nothing, the LEC will attempt to join a default emulated LAN. If you type a Computer Name, the LECS will attach the LEC to the emulated LAN whose membership list includes its name.

If you want to configure the LECS to use a default emulated LAN, or if you want to create a membership list for an emulated LAN, see the information in Chapter 10 about managing LECSs.

- 6 Press [ENTER] to leave the LANE Configuration window, and press [ENTER] again to install the files onto the computer.
- 7 Specify the path of the files on the distribution disk. To use the default directory, A:\DOS, press [ENTER].
- 8 The program copies the LAN emulation software to disk. To load these files, edit AUTOEXEC.BAT so that it contains lines similar to those in Figures 4.1 and 4.2.
- 9 Reboot the computer.

*Figure 4.1 Sample AUTOEXEC.BAT File for Token Ring LAN emulation*

```
lsl
c:\atm\matm
c:\atm\atmodi
ipxodi
```

*Figure 4.2 Sample AUTOEXEC.BAT File for Ethernet LAN emulation*

```
lsl
c:\atm\matm
c:\atm\atmodie
ipxodi
```



**Note:** For Token Ring LAN emulation, load the ATMODI driver. For Ethernet LAN emulation, load the ATMODIE driver.

---

# Windows NT

---

Introduction	24
Installing a LEC	24
Configuring a LEC	26
Installing LAN emulation services	28

## Introduction

This chapter tells you how to install and configure the NDIS3 driver, including the LEC software, for Windows NT version 3.51 (or later) workstations and servers.

Some management and configuration facilities are built into the software described in this chapter. However, for comprehensive management facilities, and for installing and configuring LAN emulation services, use the Madge ATM Manager for Windows NT (see Chapter 10). The ATM Manager is on the same disk as the Madge drivers for Windows NT.



**Note:** To upgrade from Release 1.0x to Release 1.10 of the LAN Emulation Software, refer to the INSTALL.TXT file on the Madge disk for Windows NT.

---



**Note:** You cannot run the Madge diagnostics (ATMDIAG) software under Windows NT.

---

## Installing a LEC

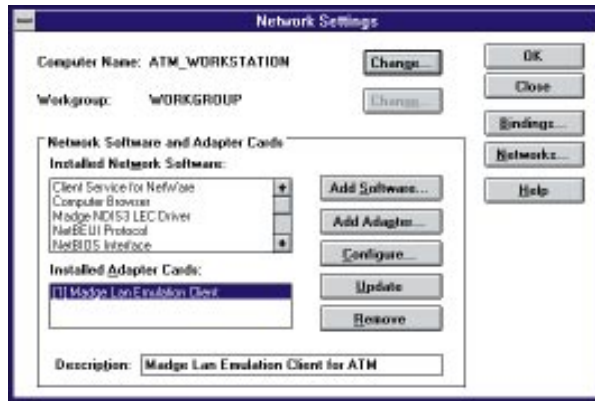
This section tells you how to install a LAN emulation Client (LEC) for an NT server or workstation. The LEC you install attempts to find a LECS that is using the “well known” LECS address. If you want the LEC to use a LECS at a different address, see the next section of this chapter, “Configuring a LEC”.

- 1 Put the Madge disk containing the software for Windows NT into the floppy drive.
- 2 In the Control Panel, double-click on Network.
- 3 In Network Settings, click on Add Adapter.
- 4 Select “<Other> requires disk from manufacturer”, and click on Continue.
- 5 Type the path of the driver software: A:\I386\LEC.
- 6 Select “Madge NDIS3 LAN Emulation Client”. Click on OK.
- 7 When the Add Adapter dialog box appears (telling you to give hardware details), click on OK.
- 8 Select the type of Collage adapter you are installing for. Then click on OK.
- 9 Give the LEC a unique name, and click on OK.
- 10 In the LEC Configuration dialog box, choose Token Ring or Ethernet. Click on OK.
- 11 Select the bus-type appropriate to your adapter.



- 12 In the Network Settings dialog box, click on OK.
- 13 Depending on your transport protocols, NT may ask you for transport-specific information (for example, IP address, IPX frame-type). Provide the information, then shutdown and restart the system.

Figure 5.1 The Network Settings dialog box



**Note:** Windows NT lists each LEC under the heading “Installed Adapter Cards:”. This is because each LEC is a virtual adapter card.

### Adding another LEC onto the adapter

You need one LEC for each emulated LAN that you intend to connect the NT station to. After installing a new LEC, shutdown and restart the NT system. Always install LECs one at a time.



**Note:** If you attach several LECs with NetBIOS enabled to emulated LANs that are joined by bridges or routers, you will see error messages. This is because, under Windows NT, each LEC (or, in other words, each virtual adapter) has to use the same NetBIOS name.

- 1 In the Control Panel, double-click on Network.
- 2 In the Network Settings dialog box, click on Add Adapter.
- 3 Choose “Madge NDIS3 LAN Emulation Client”. Click on Continue, and then OK.
- 4 In the New LEC dialog box, give the LEC a unique name, and click on OK.
- 5 In the LEC Configuration dialog box, select the type of LAN for the LEC to emulate, select the adapter you want the LEC to use, and click on OK.
- 6 The new LEC appears in the Network Settings dialog box.

### Removing a LEC from the adapter

Each emulated LAN you connect to requires one LEC. You might want to remove a LEC because you no longer need to connect to a particular emulated LAN.

- 1 In the Control Panel, double-click on Network.
- 2 In the Network Settings dialog box, select a LEC.
- 3 Click on Remove and confirm your decision by answering Yes.
- 4 In Network Settings, click on OK.



**Note:** You can recover the LEC by installing a new LEC but selecting the old name when prompted to give the LEC a name.

---

## Configuring a LEC

---



**Note:** Whenever you alter the system's ATM configuration, you are prompted to specify the BUS-type for the adapter you have installed.

---

### Adding another adapter into the PC

- 1 In the Control Panel, double-click on Network.
- 2 Select a LEC and click on Configure.
- 3 In the Configure Adapter window, click on New.
- 4 Type a name for the new adapter, and click on OK.
- 5 Set the correct adapter-type. Click on Advanced.
- 6 Select the signaling you require, and click on OK.

### Overriding the ATM Address of the adapter

---



**Note:** Only do this if your switch does not have support for address registration via ILMI.

---

- 1 In the LEC Configuration dialog box, click on the Configure button.
- 2 Select the adapter whose address you want to change, and click on Advanced.
- 3 Type the ATM address you want the adapter to use.

### Specifying a LECS address

If the LECS you wish to use is not using the “well known” address, specify its ATM address.

- 1 In the Control Panel, double-click on Network.
- 2 Select the instance of the LEC for which you wish to specify a LECS address. Click on Configure.
- 3 Click on Advanced.
- 4 Select Automatic as the Elan Configuration option. Click on Configure.
- 5 Type the ATM address of the LECS.
- 6 Choose the adapter that the LEC is to use to communicate with the LECS. By default, this will be the adapter you first installed the LEC onto.
- 7 Click on OK until you return to the Network Settings box. Then click on OK again.

### Attaching a LEC to a New LECS

Use this facility when you have several LECSs available. It enables you to choose another LECS without losing the address of the original one, should you ever wish to use that address again.

- 1 In the Control Panel, double-click on Network.
- 2 Select the LEC that you wish to attach to a new LECS. Then click on the Configure button.

- 3 In the LEC Configuration dialog box, click on Advanced.
- 4 In the Advanced LEC Configuration dialog box, select Automatic as the Elan Configuration option. Then click on the Configure button.
- 5 In the LANE Configuration Server dialog box, either:
  - Click on New and type a unique name for the LECS. The name that the installation software suggests is a unique name, but you can type your own suggestion. Finally, in the LANE Configuration Server dialog box, type the ATM address of the new LECS, and click on OK.
  - Or, type the ATM address of the new LECS.

### Changing the LECS that a LEC uses

This is another facility enabling you to change the LECS that the LEC uses. Use it if you know the name of the LECS that you want the LEC to start using.

- 1 In the Control Panel, double-click on Network.
- 2 In the Network Settings dialog box, select a LEC, and click on the Configure button.
- 3 Click on Advanced.
- 4 Choose a new LECS from the list of LECSs that are available.

### Removing a Reference to a LECS

You can remove references to LECSs that you no longer need.

- 1 In the Control Panel, double-click on Network.
- 2 In the Network Settings dialog box, select a LEC, then click on the Configure button.
- 3 In the LEC Configuration dialog box, click on Advanced.
- 4 In the Advanced LEC Configuration dialog box, select a LECS and click on Delete.

### Changing to a different emulated LAN

- 1 In the Control Panel, double-click on Network.
- 2 In the Network Settings dialog box, select a LEC, and click on the Configure button.
- 3 In the LEC Configuration box, click on Advanced.
- 4 In the Advanced LEC Configuration box, type either:
  - The name of the emulated LAN you want to attach to.
  - Or the name of the PC you want to attach as. This will only work if the PC name you use is on the membership list of the emulated LAN you intend to attach to.

## Installing LAN emulation services

This section tells you how to install LAN emulation services for a Windows NT station.

- 1 Put the Madge disk containing the software for Windows NT into the floppy drive.
- 2 In the Control Panel, double-click on Network.
- 3 In Network Settings, click on Add Software.
- 4 Select “<Other> requires disk from manufacturer”. Click on Continue.
- 5 Type the path of the driver software:  
A:\I386\LANE.
- 6 Select “Madge ATM LANE Services”. Click on OK.
- 7 In Network Settings, click on OK.
- 8 Click on Restart Now.
- 9 The default configuration of the service components for Windows NT is: one emulated Ethernet LES, one emulated Token Ring LES, and one LECS which uses the “well known” address. If you want to alter this configuration, run the Madge ATM Manager for Windows NT (see Chapter 10).

# Windows 95

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This chapter tells you how to install an ODI LAN Emulation Client (LEC) onto a Windows 95 computer. With all ODI drivers, Windows 95 uses an ODI/NDIS3 mapper (ODIHLPEXE and MSODISUP.VXD) to provide support for its protocol stacks.

To install the Madge software:

- 1 Run the Madge ATMSETUP program for NetWare (DOS) workstations, in a DOS box. This program is described in Chapter 4.
- 2 In the group called My Computer, click on Control Panel.
- 3 In the Control Panel, click on Network.
- 4 In the Network window, click on the Add button.
- 5 Click on Adapter, then click on the Add button.
- 6 Click on Have Disk.
- 7 When prompted, insert the Madge release disk containing the COLLAGE.INF file.
- 8 If you need connections to a Windows NT or Windows for Workgroups network, load the Microsoft network client and the Netbeui protocol. If you need a NetWare connection, load the NetWare client and the IPX/SPX-compatible protocol.
- 9 When you finish editing the settings in the Network window, click on OK. You are now prompted for some Microsoft files from the Windows 95 CD-ROM or floppy disks.
- 10 When asked whether you want to restart the computer, answer No.
- 11 Edit AUTOEXEC.BAT by adding the line in Figure 6.1 that loads MATM. Check that the adapter software loads in the same order as in the example in Figure 6.1. (Run ATMODI for Token Ring emulation, and ATMODIE for Ethernet emulation.)
- 12 Restart the computer.

Figure 6.1 Sample AUTOEXEC.BAT for Token Ring LAN emulation

```
c:\atm\matm c:\atm\mdgatm.ini
ls1 /c=c:\nwclient\net.cfg
c:\atm\atmodi
c:\windows\odihlp.exe
```



**Note:** If you remove the ODI LEC, make sure you comment out the line in AUTOEXEC.BAT that loads MATM.

# Windows for Workgroups

---

This chapter tells you how to install an ODI LAN Emulation Client (LEC) onto a Windows for Workgroups computer. With all ODI drivers, Windows for Workgroups uses an ODI/NDIS3 mapper (ODIHLPEXE and MSODISUP.386) to provide support for its protocol stacks.

To install the Madge software:

- 1 Run the Madge ATMSETUP program for NetWare (DOS) workstations (see Chapter 4).
- 2 Edit the AUTOEXEC.BAT to include lines similar to those in Figures 7.1 (Token Ring emulation) and 7.2 (Ethernet emulation).
- 3 Start Windows.
- 4 In the Network group, click on the Network Setup icon.
- 5 In the Network dialog box, install the network support you require.
- 6 Click on the Drivers button.
- 7 Click on Add Adapter.
- 8 Select “Unlisted or Updated Network Adapter”, then click on OK.
- 9 When prompted, insert the Madge release disk containing the OEMSETUP.INF file.
- 10 Select the adapter/LAN emulation type.
- 11 Add any protocols you require, and remove any you do not. Set the default protocol. Click on Close.
- 12 Click on OK. You will be prompted for disks from Microsoft, and, if you installed Microsoft support for additional networks, you will also be prompted for other vendors’ disks.
- 13 Instead of restarting the computer (when you are prompted to do so), open a DOS box, and check that the adapter software loads in the same order as in the examples in Figures 7.1 and 7.2.
- 14 Restart the computer.

*Figure 7.1 Sample AUTOEXEC.BAT for Token Ring LAN emulation*

```
c:\atm\matm c:\atm\mdgatm.ini
ls1 /c=c:\nwclient\net.cfg
c:\atm\atmodi
c:\windows\odihlp.exe
```

*Figure 7.2 Sample AUTOEXEC.BAT for Ethernet LAN emulation*

```
c:\atm\matm c:\atm\mdgatm.ini
ls1 /c=c:\nwclient\net.cfg
c:\atm\atmodie
c:\windows\odihlp.exe
```



# OS/2 Warp workstations

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Installing the LEC	34
Installing the LEC while installing OS/2 Networking	35

## Installing the LEC

To install the Madge NDIS2 LEC onto a computer that is already running OS/2, follow the instructions in this section.



**Note:** The Madge LEC supports OS/2 Warp version 3.0 (or above). To run the LEC, you need a PC with a 486 (or above) processor.

---

- 1 Run the IBM LAN Adapter and Protocol Support (LAPS) program.
- 2 In the LAPS Configuration dialog box, delete any network drivers that you are replacing with ATM.
- 3 Insert the Madge OS/2 disk into the floppy drive and click on Other Adapters.
- 4 Type the path of the drivers, and click on OK. OS/2 then copies files from the disk.
- 5 From the list of network drivers, choose the Madge Collage driver for the adapter in your PC.
- 6 Click on Add.
- 7 Select and add the network protocols you require.
- 8 Click on OK.
- 9 Open an OS/2 window and run the Madge OS/2 command file, MDGATM.CMD.

To run this program, type:

**A:** \MDGATM <ADAPTER TYPE> <LAN TYPE>

where ADAPTER TYPE is 25, 155CLIENT, or 155SERVER, and LAN TYPE is ETH (for Ethernet) or TR (for Token Ring).

Running MDGATM.CMD ensures that OS/2 copies all the components of the Madge software (which is not a normal, monolithic, OS/2 driver) to the correct location.

- 10 Remove the Madge disk, then shutdown and restart the PC.



**Note:** Release 1.10 of the LAN Emulation Software supports only 25Mbps adapters. Support for 155Mbps client or server adapters will be included in future releases, as will support for multiple LECs on a single adapter, and multiple adapters in a single PC.

---



**Note:** The ATM Manager for OS/2 is not available with Release 1.10 software. It will be included in future releases, and will also be made available from the Madge BBS (see Appendix D).

---

## Installing the LEC while installing OS/2 Networking



**Note:** During the installation process OS/2 reboots several times. Until you have run the Madge OS/2 command file MDGATM.CMD (in Step 10), the system will not be able to load the Madge drivers correctly. When you see error messages to this effect, press [ENTER] and continue with the installation process.

- 1 In the Configuration dialog box (which appears during the OS/2 Network installation process), click on Adapters and Protocol Services.
- 2 Click on Add Adapter.
- 3 Insert the Madge OS/2 disk, and click on Other Adapter.
- 4 Type the path of the drivers, and click on OK.
- 5 In the Drivers Found dialog box, select the correct driver for the Collage adapter in the PC.
- 6 Select the type of LAN emulation you require (Token Ring or Ethernet), then click on OK. OS/2 then copies files from the disk.
- 7 Click on Add.

- 8 Select and add the network protocols you require.
- 9 Click on Install, and continue with the OS/2 installation process.
- 10 When you have finished, open an OS/2 window and run the Madge command file, MDGATM.CMD. To run this program, type:

**A:** \MDGATM <ADAPTER TYPE> <LAN TYPE>

where ADAPTER TYPE is 25, 155CLIENT, or 155SERVER, and LAN TYPE is ETH (for Ethernet) or TR (for Token Ring).

Running MDGATM.CMD ensures that OS/2 copies all the components of the Madge software (which is not a normal, monolithic, OS/2 driver) to the correct location.

- 11 Remove the Madge disk, then shutdown and restart the PC.



**Note:** Release 1.10 of the LAN Emulation Software supports only 25Mbps adapters. Support for 155Mbps client and server adapters will be included in future releases, as will support for multiple LECs on a single adapter, and multiple adapters in a single PC.



# Novell MultiProtocol Router 3.1

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The Madge ATM HSM

38

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## The Madge ATM HSM

Madge provide an ATM Hardware Support Module (HSM) to support Novell's MultiProtocol Router 3.1 software. The driver is called MADGEATM.LAN.

To use MADGEATM.LAN, follow the instructions below, in conjunction with the instructions in the Novell documentation for Multiprotocol Router 3.1:

- 1 Load INETCFG and select the BOARDS option.
- 2 Press [INSERT].
- 3 Press [INSERT] again and insert the Madge disk containing the NetWare server files into the floppy drive.
- 4 Type: A:MADGEATM.LAN. INETCFG copies two files (MADGEATM.LAN and MADGEATM.LDI) from the Madge disk to the SYS/SYSTEM directory on the NetWare server.
- 5 From the list of drivers that appears, select "MADGEATM Madge ATM Hardware Support Module".
- 6 Type a Board Name, and specify the Card Type and Card Number correctly. Configure any of the other parameters you wish to use.
- 7 Press [ESCAPE], and save the changes you have made.

# Local ATM management

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Using the local ATM Manager	40
Managing adapters	41
Managing LECs	43
Managing LECsS	47
Managing LESs	52

## Using the local ATM Manager

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**Note:** Before running the ATM Manager, install the Madge LAN Emulation Software.

---

To run the ATM Manager for:

- NetWare, ensure that the directory you installed the driver software into is still on the search list and, at the server prompt, type: `LOAD ATMMGR`.
  - DOS, change to the directory that you installed the software into and, at the DOS prompt, type: `ATMMGR`.
  - Windows NT, first create a directory called `C:\NTMGR` on the hard disk, then insert the Madge floppy disk containing the NT drivers into the floppy drive. Copy the file `NTMGR.EXE` from the directory `A:\I386` to the new directory you have created. Finally, run the program by opening a DOS box and typing `C:\NTMGR\NTMGR`.
- 



**Note:** Release 1.10 does not include a local ATM Manager for OS/2. Forthcoming releases will include this software. The software will also be made available from the Madge BBS.

---

### Selecting and editing items in the windows

Use the cursor keys to select different configuration options in the program's windows. (Not all the information in a window is editable.) Once you have an option selected, press [ENTER] to edit it. When you have finished, press [ENTER] again, and use the cursor keys to move to the next option.

### Selecting and editing menu items

To select an item in a menu, use the cursor keys to highlight it, then press [ENTER]. Some of the menus allow you to use the [INSERT] and [DELETE] keys. When this is possible, a message telling you so appears at the bottom of the screen.

### Viewing the previous screen

To view the previous screen, use [ESCAPE]. If you press [ESCAPE] after making changes, the program asks you if you want to save the changes.

### Before exiting the ATM Manager

If you alter your configuration, choose "Save Configuration" from the Main Menu.

### Help

For help, press [F1]. In some screens the program also prints guidance at the bottom of the screen.



## Managing adapters

To view the Adapter Configuration window, choose Adapter Configuration from the Main Menu. To:

- Install support for a new adapter, press [INSERT].
- Delete support for an adapter, select the adapter, and press [DELETE].
- View or edit the configuration for an adapter, select that adapter, and press [ENTER].

If you highlight an adapter in the Adapter Configuration menu, and then press [INSERT] or [ENTER], the Adapter Configuration window appears.

### What to use the adapter configuration window for

- To set or change the logical name of the adapter.
- To configure support for a different type of adapter.
- To override the adapter's Burnt-In Address (BIA).
- To enable/disable ILMI address registration.
- To enable/disable adapter loopback.
- To change the signaling stack.
- To view information about the adapter.

### The Adapter Configuration window

- Adapter name: The logical name of the adapter.
- Adapter type: The Madge adapter that the software is configured to use. If you change an adapter, edit this field instead of running ATMSETUP again.
- ESI address: By default, the adapter uses its own Burnt-In Address (BIA). This forms part of the ATM address that each module of the LAN Emulation Software negotiates with the switch via ILMI. If you intend to override the BIA, type a new ESI (End System Identifier).
- ATM address: If your switch does not support address registration via ILMI, type the ATM address that you intend the adapter to use.
- Connections: If you select this field, the Adapter Connection Information window appears. This displays information about the virtual connections that the adapter is using.

Adapter loopback:	Loopback is disabled by default. This means that different software modules, for example, a LEC and LES, must communicate via the switch even though they are running on the same device. If you ENABLE loopback, modules on a single computer can communicate without using the switch. This can speed up communication on servers that are not heavily loaded.	Number of VCs:	The number of VCCs that are currently set up.
Signaling:	The version of UNI signaling that the adapter is using.	ATM address:	The address that the adapter is registered with at the ATM switch.
The following information only appears in the Adapter Configuration window if the adapter is already active:		Interface type:	The type of interface that the adapter presents to the ATM network. For 155Mbps adapters this is SONET 155. For 25Mbps adapters it is Forum 25.
Speed:	The line rate of the adapter (in Mbps).	Max frame size:	The largest AAL5 (ATM Adaptation Layer 5) frame that the adapter can accept.
Media type:	The type of cabling the adapter is using.	VCI bits:	The number of bits of a VCC number that the adapter reads. If the adapter can only use the highest 10 bits of the VCC number, then the maximum VCC number is 1023.
Max VCC count:	The largest number of VCCs that the adapter can support. This is normally 1024. On workstations, the software running on the adapter limits the maximum to 256 even though the hardware would permit more.	Signaling status:	Whether signaling is up or down. If signaling is down, the adapter and the switch cannot communicate. The most likely reason for signaling being down is either that the adapter is not correctly connected physically to the switch or that the switch is not powered on.

## Managing LECs

To see the LEC Configuration window, choose LEC Configuration from the Main Menu. Then, to:

- Install a new LEC, press [INSERT].
- Delete a LEC, select it and press [DELETE].
- View or edit details of a LEC, select that LEC, and press [ENTER].

If you highlight a LEC in the LEC Configuration menu, and then press [INSERT] or [ENTER], the LEC Configuration window appears.

### What to use the LEC Configuration window for

- To set or change the name of the LEC.
- To specify an emulated LAN for the LEC to attach to, or to give it a Computer Name to use when it asks the LECS to attach it to an emulated LAN.
- To change from Token Ring to Ethernet LAN emulation (or vice versa).
- To alter the Ring Number (if one is specified).
- To alter the LES that the LEC uses.
- To alter the LECS for all LECs in the computer.
- To specify a value for the LEC Selector.
- To alter the MAC address that the LEC uses.

### The LEC Configuration window

- LEC name: If you have more than one local LEC, you must give each one a different name.
- Adapter name: The logical name of the adapter.
- ELAN/  
Computer: The name of the emulated LAN that the LEC is a member of, or the Computer Name that the LEC uses.
- ELAN type: Token Ring or Ethernet.
- MAC address: The LEC's MAC address on the emulated LAN.
- LES address: By default, the LEC receives the address of the LES automatically from the LECS. If for any reason you do not want to use a LECS, you can specify a LES address instead. If you specify a LES address manually, the LECS location field disappears from this window (because you will not be using a LECS), and the ELAN Properties field appears.

ARP cache entries:	Press [ENTER] to view the MAC-to-ATM address mappings and the Route Descriptor-to-ATM address mappings that the LEC has used and stored in its cache.	LEC ID:	The number that the LES uses to identify the LEC by. Each LEC receives from the LES a different LEC ID.
LECS location:	(This field disappears if you have typed a LES address for the LEC to use.) If you select LECS location, you can press [ENTER] to view the LECS Location window. To edit the LECS location (local or remote) press [ENTER] until the LECS Location Menu appears. To edit the address of a remote LECS, highlight the address and press [ENTER].	Control packets in:	The number of control (that is, non-data) frames that the LEC has received from the LECS and the LES.
ELAN properties:	If you select this item, the ELAN Properties window appears.	ARP packets in:	The number of LEARP frames the LEC has received from the LES. The LEC receives LEARP frames in response to requests it makes to the LES to resolve addresses. It might also receive LEARP frames from a LES that is unable to resolve an address. However, the Madge LES only sends LEARP request frames to Proxy LECs.
Selector:	By default, you do not need to specify a selector for the LEC. If you want to specify one, make sure that it is different from the selectors used by any other software modules associated with the same adapter.	MAC address:	The LEC's MAC address on the emulated LAN.
		ATM address:	The ATM address of the LEC, including its selector (the last two digits).
		LES address:	The ATM address of the LES that the LEC is currently using.

Maximum frame size:	The maximum size of LAN frame that the emulated LAN supports.
Bad control packets:	The number of bad control packets that the LEC has received.  Bad packets, in this sense, are frames that are corrupted or that have been generated for some proprietary purpose by third-party LAN emulation software components.
ARP packets out:	The number of LEARP frames the LEC has sent to the LES.  The LEC sends LEARP frames to the LES when it is requesting an address resolution or when it is replying to a request from the LES for an address resolution. (The Madge LES only sends LEARP requests to Proxy LECs.)
Route desc:	The Route Descriptor that the LEC is using on the emulated Token Ring LAN. This will be <none> unless the LEC you are inspecting is in a computer that is performing source routing.

### The ELAN Properties window (for a single LEC)

This window appears if you type a specific LES address in the LEC Configuration window and then select ELAN Properties. (If you type a specific LES address, it is because you have decided not to use a LECs.) You can use this window to configure the following attributes for an individual LEC:

Control time-out:	The time that the LEC waits for a response to a control frame before sending the frame again.
Max unknown frame time/ count:	When the LEC has no VCC set up to a LEC that it needs to send a frame to, it will send that frame repeatedly to the BUS. To ensure that this does not overload the BUS, the LEC will only continue sending the frame for a certain period of time (maximum unknown frame time). Also, it will only send the frame a maximum number of times (max unknown frame count).
Max retry count:	The number of times that the LEC will repeat a LEARP request that has timed out.

Aging time:	The time that the LEC will keep an entry in its table of MAC-to-ATM address mappings, in the absence of any verification of that mapping.	Multicast send type:	The Quality of Service of the connection that the LEC will use to communicate with the BUS. The Madge LEC currently supports only “Best Effort” connections.
Expected LEARP time:	The maximum time that the LEC will wait for a LEARP request to be successful.	VCC time-out:	The time that the LEC will permit Data Direct VCCs to remain idle, before releasing them.
Flush time-out:	The time that the LEC will wait for a response to a flush request, before taking recovery action. When a VCC has just been set up to a particular LEC, the transmitting LEC will stop sending frames via the BUS, and start sending them directly to their target LEC. The flush procedure is necessary to prevent frames from arriving at their destination out of sequence. For example, it prevents the first direct transmission to the LEC arriving before the last transmission to go via the BUS.	Forward delay time:	The time that the LEC will keep an entry for a non-local MAC address in its table of MAC-to-ATM address mappings, in the absence of any verification of that mapping. A non-local MAC address is an address on the other side of a bridging device.
Local segment ID:	The ring number of the emulated LAN.	Path switching delay:	The time after which the LEC will assume that a frame it has sent via the BUS has either reached its destination or been discarded by the BUS.
		Connection completion timer:	The time that the LEC expects to wait before receiving data (or a “ready” indication) from a LEC that has set up a VCC to it.
		Max frame size:	The maximum size of LAN frame that the emulated LAN supports.

## Managing LECSs

To see the LECS Configuration window, choose LECS Configuration from the Main Menu. To:

- Install a new LECS, press [INSERT].
- Delete an existing LECS, select the LECS, and press [DELETE].
- View or edit details of an existing LECS, select that LECS, and press [ENTER].

If you highlight a LECS and then press [INSERT] or [ENTER], the LECS Configuration window appears.

### What to use the LECS Configuration window for

- To find out the ATM address of a local LECS.
- To specify default emulated LANs for a LECS to attach LECs to.
- To specify a LECS selector for a LECS that is not using the “well known” LECS address.
- To add emulated LANs to the list of emulated LANs that a LECS can attach LECs to. You can also delete emulated LANs from the list.
- To add new LECs to the membership list of a particular emulated LAN (or to delete LECs from such a list).
- To configure emulated LAN properties centrally.



**Note:** The LECS Configuration window is only available on NetWare servers or Windows NT stations that are running the Madge service components.

### The LECS Configuration window

- LECS name:** The name of the LECS.
- Adapter:** The logical name of the adapter that the LECS is using.
- Selector:** The selector is the last two digits of an ATM process' ATM address. By default, the Madge LECS uses the “well known” LECS address and you do not need to give it a selector. If you do not want the LECS to use the “well known” address, give it a selector to enable the adapter to distinguish the LECS from other ATM processes associated with it, for example, the LES, and BUS. Do not give it a selector that another ATM process is using.

**Default ELANs by network type:** The name of the emulated LAN that the LECS attaches LECs to if they do not specify a Computer Name or an emulated LAN name. You can choose a default Token Ring and/or a default Ethernet emulated LAN. You can also choose a default emulated LAN for a LEC to use when it has not requested to be attached to a particular type of emulated LAN.

**ELANs:** If you select ELANs and press [INSERT], you can add a new emulated LAN to the LECS's list.  
If you select ELANs and press [ENTER], you can select particular emulated LANs to inspect. When you have selected one, press [ENTER] again. The LECS ELAN Configuration window appears.

**Control packets:** The number of control (that is, non-data) frames that the local LECS has received from the LES or from LECs.

**ATM address:** The ATM address of the local LECS.

**Bad control packets:** The number of bad control packets that the local LECS has received from the LES or from LECs.

Bad packets, in this sense, are frames that are corrupted or that have been generated for some proprietary purpose by third-party LAN emulation software components.

### **The LECS ELAN Configuration window**

This window allows you to edit the details that the LECS has about an emulated LAN. Use it to edit the name, type, registration mode, ring number, and access policy (open or closed) of the emulated LAN.

From this window you can also access the LECS Client Configuration window and the ELAN Properties window.

To see the LECS ELAN Configuration window:

- 1 From the Main Menu select LECS Configuration.
- 2 Then select ELANs.
- 3 From the LECS ELAN List menu, either select the emulated LAN whose details you want to view/edit, or press [INSERT] to add a new emulated LAN to the LECS's list.



The LECS ELAN Configuration window contains the following information:

ELAN:	The name of the emulated LAN.
Type:	Token Ring or Ethernet.
Access policy:	Open or Closed. If the emulated LAN is closed, the LECS will attach LECs to it that give the correct information when they apply to join the emulated LAN. The information that they must give is displayed in the LECS Client Configuration window.
Registration:	Whether a LES will register automatically with the LECS. By default, a Madge LES does register automatically with the LECS.
LECS ELAN Clients:	If you select this field, the Select ELAN menu appears. Press [ENTER] or [INSERT] to see the LECS Client Configuration window.
ELAN properties:	If you select this field, the ELAN Properties window appears.

### The LECS Client Configuration window

This window enables you to specify:

- The details that the LECS checks individual LECs for when they apply to join emulated LANs. If a LEC does not give the details correctly and seeks to join a closed emulated LAN, the LECS will not allow it to join that emulated LAN.
- A MAC address for the LEC to use (if it has not given the LECS a MAC address for itself).

To view this window:

- 1 From the Main Menu choose LECS Configuration.
- 2 In the LECS Configuration window, select ELANs.
- 3 From the LECS ELAN List, either press [ENTER] over a particular emulated LAN or press [INSERT] to add a new one to the list.
- 4 In the LECS ELAN Configuration window, select LECS ELAN Clients.
- 5 From the ELAN Client List, select the LEC you want to view/edit, or press [INSERT] to add a new LEC to the list. The LECS checks the details of the LECs on this list before letting them onto a closed emulated LAN.

The LECS Client Configuration window contains the following editable fields:

**Client name:** The name by which you wish to identify the LEC in the menus of the ATM Manager. This name is not the name that the LEC must give to the LECS to gain access to a particular emulated LAN.

**Computer:** This is the name that the LEC must give to the LECS to gain access to a particular (closed) emulated LAN. It is, effectively, a password.

**ATM address:** The ATM address that the LEC must give to the LECS before the LECS will permit it onto the emulated LAN. If you specify an ATM address, the ATM mask field appears.

**ATM mask:** A mask for the ATM address. This field only appears if you specify an ATM address that the LEC must use when it applies to join the emulated LAN.

To use an ATM mask, type the ATM address again, but this time type a zero for any digit that you wish the LECS not to check.

**MAC address:** The MAC address that you require the LECS to give to the LEC if the LEC does not tell the LECS the MAC address it will use.

### **The ELAN Properties Window (for all LECs)**

The parameters in this window are the same as the ones described in the section on managing individual LECs, earlier in this chapter. However, this window enables you to specify the various properties centrally for every LEC on the emulated LAN.

To view this window:

- 1 Select ELANS from the LECS Configuration window.
- 2 Select an emulated LAN from the list of emulated LANs that the LECS knows about.
- 3 Select ELAN Properties from the LECS ELAN Configuration window.

The ELAN properties window contains the following parameters:

Control time-out:	The time that each LEC will wait for a response to a control frame, before sending the frame again.
Max unknown frame time/ count:	When a LEC has no VCC set up to a LEC that it needs to send a frame to, it will send that frame repeatedly to the BUS. To ensure that this does not overload the BUS, the LEC will only continue sending the frame for a certain period of time (max unknown frame time). Also, it will only send the frame a maximum number of times (max unknown frame count).
Max retry count:	The number of times that a LEC will repeat a LEARP request that has timed out.
Aging time:	The time that a LEC will keep an entry in its table of MAC-to-ATM address mappings, in the absence of any verification of that mapping.
Expected LEARP time:	The maximum time that a LEC will expect to wait for a LEARP request to be successful.

Flush time-out:

The time that a LEC will wait for a response to a flush request, before taking recovery action. When a VCC has just been set up to a particular LEC, the transmitting LEC stops sending frames via the BUS, and starts sending them directly to their target LEC. The flush procedure is necessary to prevent frames from arriving at their destination out of sequence. For example, it prevents the first direct transmission to the LEC arriving before the last transmission to go via the BUS.

Local segment ID:

The ring number of the emulated LAN.

Multicast send type:

The Quality of Service of the connection that a LEC uses to communicate with the BUS. The Madge LEC supports only “Best Effort” connections.

VCC time-out:

The time that each LEC will permit Data Direct VCCs to remain idle, before releasing them.

Forward delay time:	The time for which each LEC will keep an entry for a non-local MAC address in its table of MAC-to-ATM address mappings, in the absence of any verification of that mapping. A non-local MAC address is an address on the other side of a bridging device.
Path switching delay:	The time after which each LEC assumes that a frame it has sent via the BUS has either reached its destination or been discarded by the BUS.
Connection completion timer:	The time that a LEC expects to wait before receiving data, or a “ready” indication, from a LEC that has set up a VCC to it.
Max frame size:	The maximum size of LAN frame that the emulated LAN supports.

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## Managing LESs

To see the LES Configuration menu, choose LES Configuration from the Main Menu. Then, to:

- Install a new LES (that is, a new emulated LAN), press [INSERT].
- Delete an existing LES, press [DELETE].
- View or edit details of an existing LES, select that LES, and press [ENTER].



**Note:** The LES Configuration window is only available on NetWare servers or Windows NT stations that are running the Madge service components.

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**Note:** If you create a new LES, include it in the LECS’s list of emulated LANs. See the section of this chapter called “Managing LECSs”.

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If you highlight a LES and then press [INSERT] or [ENTER], the LES Configuration window appears.

### What to use the LES Configuration window for

- To set or change the name of the emulated LAN.
- To change from Token Ring to Ethernet LAN Emulation or vice versa.
- To change the adapter that the LES uses.
- To set a particular Selector for the LES and/or BUS.
- To change from automatic to manual registration (or vice versa) of the LES with the LECS.

### The LES Configuration window

- ELAN name: The name of the emulated LAN that the LES services.
- ELAN type: Token Ring or Ethernet.
- LES selector: The selector that the LES uses. The selector is the last two digits of the LES's ATM address. Only set a selector if you need to.
- BUS selector: The selector that the BUS uses. The selector is the last two digits of the BUS's ATM address. Only set a selector if you need to.

**Configuration:** If you are using the Madge LECS and LES, the LES registers automatically with the LECS. If you are not using a Madge LES, the LES will not be able to register automatically with the LECS. Select Configuration, and press [ENTER]. Then choose "Manual configuration". When you do this, three more parameters appear: Ring Number, Max Frame Size, and Control Time-out. The LECS Location parameter disappears.

**LECS location:** If you configure the LES for manual registration with the LECS, this parameter disappears.

If your LES is configured to register automatically with the LECS, and you select LECS location, you can press [ENTER] to view the LECS Location window. To edit the LECS location (local or remote), press [ENTER] until the LECS Location Menu appears. To edit the address of a remote LECS, highlight the address, and press [ENTER], then type the address.

ELAN Clients:	Details of the individual LECs that are attached to the LES. To view these details, select ELAN Clients and press [ENTER]. Then choose a LEC from the list. The LES Client Information window appears for each LEC that you highlight. You can also delete LECs by using the [DELETE] key.	ARP packets in:	The number of LEARP frames the LES has received from LECs. The LES receives LEARP frames whenever a LEC needs an address resolved or whenever a LEC replies to a request from the LES for an address resolution. (The Madge LES only sends LEARP requests to Proxy LECs.)
Control time-out:	The time that a LEC waits for a response to a control frame, before sending the frame again. This information only appears if you configure the LES to register manually with the LECS.	ARP responded:	The number of LEARP frames from LECs that the LES has responded to.
Max frame size:	The maximum size of LAN frame that the emulated LAN supports. This information only appears if you configure the LES to register manually with the LECS.)	Control packets in:	The number of control (that is, non-data) frames that the LES has received from the LECS and from different LECs.
Control time-out:	The time that a LEC waits for a response to a control frame, before sending the frame again. This field only appears if you configure the LES to register manually with the LECS.	LES address:	The ATM address of the LES.
		BUS address:	The ATM address of the BUS.
		ARP packets out:	The number of LEARP frames the LES has sent to LECs. The LES sends LEARP frames to LECs when it is replying to requests from them for address resolutions or when it requires an address resolution from one of them. (The Madge LES only sends LEARP requests to Proxy LECs.)

Packets forwarded by BUS:	The number of frames that the BUS has sent onto the emulated LAN.
Bad control packets:	<p>The number of bad control packets that the local LES has received from the LECS or from LECs.</p> <p>Bad packets, in this sense, are frames that are corrupted, or that have been generated for some proprietary purpose by third-party LAN emulation software components.</p>

### The LES Client Information window

This window displays information about each LEC that is currently attached to the LES. To see the window:

- 1 Choose LES Configuration from the Main Menu.
- 2 Select the LES whose LEC's you wish to inspect.
- 3 In the LES Configuration window, select ELAN Clients.
- 4 From the Select LES Client menu, select a LEC to inspect. To delete a LEC from the emulated LAN, highlight that LEC then press [DELETE].
- 5 While you are in the LES Client Information window, press [F7] to view details of the next LEC on this emulated LAN; press [F8] to view the details of the previous LEC.

The window contains the following information:

ATM address:	The ATM address of the LEC.
LEC ID:	The LEC's ID number. The number that the LES uses to identify the LEC by. Each LEC receives from the LES a different LEC ID.
ARP packets in:	The number of LEARP frames that the LEC has sent to the LES.

Control packets in:	The number of control (non-data) frames the LEC has sent to the LES.
MAC address(es):	The MAC address or addresses that the LEC uses.
Route descriptors:	The route descriptors that the LEC uses.
ARP packets out:	The number of LEARP frames that the LES has sent to this LEC.
Bad control packets:	The number of bad control frames that the LES has received from this LEC.
Packets to BUS:	The number of frames that this LEC has sent to the BUS.



# Troubleshooting

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### **When the driver cannot find the adapter**

- Run ATMDIAG and follow any advice that appears on the screen.
- If the PC has a configuration program, run it and check that there are no clashes between the settings of PCI adapters and those of any non-Plug 'n' Play ISA adapters in the computer.

### **When the LEC cannot find the LECS**

- Check that the adapter's green LED is ON. If it is, the adapter is properly connected to the switch. If it is not, check the cable connections to the switch.
- Check the LECS address that the PC is using. To find this out, run the ATM Manager (see Chapter 10).

### **When the LEC does not join the emulated LAN**

- Check that the LEC is configured for the same type of LAN emulation as the LES you are using.

### **Other things to check**

- If the PC has EMM386 loaded, make sure it uses version 4.49 or later (see the adapter installation guide).
- For NetWare (DOS) workstations, check that you have versions 2.11 (or later) of LSL and IPXODI loaded.
- Check that the signaling stack you have configured the adapter to use is the same as the one that the ATM switch is configured to use (that is to say, either UNI 3.0 or UNI 3.1).

# Migrating to ATM

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Introduction	60
Connecting desktop ATM users to the Token Ring backbone	61
Using a Token Ring-to-ATM access switch	62
Connecting desktop ATM users to Ethernet LANs	63
Adding ATM into the backbone	64
An ATM-only Network	67

## Introduction

This chapter illustrates LAN designs that may help you plan how you integrate ATM with your existing network. It uses Madge products for illustration, but the principles it describes are general ones.

### High-speed connectivity products from Madge

- *Collage 250 and 280 Workgroup ATM Switches.*  
These are stackable, 25Mbps ATM switches. The Collage 280 adapts automatically between switched 10Mbps Ethernet and 25Mbps ATM. Available with the Collage 250/280 switches are the Collage 214/215 155Mbps Network Option Modules for 155Mbps ATM connectivity, and the Collage 218 Stacking Bus Modules for linking stacked Collage 250/280s to each other.
- *Smart Ringswitch.*  
This is a high-performance Token Ring backbone switch. The Ringswitch is optimized for high-speed connectivity between existing Token Ring LANs. Forthcoming optional expansion modules provide direct connectivity to 155Mbps ATM devices or to FDDI.
- *Collage Connection.*  
This is a kit that enables you to use a NetWare server to connect emulated LANs and real Token Ring LANs. It includes a Collage 25 PCI Adapter, a Smart 16/4 EISA Bridgenode, and NetWare MultiProtocol Router 3.0 software. The Collage Connection particularly suits customers who are trying out ATM and who need to give ATM users access to resources on a real Token Ring LAN.
- *Collage 530 Ethernet-ATM Access Switch.*  
This is a high-performance Ethernet-to-ATM access switch. The Collage 530 connects individual Ethernet LANs to each other and to a 155Mbps ATM backbone switch. It is optimized for direct connectivity between Ethernet and ATM.
- *Collage 540 Token Ring-ATM Access Switch.*  
This is a high-performance Token Ring-to-ATM access switch for connecting individual Token Ring LANs both to each other and to a 155Mbps ATM backbone switch. The Collage 540 is optimized for direct connectivity between Token Ring and ATM.
- *Collage 740 Backbone ATM Switch.*  
This is a high-performance 155Mbps backbone ATM switch with onboard support for LAN emulation.

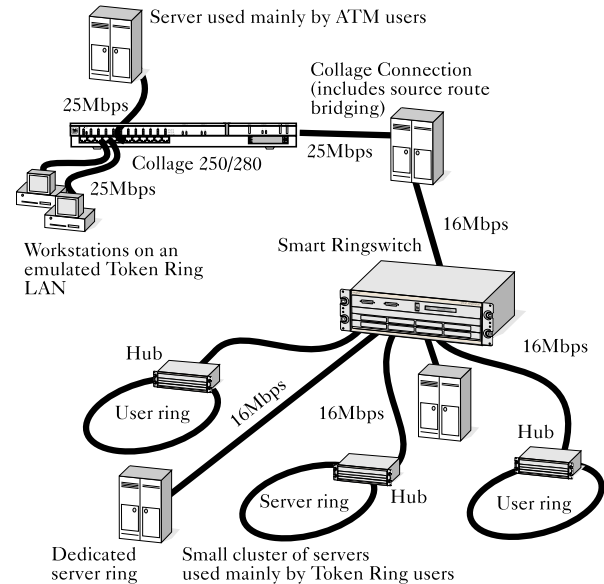
## Connecting desktop ATM users to the Token Ring backbone

To connect emulated and real Token Ring LANs, we recommend you use the Collage 540 (described later in this Appendix). However, for customers who are experimenting with ATM, Madge produce the Collage Connection. This is a kit that enables you to use a NetWare server as a two-port, source routing bridge (see Figure A.1).

### Speeding up Server Access

- Put any servers that are used mainly by ATM users onto the emulated LAN. This gives the workgroup users fast access to them.
- Put any servers accessed mainly by Token Ring users onto either dedicated connections or small server-only rings on the Ringswitch. The Token Ring users will then benefit from fast access to the server rings, and particularly from fast access to the dedicated server rings.
- Servers that you leave attached to a Ringswitch can also have connections to the ATM switch. If you connect a server to both networks, however, you must configure the Collage Connection as a router, not as a source routing bridge. You must also give each of its interfaces an IPX number.

Figure A.1 Using the Collage Connection



**Note:** If you connect any servers (except the server running the Collage Connection) to both ATM and Token Ring, you must administer the IP addresses on ATM stations separately from the IP addresses on Token Ring stations.

## Using a Token Ring-to-ATM access switch

One strategy for migrating to ATM is to connect existing Token Ring and emulated LANs to a Token Ring-to-ATM access switch, for example, the Collage 540 (see Figure A.2). In the future, you then have the option of upgrading your network further by connecting the Collage 540 to a 155Mbps ATM backbone switch (see “Adding ATM into the backbone” later in this Appendix).

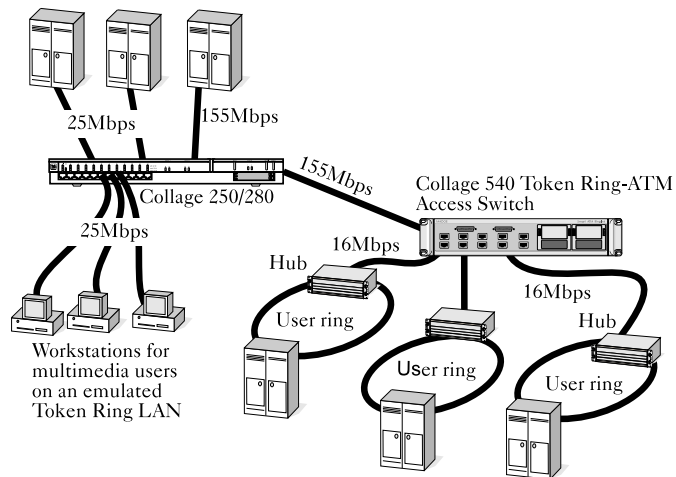
### Speeding up Server Access

The Collage 540 is optimized for Token Ring-to-ATM access. To take advantage of this for server access, include as many servers as possible on the emulated LAN.

In Figure A.2, a workstation on one of the user rings will communicate with a server on the ATM switch at speeds of at least 9.6 Mbps. This is as fast as if the server were on the same Token Ring as the workstation.

Any servers that you do not have room for on the ATM workgroup switch, you can put on user rings on the Collage 540. However, if there are a lot of servers, it might be time to install an ATM backbone switch.

Figure A.2 Using a Token Ring-to-ATM access switch



## Connecting desktop ATM users to Ethernet LANs

The ports of the Collage 280 Workgroup ATM Switch adapt automatically between 10Mbps Ethernet and 25Mbps ATM, depending on the network adapter you use. You can also configure the ports of the Collage 280 so that any Ethernet adapters attached to it are also members of the emulated Ethernet LAN (there is an Ethernet LEC associated with each port on the Collage 280).

To connect desktop ATM users to larger Ethernet LANs, use an Ethernet-to-ATM access switch such as the Collage 530. If you have already decided to pursue an ATM migration strategy, this is the best alternative.

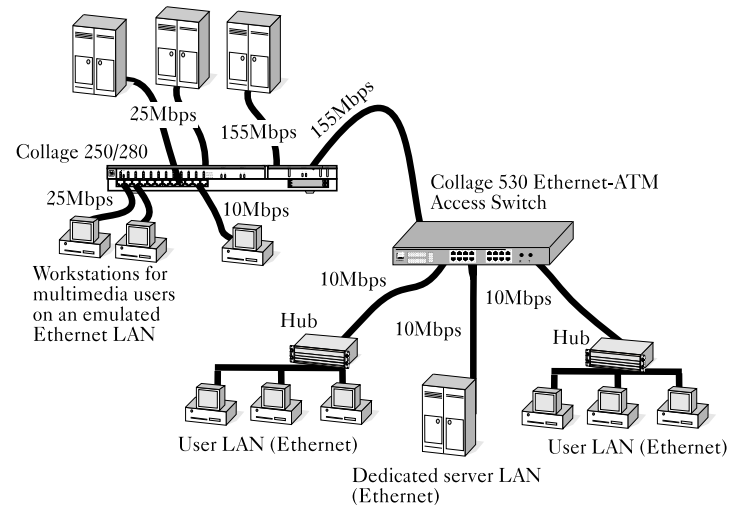
### Speeding up Server Access

The Collage 530 is optimized for Ethernet-to-ATM access. To take advantage of this for server access, put as many servers as possible on the emulated LAN. In this way, all network users benefit from fast server access. For example, in Figure A.3, a workstation on one of the user LANs will communicate with a server on the ATM switch at speeds of at least 8 Mbps.

Accessing a server will be as fast as if the server were on the same Ethernet LAN as the user's workstation.

Any servers you do not have room for on the ATM switch, put on dedicated connections to the Collage 530.

Figure A.3 Using an Ethernet-to-ATM access switch



## Adding ATM into the backbone

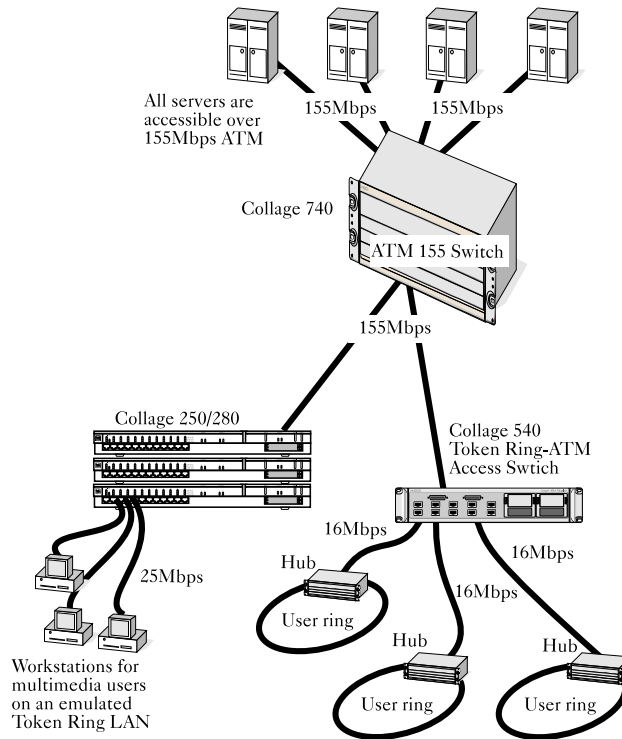
This section illustrates ways of accessing a 155Mbps ATM backbone switch, such as the Collage 740, from existing LAN technologies. The examples it uses focus on Token Ring-to-ATM access switches, Token Ring switches, and Ethernet-to-ATM access switches.

These switches enable you to centralize servers on an ATM backbone. By doing this, you achieve the benefits of centralization without the normal reduction in server access speeds: workstation users on Token Ring or Ethernet LANs can access the servers as quickly as if they were accessing them locally.

### The Direct Route from Token Ring to ATM

The Collage 540 Token Ring-to-ATM Access Switch provides a direct route from Token Ring to ATM. In Figure A.4, all the servers on the network are accessible to network users over 155Mbps ATM. All users benefit from server access speeds of at least 9.6Mbps. Users on the emulated LANs benefit from access speeds of over 20Mbps.

Figure A.4 Accessing an ATM backbone via the Collage540 Token Ring-ATM Access Switch





## Upgrading a switched Token Ring backbone to an ATM backbone



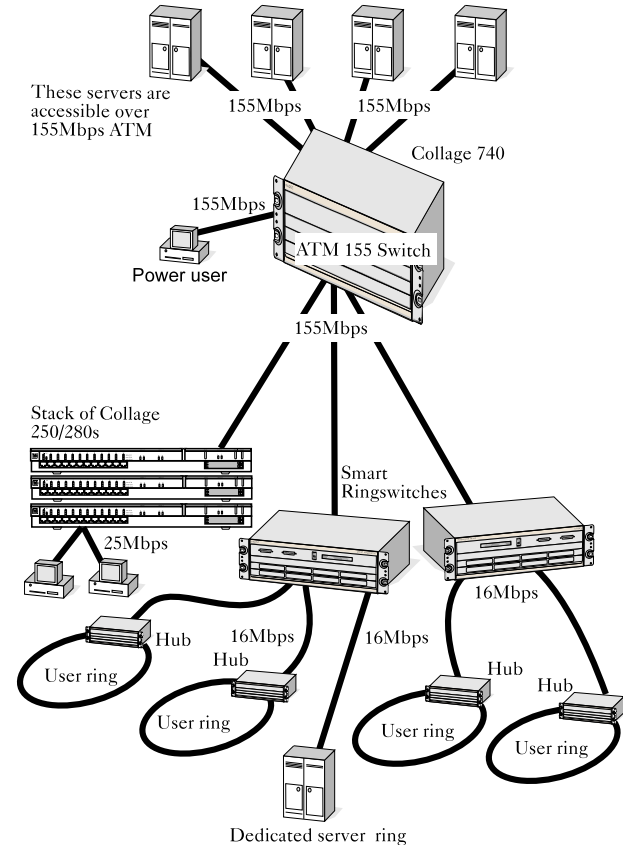
**Note:** 155Mbps ATM expansion modules are forthcoming for the Smart Ringswitch.

If your servers are already attached to a backbone Token Ring switch, you can upgrade further by:

- 1 Connecting individual Token Ring switches to an ATM 155Mbps backbone switch.
- 2 Moving servers from the Token Ring switch to an ATM backbone switch.
- 3 Gradually replacing desktop Token Ring adapters with 25Mbps desktop ATM adapters.
- 4 Attaching power users directly to the backbone (for server access speeds of more than 100Mbps).

Figure A.5 shows two Smart Ringswitches connected to a 155Mbps ATM switch such as the Collage 740. (One of the Ringswitches in the diagram could equally well be a Collage 540.) A series of stacked Collage 250/280 switches are also connected directly to the ATM backbone switch (which, in the case of the Collage 740, includes its own onboard LAN emulation software). All the servers centralized on the ATM backbone switch can be accessed at speeds of at least 9.6Mbps.

Figure A.5 Centralizing servers on an ATM backbone

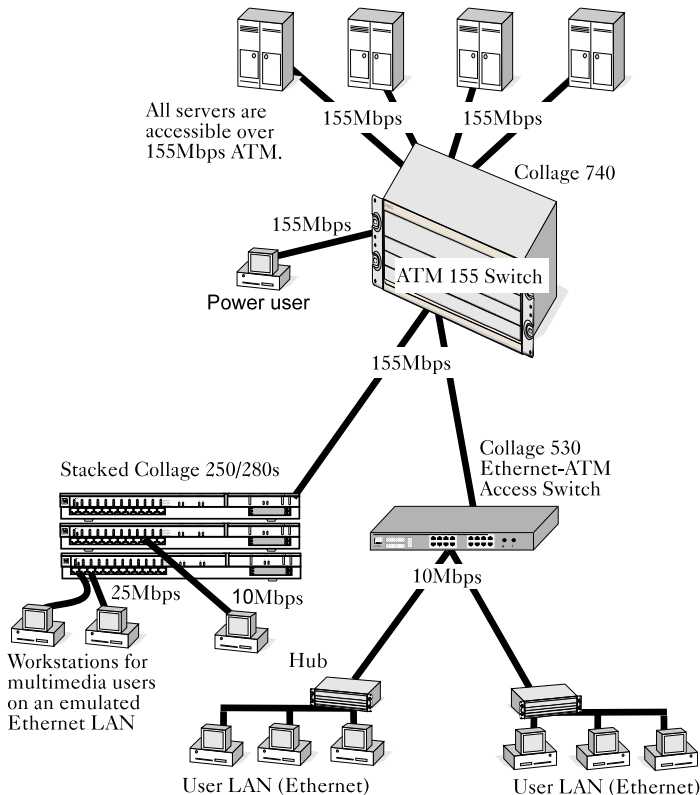


### The Direct Route from Ethernet to ATM

The Collage 530 Ethernet-to-ATM Access Switch provides a direct route from Ethernet to ATM.

In Figure A.7 a series of stacked Collage 250/280 switches and a Collage 530 are attached to a Collage 740 Backbone ATM Switch. All the servers on the network are accessible to network users at speeds of at least 8Mbps. Multimedia users on the Collage 250/280 switches can access the servers at speeds of over 20Mbps. Power users on the backbone switch can access the servers at speeds of over 100Mbps.

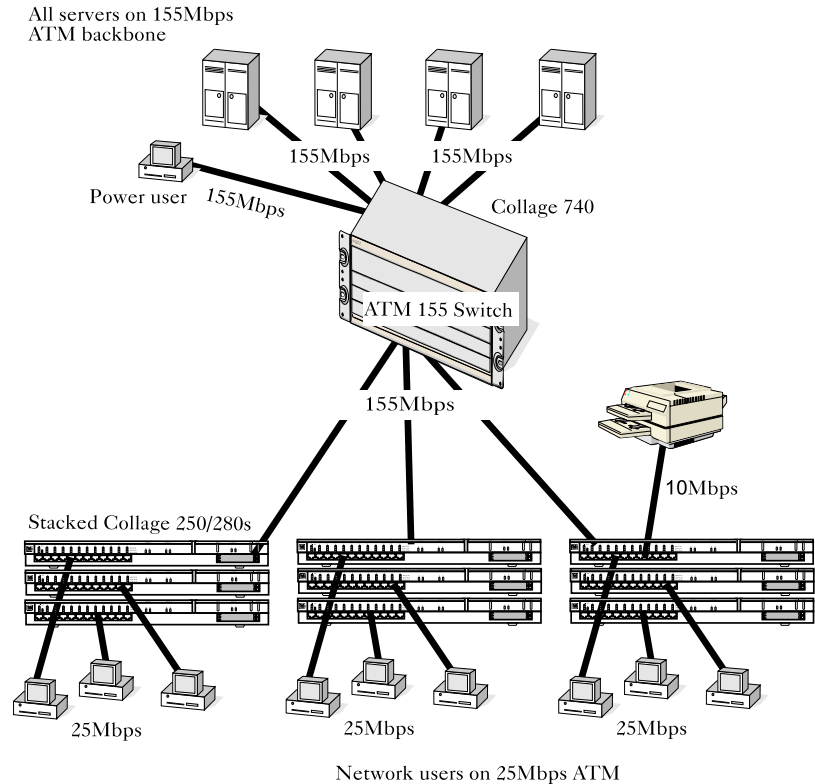
Figure A.7 Access to an ATM backbone via the Collage 530 Ethernet-ATM Access Switch



## An ATM-only Network

Eventually you may seek to have a network where users benefit uniformly from the very high performance of ATM. In Figure A.8 all the servers are attached to a 155Mbps ATM backbone, and all the network users can access the servers at speeds of over 20Mbps. Power users on the backbone switch can access the servers at speeds of over 100Mbps.

Figure A.8 An ATM-only Network





# Where to run LAN emulation services

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Internal or external services	70
The LECS Address	71

## Internal or external services

Madge Collage adapters ship with LAN emulation services (LECS, LES, and BUS software) for NetWare servers or Windows NT stations. These are *external* service components: they run outside the ATM switch. You do not have to use these service components. The Madge Client (LEC) is compatible with all LAN emulation services that comply with the standards laid down by the ATM Forum.

On a fully integrated ATM network, we recommend you to run the *internal* LAN emulation services on an ATM switch. However, there may be good reasons why you cannot or do not want to do this. Not least, you may want to use the service components supplied with the Collage adapter because they are easy to manage, or because they enable you to set up both Token Ring and Ethernet emulated LANs.

If you are using Collage switches (or similar switches from other vendors), the following considerations will help you decide where to run LAN emulation services:

- *The Collage 740 Backbone ATM Switch.*  
This switch has full support for both Token Ring and Ethernet LAN emulation. We recommend you to use the switch's internal service components. One advantage of running LAN emulation services on the backbone switch, instead of on a server, is that you can then take the server down for maintenance without interrupting LAN emulation.
- *The Collage 530 Ethernet-ATM Access Switch.*  
This switch does not include support for LAN emulation services. Unless you have another ATM switch to run LAN emulation services on, use the external service components shipped with the Collage adapter.
- *The Collage 250 Workgroup ATM Switch.*  
This switch includes no service components for LAN emulation. Unless you have another ATM switch to run LAN emulation services on, use the external service components shipped with the Collage adapter.
- *The Collage 280 Workgroup ATM Switch.*  
This switch includes service components for emulated Ethernet LANs. If you need support for emulated Token Ring LANs, and you have no other switch whose onboard services support Token Ring LAN emulation, use the external service components shipped with the Collage adapter.

- *The Collage 540 Token Ring-ATM Access Switch.*  
This switch includes support for Token Ring LAN emulation. However, we recommend you either to run LAN emulation services on another ATM switch, for example, the Collage 740, or to use the external service components supplied with the Collage adapter.



**Note:** If your switch has onboard services but you want to use the external Madge services supplied with the Collage adapter, disable the switch's internal service components.

## The LECS Address

Wherever you decide to run LAN emulation services, each LEC you install needs to be able to find the LECS.

If you are using ATM-Forum-compliant services, each LEC will find the LECS automatically, normally by using the ATM Forum's "well known" LECS address.

However, only one LECS on the ATM network can use the "well known" address. If you need to run more than one LECS, give each LEC not using the "well known" LECS the ATM address of another LECS.



**Note:** To find out the ATM address of an external Madge LECS, see the section entitled "Managing LECSs" in Chapter 10.





# Increasing performance on a NetWare server

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Introduction	74
Configuring the server	75

## Introduction

The Collage adapter uses at most 20 percent of a high-performance server's processing resources. To make best use of the server therefore you can install several adapters into it.

By increasing aggregate bandwidth at the server in this way, you can more than double its performance. For example, if a server is connected to the ATM backbone by one adapter, even though the adapter is operating at full capacity, it will only use a fifth of the server's processing resources. If you install a second adapter and connect it to the ATM backbone, then, with both adapters operating at full capacity, the server will use perhaps 40 percent of its processing resources. This will enable it, in any given time, to handle twice as many user accesses as it could previously handle. Of course, if processor utilization is only 40%, you can add still another adapter into the server, trebling its original performance.

The concept of distributing traffic between two or more adapters in this way is called load sharing.

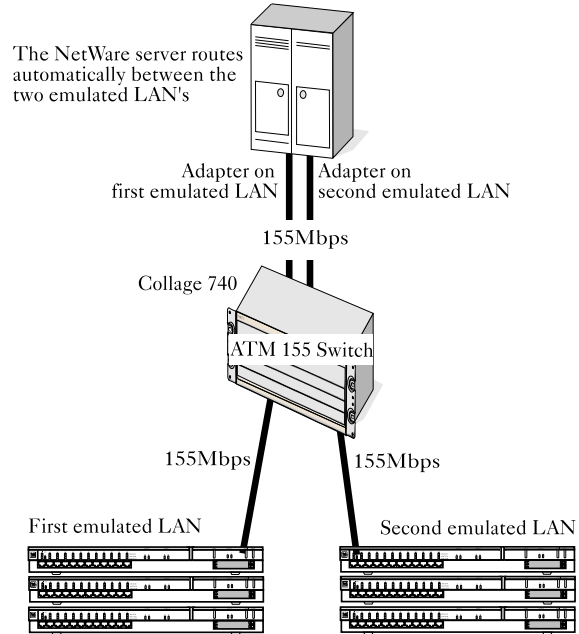


**Note:** For load sharing your server needs a Pentium 100 MHz (or faster) processor.



**Note:** To check processor utilization on the server, run Novell's MONITOR.NLM. If the figure is 50% or less, add another adapter.

Figure C.1 Two adapters can double performance



### Using separate emulated LANs for each adapter

Installing two adapters into a NetWare server and creating two emulated LANs, one for each adapter in the server, can double server performance. For purposes of illustration, the instructions in this chapter assume you are using the external Madge services supplied with the Collage adapter. However, if you are using different service components the principles are the same. In any case, the instructions are only a guide; you must adapt them to your own needs. For example, they tell you how to set up two Token Ring emulated LANs; if you need Ethernet (or Ethernet and Token Ring) emulation you must modify them accordingly.

### Using one emulated LAN with NetWare 4.10

If you are using NetWare 4.10, you do not need to configure separate emulated LANs. Instead, you can put all adapters, including the adapters in the server, onto one emulated LAN (that is, one IPX network). This is a simpler configuration, and it also gives you the benefit of fault tolerance: if one of the server's backbone connections fails, the other (or others) will assume the extra load and no users will be cut off from the server. For this configuration you need to load the Novell utility IPXRTR.NLM. For more information, refer to the NetWare 4.10 documentation, or contact Madge Technical Support.

## Configuring the server

### Set up the first emulated LAN on the server

- 1 Install two adapters physically into the server.
- 2 Load the drivers and service components for one adapter by running `ATMSETUP` on the server (see Chapter 3).

### Load the drivers for the server's second adapter

- 1 Run `ATMMGR` on the server (see Chapter 10).
- 2 From the Main Menu, select Adapter Configuration and press [INSERT].
- 3 Type a name for the second adapter, for example, type `ADAPTER_2`. Save changes.

### Install a second emulated LAN onto the server

- 1 From the Main Menu of the ATM Manager, select LES Configuration and press [INSERT].
- 2 Type a name for the second LES, for example, type `LES_2`.
- 3 Specify the type of LAN emulation you require (Token Ring or Ethernet). In the Adapter field, type the name of the second adapter (This ensures that the second LES runs on the second adapter).

- 4 When asked if you want to create the ELAN in the LECS too, answer Yes. This ensures that the Madge LECS (which is running on the first adapter) knows about the new LES.
- 5 Accept the information in the LECS ELAN Configuration window. Press [ESCAPE]. Save changes.
- 6 When asked if you want this to be the default emulated LAN, answer No. When asked if you want this to be the default Token Ring emulated LAN for the Madge LECS, answer No.

#### **Install a LEC onto the server's second adapter**

- 1 From the Main Menu of the ATM Manager, select LEC Configuration and press [INSERT].
- 2 Type a name for the new LEC, for example, type LEC\_2.
- 3 Put the new LEC on the emulated LAN you created called LES\_2.
- 4 In the LECS Location field, specify that the LECS is REMOTE (because, even though the LECS is running in the same computer, it is running on a different adapter).
- 5 Save changes. Press [ESCAPE]. Save changes again and exit the program.

#### **Edit the server's AUTOEXEC.NCF**

- 1 At the server prompt, type CONFIG. The server will report that ATMODI, the Madge driver for Token Ring LAN emulation, has been loaded twice; once for each adapter.
- 2 Edit AUTOEXEC.NCF to ensure that, when the server boots, it loads ATMODI twice. Bind a different IPX number to each instance of the Madge driver.

#### **Attach users' LECs to the new emulated LANs**

- 1 Install an adapter into each NetWare (DOS) client station.
- 2 On each client station, load the LEC and the drivers by running ATMSETUP (see Chapter 4). For best server performance, make sure that roughly equal numbers of LECs use each adapter. The way to do this is to assign roughly equal numbers of LECs to each of the two emulated LANs.
- 3 Watch the screen of the server. Whenever a LEC joins an emulated LAN, the event is reported on the screen of the server that is running the Madge LES.

# Technical support services

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Introduction	78
Worldwide Web and FTP	78
Telephone, fax, BBS, and e-mail	79
CompuServe and Nifty-Serve	81

## Introduction

Technical support is available to all Madge customers. To receive technical support:

- Use the PC Vendor G Forum on CompuServe
- Use the Madge Networks section on NIFTY-Serve (only accessible in Japan)
- Send an email (see later in this Appendix)
- Telephone Technical Support (see later in this Appendix)

For software upgrades and product information:

- Use the Bulletin Board System (BBS)
- Use the PC Vendor G Forum on CompuServe
- Use the Worldwide Web home page (<http://www.madge.com>)
- Access Madge Networks' FTP server (<ftp.madge.com>)
- Contact your local Madge office or representative

## Worldwide Web and FTP

To access the Madge Networks home page, use either a web browser or FTP software.

If you use a web browser, you can access the full home page service. If you do not have a web browser, you can still download new or updated software by using FTP software.

If you use a web browser, enter the URL:

**`http://www.madge.com`**

If you use FTP software:

- 1 Connect to <ftp.madge.com>. (The system prompts you for your login name.)
- 2 Type ANONYMOUS. (The system prompts you for your password.)
- 3 Type your full email address.

Once this is complete, you can issue file transfer commands.

## Telephone, fax, BBS, and e-mail

Region	Service	Number/address
Europe, Middle East, Africa	Telephone	+44 1628 858700
	Fax	+44 1628 858977
	BBS	+44 1628 858008
	Email	curtech@madge.com
Americas	Telephone	800 876 2343
	BBS	+1 408 955 0262
	Email	us-suprt@madge.com
Asia, Australia, New Zealand	Telephone	+852 2593 9839
	BBS	+852 2593 9829
	Email	support@madge.com
Japan	Telephone	+81 3 5232 3275
	Fax	+81 3 5232 3276
	Email	support@madge.com

**Toll-free regional support numbers**

Country	Number
Americas	800 876 2343
Australia	02 9936 1739 *
Austria	0660 8366
Belgium	0800 10485
Denmark	800 17649
Finland	0800 118 074
France	05 90 82 50
Germany	0130 868828
Hong Kong	2593 9839 *
Israel	177 440 2530
Italy	1678 72092
Malaysia	800 4137

**Toll-free regional support numbers (cont'd)**

Country	Number
Netherlands	06022 7120
Norway	800 11759
Portugal	0505 44 4602
Singapore	800 852 3151
South Africa	0800 991013
Spain	900 974412
Sweden	020 793127
Switzerland ( <i>French</i> )	155 6432
Switzerland ( <i>German</i> )	155 1057
Thailand	2231 8191*
United Kingdom	Lo-call: 0345 125539

\* Calls charged at local rate.



## CompuServe and Nifty-Serve

### CompuServe

If you are a CompuServe member, access the Madge Networks Section by typing GO MADGE at the ! prompt or, load a Windows application such as WinCIM, and type MADGE in the Go option from the Services menu.

The Madge Networks service on CompuServe provides the following facilities:

- Message section
- Library
- Conference area
- Latest software releases

For customers who have not experienced the benefits that access to CompuServe can bring, Madge Networks offers a free introductory membership. This includes a user-ID and password, one month's access to all of CompuServe's Basic services, and an introductory US\$15 usage credit that enables you to access the Madge Networks Section of the PC Vendor G Forum and CompuServe's other Extended and Premium services. You also get complimentary subscription to the monthly CompuServe magazine.

To obtain your free introductory membership, call:

Area	Number
UK	0800 289378
Germany	0130 3732
Rest of Europe	+44 272 255111
Americas	800 524 3388
Rest of the world	+1 614 457 0802

### NIFTY-Serve

This is an equivalent service to CompuServe but is only available in Japan.

Log into NIFTY-Serve and, at the > prompt, type GO FLANVA.

## Bulletin Board System (BBS)

Madge Networks maintains a free 24-hour Bulletin Board System (BBS) that provides the latest software and technical support information.

You need a modem to access the BBS. We recommend you use an ANSI (VT100) terminal emulator (for example, ProComm) with your serial port set to: 8-bit data, NO parity check, and ONE stop bit. This is because it is likely that any other setup will cause transmission errors. The BBS supports modem speeds of up to 14 400 baud (with MNP5). Download protocols supported are X Modem, Y Modem, and Z Modem.

Because the BBS is an open system, anyone can log in. The first time that you log in, the system prompts you for your name and for a password. It also asks you to complete a brief questionnaire. Please take the time to complete the questionnaire. The system displays Madge's license agreement and asks you to acknowledge it.

When you log in on subsequent occasions, make sure you enter the same name and password that you entered when you first logged in. The system tells you the last time that you logged in, asks whether you want to read the bulletins, and tells you whether there are any new mail messages for you.

To find out more about the Madge BBS service call:

Area	Number
Germany	0180 535 7273
Rest of Europe	+44 1628 858008
Americas	+1 408 955 0262
Asia	+ 852 2593 9829

## Madge FaxBack

The Madge FaxBack Product Information Service (based in the United States) is an international service for all Madge customers. Phone +1 408 383 1002, to request technical support documents, marketing documents, and information about seminars and events organized by Madge Networks.

# Index

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## A

ARP information 44, 45, 54, 55, 56

### ATM

AAL5 8, 42

address 6, 8-12, 15, 21, 26, 41, 44, 48, 50, 55

and LAN emulation 5-12

and source routing 10-11, 61, 62, 64, 65

transparent bridging 11-12, 63, 66

local management 39, 56

ATMDIAG.EXE 14, 20, 24

ATMMGR.EXE 40

ATMMGR.NLM 40

ATMODI and ATMODIE 16, 17, 22, 32

ATMSETUP.EXE 21

ATMSETUP.NLM 14

AUTOEXEC.BAT 22, 30, 32

AUTOEXEC.NCF 16-17, 76

## B

Broadcast data 9, 10

Broadcast and Unknown Server (BUS) 9, 10, 12, 45,

46, 47, 51, 52, 53, 54, 55, 56

Burnt-in Address 26, 41

BUS (see Broadcast and Unknown Server)

BUS address/selector 53, 54

## C

Client software (see LAN Emulation Client)

Collage 250/280 3, 14, 20, 59-67, 70, 74

Collage 530 3, 10, 11-12, 60, 63, 66, 70

Collage 540 3, 10-11, 60, 62, 64, 65, 71

Collage 740 60, 64, 65, 66, 67, 70, 74

Computer Name 15, 21, 43, 48, 50

Configuration Direct VCC 7

Control Direct VCC 7

Control Distribute VCC 7, 11

## D

Data Direct VCCs 7

## E

EMM386.EXE 58

Emulated LAN Name 15, 21, 43, 48, 53

Ethernet LAN emulation 11-12, 15, 16, 17, 21, 24,

30, 32, 35, 43, 60, 63, 66, 70, 75

## F

Frame type 17

**I**

ILMI 7, 26  
 IP addresses 61  
 IPXODI 22, 58  
 IPX numbers 61, 75  
 IPXRTR.NLM 75

**L**

LAN Emulation Address Resolution Protocol  
 (see also ARP information) 9, 11  
 LAN Emulation Client (LEC) 7, 8-12, 14, 20, 24,  
 26, 30, 32, 34, 35, 43-6, 50, 54, 55, 58, 75-6  
 Adding a LEC to the membership list of an  
 emulated LAN 47  
 Viewing the LECs on an emulated LAN 55  
 LAN Emulation Configuration Server (LECS) 10,  
 14, 15, 16, 21, 22, 27, 28, 43, 47-52, 53, 58, 71  
 Finding out the ATM address of a LECS 48  
 LAN Emulation Server (LES)  
 (see service components) 8-9, 10, 11, 12, 52-6  
 LEC address/selector 44  
 LECS address 14, 15, 16, 21, 27, 48, 71  
 LECS selector 47  
 LES address 43, 53, 54  
 LES selector 53  
 LSL.COM 22, 30, 32, 58

**M**

MAC addresses 8, 10, 12, 43, 44, 50, 56  
 MADGEATM.LAN 38  
 MADGEATM.LDI 38  
 Maximum (ATM) frame size 42  
 Maximum (LAN) frame size 45  
 MDGATM.CMD 34  
 MSODISUP.386 32  
 MSODISUP.VXD 30  
 Multicast Forward VCC 7, 9  
 Multicast Send VCC 7, 9

**N**

NDIS2 driver for OS/2 stations 33-5  
 NDIS3 driver for Windows NT stations 24  
 NetBIOS/Netbeui 25, 30  
 NET.CFG 20  
 Novell MultiProtocol Router 3.1 38  
 Novell NetWare 13-18, 19-22, 58, 73-6  
 NTMGR.EXE 40

**O**

ODI driver 14, 20, 30, 32  
 OS2 30, 33-5

---

## P

Permanent Virtual Channel Connections 6  
Proxy clients 11, 44, 45

## R

Ring number 16, 51  
Route descriptor 10, 45, 56

## S

Service components  
(see also LES, LECS, and BUS)  
configuration and management 39-56  
where to run services 69-71  
Signaled Virtual Channel Connections 3, 6, 7, 8, 9,  
15, 21, 42, 46, 51, 52

## T

Token Ring LAN emulation 16, 17, 21, 22, 30, 32,  
43, 61, 62, 64, 5, 70, 75, 76  
Transparent bridges 11-12

## U

UNI 3.0/3.1 3, 15, 21, 42

## V

VCCs (see Signaled and Permanent Virtual Channel  
Connections)

## W

Windows 95 30  
Windows for Workgroups 32  
Windows NT 23-8