

ATM

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RapidFire 615x ATM PCI 155 Adapters Guide to Operations

 **olicom**
THE NETWORKING COMPANY

RapidFire 615x ATM PCI 155 Adapters

Guide to Operations

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OC-6151, ATM PCI 155 UTP Adapter

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with the following standards or other normative documents

EN 50082-1

EN 55022

EN 60825-1

EN 60950/1992 + amendments

following the provisions of 89/336/EEC Directive and 73/23/EEC Directive.

CLASS 1 LASER PRODUCT

Table of Contents

| | |
|--|-----------|
| 1. Introduction | 1 |
| 1.1 Package Contents | 2 |
| 1.2 Operational Overview | 3 |
| 1.3 Environment and Driver Overview | 3 |
| 1.3.1 Microsoft Windows NT | 4 |
| 1.3.2 Microsoft Windows 95 | 4 |
| 1.3.3 Novell NetWare 4.x | 4 |
| 1.3.4 Novell NetWare 3.12 | 5 |
| 1.3.5 Microsoft Windows for Workgroups and Novell NetWare 3.11 | 5 |
| 1.3.6 OS/2 - IBM Warp | 5 |
| 1.4 Utility Overview | 6 |
| 1.5 Release Information and Last-minute Changes | 6 |
| 1.6 Textual Conventions | 7 |
| 2. Introduction to ATM | 9 |
| 2.1 LAN Emulation Concept and Use | 10 |
| 2.1.1 LAN Emulation Functionality | 11 |
| 2.1.2 LAN Emulation Network | 12 |
| 2.1.3 LAN Emulation Configuration Server - LECS | 13 |
| 2.1.4 Multiple ELANs | 13 |
| 2.1.5 Interworking with Cisco SSRP | 13 |
| 2.1.6 Active Redundancy with Multiple Adapters - ClearServer/ATM | 14 |
| 2.2 Classical IP Concept and Use | 14 |
| 2.3 RFC 1483 Concept and Use | 16 |
| 2.4 Native Use of ATM - WinSock 2 | 18 |
| 2.4.1 WinSock 2 Specifications | 19 |
| 2.5 Traffic Profiles for VCCs | 19 |
| 2.5.1 Introduction | 19 |
| 2.5.2 Configuration in mixed Rate Environments | 20 |
| 2.5.3 Rate Negotiation | 21 |
| 2.5.4 Address Controlled Rate Selection | 21 |
| 2.5.5 Traffic Profiles for PVCs | 25 |
| 2.5.6 Default Traffic Profile Configuration | 25 |
| 3. Hardware Installation | 27 |
| 3.1 Installation Requirements | 27 |
| 3.2 Adapter Card Installation | 27 |
| 3.3 Connecting the Adapter Cables | 28 |

| | |
|---|-----------|
| 4. Software Installation | 29 |
| 4.1 Olicom CD-ROM and Disks | 29 |
| 4.2 Microsoft Windows NT - NDIS 3 Driver | 30 |
| 4.2.1 Installing NDIS 3 Driver during Windows NT Installation | 31 |
| 4.2.2 Adding Adapters - Windows NT 3.51 | 32 |
| 4.2.3 Adding Adapters - Windows NT 4.0 | 33 |
| 4.2.4 Updating an existing Windows NT Driver | 34 |
| 4.2.5 NDIS 3 Error Messages | 34 |
| 4.3 Microsoft Windows 95 - NDIS 3 Driver | 35 |
| 4.3.1 Installing the ATM NDIS 3 Driver | 35 |
| 4.3.2 Adding another Virtual Adapter | 36 |
| 4.3.3 Updating Existing Windows 95 Driver | 36 |
| 4.3.4 NDIS 3 Error Messages | 37 |
| 4.4 Novell NetWare Servers - ODI 3.31 Driver | 38 |
| 4.4.1 Installing and Loading the Driver on a 4.x Server | 38 |
| 4.4.2 Command Line Syntax and Examples | 42 |
| 4.4.3 Installing and Loading the Driver on a 3.12 Server | 43 |
| 4.4.4 Changing the Configuration File | 45 |
| 4.4.5 Source-Routing for 3.12 and 4.x Servers | 45 |
| 4.4.6 Error Messages | 46 |
| 4.5 Novell NetWare 4.1x - ATM ODI Driver | 47 |
| 4.6 OS/2 - NDIS 2 Driver | 47 |
| 4.6.1 Before Starting Driver Installation | 48 |
| 4.6.2 IBM LAPS - LAN Server 4.0 | 49 |
| 4.6.3 IBM MPTS - LAN Server 4.0 | 51 |
| 4.7 WinSock2 for Windows NT | 52 |
| 4.7.1 WinSock 2 Installation | 53 |
| 4.8 WinSock2 for Windows 95 | 53 |
| 4.8.1 WinSock 2 Installation | 54 |
| 5. Driver Configuration using RapidConfig/ATM | 55 |
| 5.1 Default Configuration | 55 |
| 5.2 Editing the Configuration File Manually | 55 |
| 5.3 Installing RapidConfig | 55 |
| 5.4 Starting RapidConfig | 56 |
| 5.5 Configuration Overview | 56 |
| 5.6 Configuring Physical Adapters | 58 |
| 5.7 Configuring Virtual Adapters | 59 |
| 5.8 Configuring LAN Emulation Virtual Adapter | 60 |
| 5.9 Configuring LANE Resources | 61 |
| 5.10 Configuring Classical IP Virtual Adapter | 63 |
| 5.11 Configuring RFC 1483 Virtual Adapter | 65 |
| 5.12 Configuring WinSock 2 | 66 |
| 5.13 Configuring Traffic Profiles | 67 |
| 5.14 Configuring Permanent Virtual Connections | 69 |

| | |
|---|------------|
| 6. LANscout | 71 |
| 6.1 System Requirements | 71 |
| 6.2 Installing LANscout | 72 |
| 6.3 Starting LANscout Manager | 72 |
| 6.4 Using LANscout Manager | 73 |
| 7. RapidMon for NetWare | 77 |
| 8. Troubleshooting and Diagnostics | 79 |
| 8.1 Troubleshooting | 79 |
| 8.1.1 General Troubleshooting | 79 |
| 8.1.2 Troubleshooting LAN Emulation | 80 |
| 8.1.3 Troubleshooting Classical IP | 81 |
| 8.1.4 Troubleshooting RFC 1483 | 82 |
| 8.1.5 Troubleshooting WinSock 2 | 83 |
| 8.1.6 Novell NetWare Specific Troubleshooting | 84 |
| 8.2 Diagnostics Program - Hardware | 85 |
| 9. Getting in Touch with Technical Support | 91 |
| Appendix A. Abbreviations | 97 |
| Appendix B. Error Messages | 99 |
| B.1 LAN Emulation Client Messages and Common Messages. | 99 |
| B.2 RFC1577 and RFC1483 Error Messages | 110 |
| B.3 Winsock 2 Error Messages | 111 |
| B.4 Novell Server Error Messages | 111 |
| B.5 Diagnostics Messages | 112 |
| Appendix C. Configuration File Description | 115 |
| C.1 Configuration File Parameters | 116 |
| C.2 PVC Parameters | 124 |
| C.3 Traffic Profile Parameters | 125 |
| Appendix D. LE Client Getting Configuration from LECS | 127 |
| Appendix E. Supported Cell Rates | 129 |
| E.1 Supported Peak Rate and Sustained Rate Values for Traffic Profiles | 129 |
| E.2 Supported Max Adapter Throughput Values | 132 |
| Appendix F. Virtually Adapter MAC Addresses | 137 |
| F.1 Generation of MAC Address for each Virtual Adapter | 137 |
| F.2 Generation of Remote MAC Addresses - Not Applicable to LAN Emulation | 138 |
| Appendix G. Technical Information | 139 |
| G.1 Hardware. | 139 |
| G.2 Diagnostics LEDs | 140 |
| G.3 Software | 140 |
| G.4 Environmental | 141 |

Illustrations

Figure 1. ATM PCI 155 Adapters - OC-6151 and OC-6152 1

Figure 2. LAN Emulation Network 12

Figure 3. Classical IP Configuration 15

Figure 4. Bridged Operation 16

Figure 5. Routed Operation 17

Figure 6. Host Operation 17

Figure 7. WinSock 2 Interfaces. 18

Figure 8. Top view of PC 27

Figure 9. ATM PCI 155 Adapter Connectors 28

Figure 10. Configuring a Physical Adapter 58

Figure 11. Physical Adapter Properties 58

Figure 12. Configuring a Virtual Adapter 59

Figure 13. Select Virtual Adapter Type..... 59

Figure 14. Properties 61

Figure 15. Traffic Profile Properties 67

Figure 16. PVC Configuration..... 69

Figure 17. Loop-back Pin Connections..... 86

Figure 18. Example Drawing of a Configuration 96

Tables

Table 1. Textual Conventions 7

About this manual

Thank you for selecting an Olicom RapidFire 615x ATM PCI 155 Adapter.

This guide contains the necessary information required to install the RapidFire 6151 ATM PCI 155 Adapter (with UTP 5 connector) and the RapidFire 6152 ATM PCI 155 Adapter (with fiber connectors). The adapters are also referred to as “PCI Adapter” or just “adapter” in this guide.

- Chapter 1** is a general introduction to this guide.
- Chapter 2** introduces ATM concepts and use.
- Chapter 3** shows the physical (hardware) installation.
- Chapter 4** describes driver installation for all the supported environments .
- Chapter 5** explains how to configure the drivers.
- Chapter 6** introduces LANscout, Olicom’s powerful desktop management application.
- Chapter 7** introduces RapidMon, an adapter and driver information module for NetWare servers.
- Chapter 8** contains troubleshooting (including FAQs) and the diagnostics program guidelines.
- Chapter 9** explains how to get in touch with Olicom Technical Support.
- Appendix A** explains a list of used abbreviations.
- Appendix B** lists all possible error messages and suggests corrective actions.
- Appendix C** describes the configuration file.
- Appendix D** describes LE Client getting configuration from LECS.
- Appendix E** lists supported cell rates.
- Appendix F** describes generation of virtual adapter MAC addresses.
- Appendix G** contains technical information.



1. Introduction

The ATM PCI 155 Adapter card is a full-sized printed circuit board that fits in the expansion slots of PCI Local Bus computers and provides a high bandwidth, dedicated full-duplex connection to an ATM network.

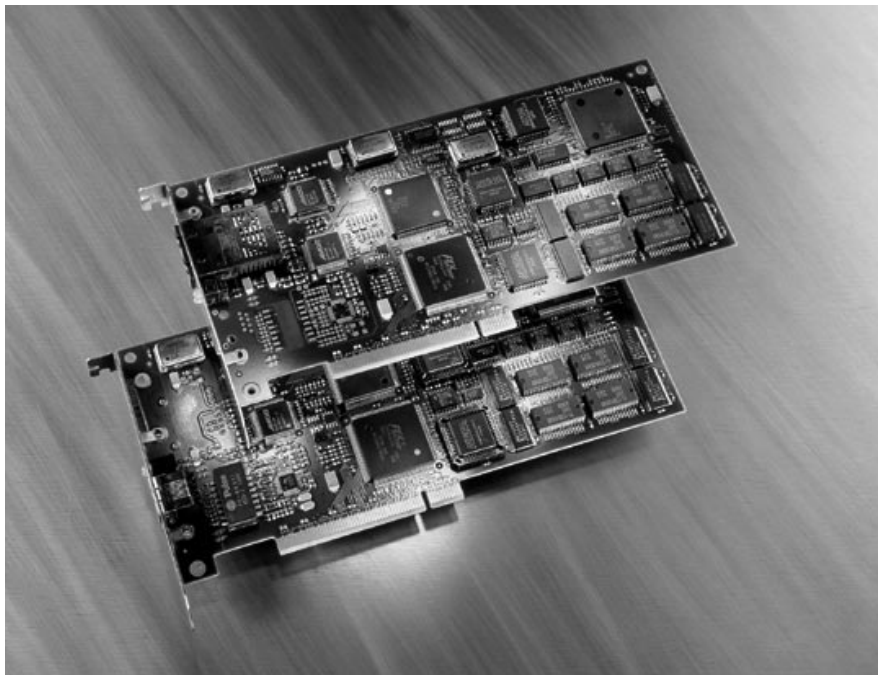


Figure 1. ATM PCI 155 Adapters - OC-6151 and OC-6152

Combined with the supplied adapter drivers and higher layer communication protocols the adapter allows application programs to communicate across an ATM network using ATM adaptation layer 5 (AAL5).

The drivers implement LAN Emulation (Ethernet and Token Ring), Classical IP (RFC1577), MultiProtocol Encapsulation (RFC1483) and WinSock 2 over ATM protocols, thus making it possible to migrate existing LAN applications to ATM and to develop native ATM applications. Depending on the configuration parameter the emulated LAN can be either Ethernet or Token-Ring. The drivers include ATM Forum compliant signalling (UNI 3.0, 3.1 and 4.0).

1.1 Package Contents

This package contains:

- A CD-ROM folder containing two Olicom disks, one Olicom CD-ROM and a booklet.
 - Olicom disks:
 - Disk 1: Diagnostics and NT Driver Disk
 - Disk 2: Configuration Disk
 - Used to install the driver configuration program, RapidConfig/ATM.
 - Olicom CD-ROM containing:
 - RapidConfig/ATM (driver configuration tool)
 - LANscout (LAN management tool)
 - RapidMon (LAN management tool for NetWare)
 - Documentation in PDF form, including a free version of Acrobat Reader
 - Make-disk utility for the following Olicom disks:
 - Disk 3 - Windows NT Driver Disk
 - Disk 4 - Windows 98 Driver Disk
 - Disk 5 - NetWare Driver Disk
 - Disk 6 - InetCfg compatible NetWare Driver Disk
 - Disk 7 - ATM ODI Driver Disk
 - Disk 8 - OS/2 Driver Disk
 - Olicom User Guide booklet
- ATM PCI 155 Adapters Guide to Operations (this document)
- A registration card

1.2 Operational Overview

The Olicom drivers can operate in a multitude of different networks. The following ATM network operational modes are supported:

- LAN Emulation over ATM, version 1.0 as defined by ATM Forum
- Classical IP and ARP over ATM as defined by IETF Network Working Group in *RFC 1577* (and *RFC 1755*)
- MultiProtocol Encapsulation over ATM Adaptation Layer 5 as defined by the IETF Network Working Group in *RFC 1483*
- WinSock2 as described in the following specifications provided by Microsoft: *Windows Sockets 2 Application Programming Interface*, *Windows Sockets 2 Protocol Specific Annex* and *Windows Sockets 2 Service Provider Interface*.

1.3 Environment and Driver Overview

The following environments and drivers are supported:

- *Microsoft Windows 4.0*
 - NDIS 3 driver
 - WinSock 2 Protocol driver
- *Microsoft Windows NT 3.51*
 - NDIS 3 driver
- *Microsoft Windows 95*
 - NDIS 3 driver
 - WinSock 2 Protocol driver
- *Microsoft Windows for Workgroups*
 - NDIS 3 driver available on Olicom Web servers
- *Novell NetWare 4.x*
 - ODI 3.31 server driver
 - ATM ODI driver
- *Novel NetWare 3.12*
 - ODI 3.31 server driver
- *Novel NetWare 3.11*
 - NDIS 3.2 driver available on Olicom Web servers
- *OS/2 version 3 or later*
 - NDIS 2 driver

1.3.1 Microsoft Windows NT

The NDIS 3 driver for Windows NT is a comprehensive driver, which:

- Includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483) with up to 16 virtual adapters.
- Provides extensive information and statistics through the use of LANscout (see chapter 6).
- Provides support for the WinSock 2 interface under Windows NT 4.0 to allow applications - specifically designed to use WinSock 2 - to interface directly to the ATM network.
- Can be configured through the use of RapidConfig (see chapter 4 and 5).

1.3.2 Microsoft Windows 95

The NDIS 3 driver for Windows 95 is a comprehensive driver, which:

- Includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483) with up to 4 virtual adapters.
- Provides extensive information and statistics through the use of LANscout (see chapter 6).
- Provides support for the WinSock 2 interface under Windows 95 to allow specially designed applications to interface directly to the ATM network.
- Can be configured through the use of RapidConfig (see chapter 4 and 5).

1.3.3 Novell NetWare 4.x

Two driver types are available for Novell Netware 4.x: ODI 3.31 and ATM ODI.

ODI 3.31 Driver

The ODI 3.31 driver for Novell NetWare 4.x is a comprehensive driver, which:

- Includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483) with up to 16 virtual adapters.
- Provides extensive information and statistics through the use of RapidMon (see chapter 7).
- Can be configured through a configuration file generated by RapidConfig on a Windows 95 or Windows NT computer (see chapter 4 and 5). Advanced users may choose to edit the configuration file with a text editor.

ATM ODI Driver

The ATM ODI driver is a so-called “thin driver”, which does not include any ATM protocols. Instead, it is used together with the ATM protocols delivered by Novell. See chapter 2 for more details on the use of ATM protocols.

1.3.4 Novell NetWare 3.12

The ODI 3.31 driver for Novell NetWare 3.12 is a comprehensive driver, which:

- Includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483), but is restricted to only 1 virtual adapter.
- Provides extensive information and statistics through the use of RapidMon (see chapter 7).
- Can be configured through a configuration file generated by RapidConfig on a Windows 95 or Windows NT computer (see chapter 4 and 5). Advanced users may choose to edit the configuration file with a text editor.

1.3.5 Microsoft Windows for Workgroups and Novell NetWare 3.11

Drivers for Windows for Workgroups and Novell Netware 3.11 are available from the Olicom web servers: www.olicom.com or www.olicom.dk.

1.3.6 OS/2 - IBM Warp

The NDIS 2 driver for OS/2 Warp is a comprehensive driver, which:

- Includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483) with up to 4 virtual adapters.
- Can be configured through a configuration file generated by RapidConfig on a Windows 95 or Windows NT computer (see chapter 4 and 5). Advanced users may choose to edit the configuration file with a text editor.

1.4 Utility Overview

- **LANscout**

LANscout is a LAN management utility for Windows which provides remote management through LANscout Manager. LANscout allows easy access to network statistics, adapter information, driver information and also access to new drivers from Olicom's web site.

The information provided for ATM includes physical adapters, protocol configuration, statistic information and event log.

You can install LANscout from the Olicom CD-ROM.

- **RapidConfig/ATM**

RapidConfig/ATM is a Windows application for creating, viewing, editing and printing configuration files (OC-615X.CFG).

You can install RapidConfig/ATM from the Olicom CD-ROM or from the Olicom Configuration Disk.

- **RapidMon**

RapidMon is a Loadable NetWare Module used to display information about physical adapters, event log, LAN Emulation, RFC 1483 and Classical IP configuration and statistics. It is also used to view connections and destinations.

You can install RapidMon from the Olicom NetWare Driver Disk. The disk can be created from the Olicom CD-ROM.

- **Online documentation**

The documentation is supplied in Windows Help format and PDF format.

- **Make Install Disks**

A utility for generating installation disks on PCs without a CD-ROM.

1.5 Release Information and Last-minute Changes

Before you install the ATM adapter, it is recommended that you read the release information in the README.TXT file on Olicom CD-ROM, and see any last-minute changes to this manual in the *Late-Breaking News* section in the on-line documentation.

1.6 Textual Conventions

| Convention | Example |
|--|-----------------------|
| User input is shown in Helvetica, upper or lower case | USER input |
| Options are identified by brackets and delimited by “ ” | (option1 option2) |
| Text to be substituted is enclosed by < > | <text> |
| References to other sections or documents are in italics | <i>italic</i> |
| Key entries are shown in Helvetica narrow | ESC Enter |
| Screen display is shown in Courier normal and bold | display |
| Hexadecimal notation may be indicated with an “h” | D0000h |
| End of a chapter is indicated with □ | □ |

Table 1. Textual Conventions



2. Introduction to ATM

There are differences between the ATM-based networks and the traditional frame-based networks (such as Token-Ring or Ethernet). Below is an overview of ATM specific characteristics.

- **Connection-oriented**

ATM requires establishing connections in order to send or receive data. In this aspect it is similar to the traditional telephone system (you have to dial and make a connection to begin the conversation).

The connection on ATM is normally called a “Virtual Channel Connection” or just a “VCC”. VCCs are typically numbered by a “Virtual Channel Identification” (VCI) number, for example VCI 32.

The addresses used to set up a VCC on ATM (that is, the “ATM telephone number”) consist of 20 bytes.

Example: C5.007900000000000000000000.00A03E000001.00.

- **Cell-based**

ATM data is sent in small units called “cells”, each cell containing up to 48 bytes. This contrasts the much larger frame sizes used by Token-Ring and Ethernet.

An important advantage of sending data in cells is that it allows better integration of video, voice and data on the same network. The cells with voice can easily be interleaved with the cells containing parts of large data frames.

- **Quality of Service**

ATM allows specific Quality of Service (QoS) to be associated with each VCC, thereby making ATM the optimal solution for integrating video, voice and data on the same physical network. The VCC used for a telephone call would be assigned a different QoS than the VCC used for sending LAN traffic.

- **Switched**

ATM networks are switched networks. Token-Ring and Ethernet networks originally used a shared medium, but today Token-Ring and Ethernet switches are also available.

The Olicom ATM adapter supports a number of ATM protocols including:

- **Signalling**

Signalling (sometimes referred to as “UNI Signalling”) are protocols used to establish and disconnect VCCs.

- **SSCOP**

SSCOP is used to establish a reliable connection to the switch so that signalling messages can be sent to the switch without any loss of information.

- **ILMI**

ILMI allows ATM adapters to request management information from the switch. It is through ILMI that the ATM adapter obtains the LECS address (see section 2.1.3). The information request can also be directed from the switch to the adapter.

- **LAN Emulation**

See section 2.1.

- **Classical IP**

See section 2.2.

- **RFC1483**

See section 2.3.

- **WinSock 2**

See section 2.4.

2.1 LAN Emulation Concept and Use

ATM is often used to carry traditional Token-Ring or Ethernet LAN traffic.

In order to integrate these types of traffic smoothly on an ATM network, additional features are needed:

- **A broadcast mechanism**

Most LAN protocols send broadcasts, that is frames to be received by all devices on the same LAN. Due to the connection-oriented nature of ATM, an additional mechanism is required through which frames can be sent to all the devices on the same LAN.

- **Conversion between MAC addresses and ATM addresses**

In order to send the LAN traffic on ATM, VCCs must be established. To do so, the ATM address - to which the VCC is to be established - must be known.

Therefore, before forwarding a frame to a certain MAC address, it is necessary to determine ATM addresses for the VCCs.

To smoothly integrate LAN traffic into ATM networks, the ATM Forum designed "LAN Emulation Over ATM" (also termed "LANE"), which is described in the sections below.

When LAN traffic is to be integrated into an ATM network, LAN Emulation should be applied.

2.1.1 LAN Emulation Functionality

When running LAN traffic on ATM, a LAN is represented by an Emulated LAN also called an “ELAN”.

In order to meet the broadcast and address conversion requirements described above, one LAN Emulation Server (LES) and one Broadcast Unknown Server (BUS) are required for an ELAN:

- LAN Emulation Server - LES
The LES is used to map MAC addresses to ATM addresses.
- Broadcast and Unknown Server - BUS
The BUS is used to forward the broadcasts. In order to reach all the devices on ELAN, the BUS maintains VCCs to them.

Typically the LES and the BUS are physically located in the same device. They may either be located internally on an ATM switch or on a separate device attached to the ATM network.

Each device participating in an ELAN must implement software called a LAN Emulation Client (LE Client). The LE Client communicates with the LES to resolve ATM addresses (corresponding to the MAC addresses to which the LE Client wants to send frames). When the LE Client wants to send a broadcast, it sends it to the BUS, which then forwards it to all LE Clients on the ELAN.

LE Client software must be used in all devices attached to an ELAN. For PCs it is either present in the operating system or in the driver for the ATM adapter. If the LE Client in the Operating System is being used, only a “thin driver” is necessary for the ATM adapter. Drivers which include LE Client software are called “comprehensive drivers” in this manual.

The LE Client in the comprehensive drivers include additional features developed by Olicom, such as the extensive monitoring facilities available through the Olicom utilities LANscout and RapidMon.

Also, comprehensive drivers with the ClearServer/ATM feature is available from Olicom. ClearServer/ATM allows active redundancy and connection-based load-sharing when installing multiple Olicom ATM adapters in a server.

See section 2.1.6, *Active Redundancy with Multiple Adapters - ClearServer/ATM*.

2.1.2 LAN Emulation Network

The following figure illustrates an ELAN with two servers, one workstation and two switches with ATM uplinks attached to the ELAN.

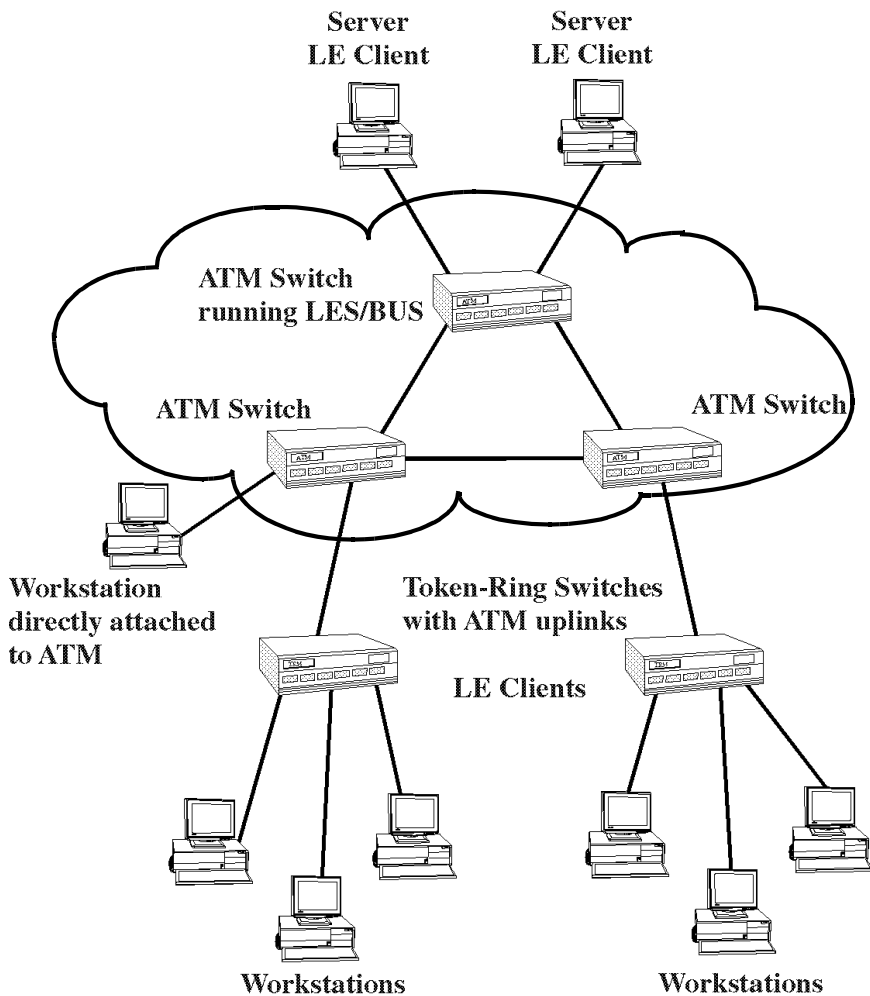


Figure 2. LAN Emulation Network

All the devices can communicate with each other. The workstations on the ATM switch communicate with the servers on the ELAN through the bridge in the ATM uplink embedded in the switch.

The LES and the BUS are running in one of the ATM switches.

2.1.3 LAN Emulation Configuration Server - LECS

To allow easier configuration of devices, an ELAN normally also includes a device called a LAN Emulation Configuration Server (LECS).

When a LECS is present, the LE Client communicates with it and retrieves configuration parameters. The most important of these configuration parameters is the LES ATM address.

To communicate with the LECS, the LE Client usually retrieves LECS ATM addresses from the ATM switch. Therefore, you do not need to configure ATM addresses in the LE Client when the LECS is used. It is all handled automatically.

The LECS becomes useful when an ATM network hosts multiple ELANs, that is, multiple LANs emulated on the same physical ATM network (sometimes called Virtual LANs or VLANs). In such situations the LE Client is typically configured with the name of the ELAN that it will be connected to, and the LE Client sends this information to the LECS asking for the address of the LES on the specified ELAN. Thereby the LE Client can connect to the right ELAN no matter where it is attached in the ATM network.

2.1.4 Multiple ELANs

One physical ATM network may host multiple ELANs. When a server is attached to an ATM network with multiple ELANs, the server may connect to these ELANs through one ATM adapter. That is, the physical ATM adapter will appear to the PC as multiple LAN adapters attached to different LANs. Since the adapters are not physically present, they are called virtual adapters.

Each virtual adapter is equivalent to an LE Client.

2.1.5 Interworking with Cisco SSRP

The ATM devices of Cisco Systems implement a LES/BUS redundancy scheme called Simple Server Redundancy Protocol (SSRP). For LE Clients to work optimally with SSRP, they need to request the address of the LECS from the ATM switch.

As described in appendix D, the LE Client in the comprehensive drivers for the Olicom ATM adapter will by default request the LECS address from the ATM switch and therefore works with SSRP.

2.1.6 Active Redundancy with Multiple Adapters - ClearServer/ATM

In addition to the drivers included in this product, you can purchase a separate driver set with support for redundancy and connection-based load-sharing. It is called ClearServer/ATM.

ClearServer/ATM is a value-add to the LAN Emulation support in Olicom's ATM adapter drivers. ClearServer can be used in standard LAN Emulation based networks.

With ClearServer you can configure the server with up to four ATM adapters for redundancy and connection-based load-sharing. The ClearServer driver groups the ATM adapters together, so that the operating system perceives them as only one adapter. The clients accessing the server will therefore only know one MAC address and - if running TCP/IP - one IP address for the server.

ClearServer works with any higher layer protocol, for example TCP/IP, SNA, SPX/IPX, or Netbeui.

The ClearServer driver will ensure that all the installed adapters are connected to the same ELAN, and if one adapter fails (for example, if the connection to the switch is lost), the other adapter(s) will automatically take over the lost connections. This recovery mechanism works extremely fast to ensure preservation of higher layer connections (for example TCP connections), and users will normally not notice that there has been a serious failure in the network. The redundancy mechanism of ClearServer is based on Active Redundancy, where the redundant adapters are all active even when there are no failures.

2.2 Classical IP Concept and Use

Classical IP allows IP traffic to be carried over ATM. However, it is generally recommended to use LAN Emulation to carry IP traffic over ATM.

Classical IP operating mode has the following characteristics:

- it supports *only* the IP protocol
- it does *not* support IP broadcasting (or multicasting)

Classical IP is defined for both PVC and SVC operation. If SVC operation is required, the central address resolution is needed. This function is known as the “ATM ARP Server” and is most commonly hosted in an ATM Switch, router or a workstation also participating in the ATM IP network. The ATM ARP server allows Classical IP stations to look up the ATM address corresponding to a given IP address. The Classical IP workstation needs to know which ATM ARP Server address to use.

When using the PVC operation, each connection between IP hosts is defined both in the software driver on each involved IP host, and in the switch connecting the IP hosts.

When SVC and PVC operations are mixed, PVC connections take precedence. If a PVC connection is not defined for a requested IP address, the ATM ARP server will be queried for the ATM address and a signaled connection (SVC) may be set up.

Each Classical IP client participates in a single IP subnet. If it is required for the same host to participate in more than one subnet, there must be a Classical IP client for each subnet in the host.

The Classical IP operating mode is defined in detail in the document *RFC1577: Classical IP and ARP over ATM*.

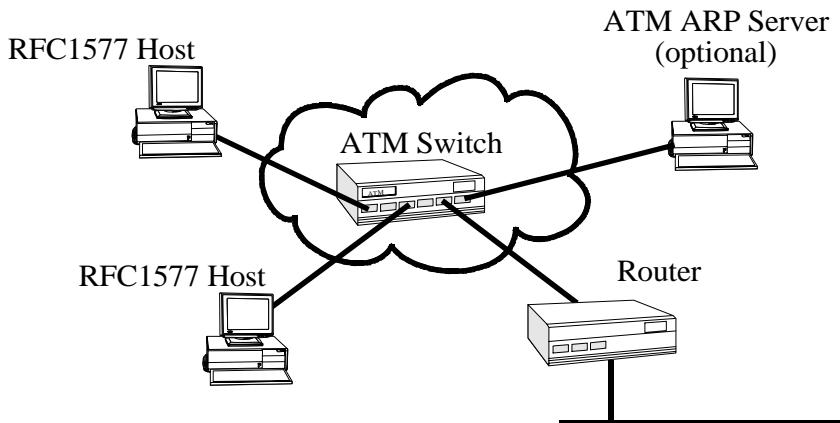


Figure 3. Classical IP Configuration

2.3 RFC 1483 Concept and Use

RFC 1483 is a method of carrying the traffic generated by multiple protocols (routed or bridged protocol data units) over ATM.

RFC 1483 operating has the following characteristics:

- it is defined *only* for PVC operation
- it supports *either* routed data frames *or* bridged data frames
- it specifies only how to connect two endpoints of *one* PVC. Each RFC 1483 virtual adapter connects only one PVC to another device. The other device can be a bridge, router or host.

The RFC 1483 operating mode is defined in detail in the document *RFC1483: Multiprotocol Encapsulation over ATM Adaptation Layer 5*.

The following scenarios illustrate typical RFC1483 configurations.

Bridged operation

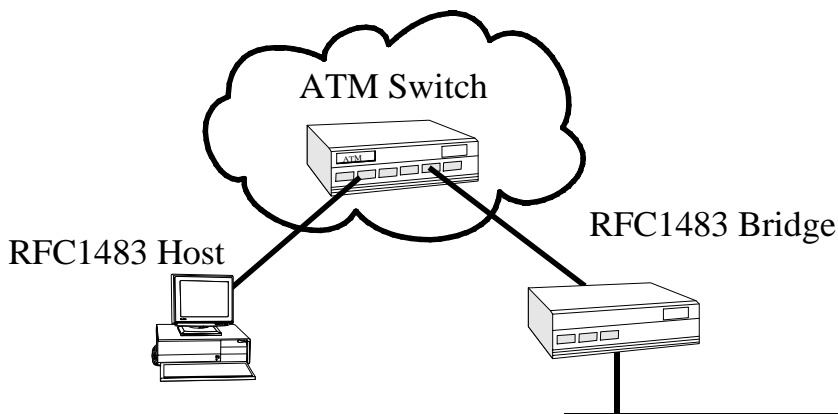


Figure 4. Bridged Operation

Routed Operation

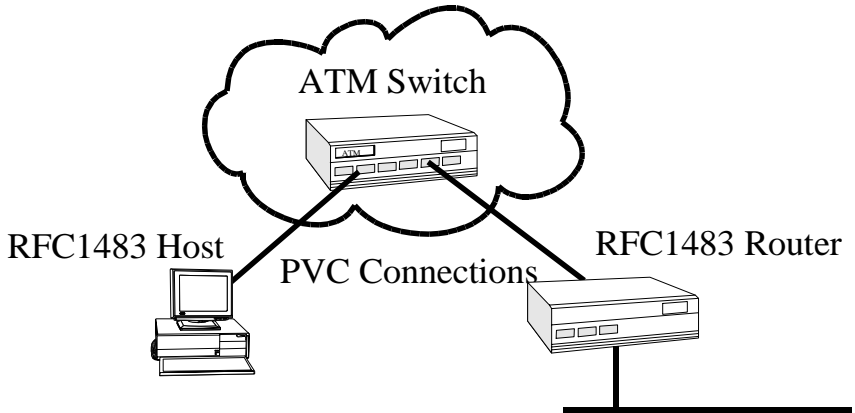


Figure 5. Routed Operation

Host Operation

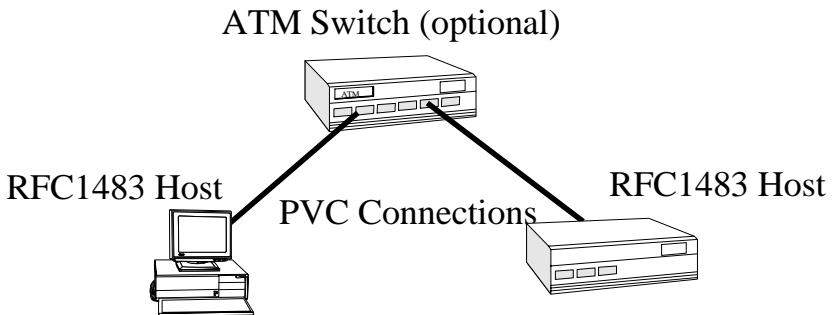


Figure 6. Host Operation

2.4 Native Use of ATM - WinSock 2

WinSock 2 is a generic network interface. Network applications can use WinSock 2 to interface ATM protocols directly.

You need to install WinSock 2 only if you use or develop such applications.

WinSock 2 consists of an application programming interface (API) for network applications and a service provider interface (SPI) implemented by service providers. A service provider is either a name space service provider (NSP) or a transport service provider (TSP). Between the application and the service providers there is a WinSock 2 DLL provided by Microsoft.

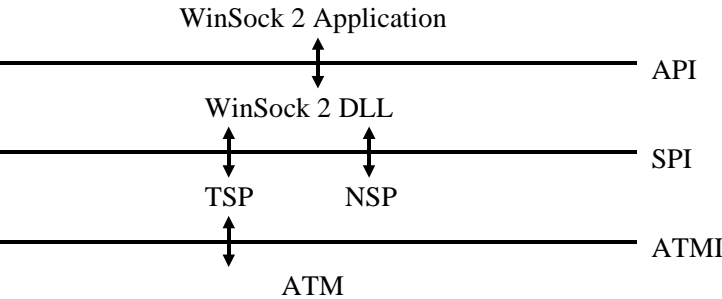


Figure 7. WinSock 2 Interfaces

The WinSock 2 API is a protocol-independent transport interface. It uses the underlying transport service providers to provide network services. The WinSock 2 API also contains the protocol specific extensions. For ATM these extensions are used to handle the ATM addresses and the ATM specific QOS. The QOS can be specified both through a protocol-independent QOS interface and through the ATM-specific interface.

A transport service provider supports one or more protocols. The transport service provider included in this release supports the ATM AAL5 protocol. This provider allows a network application to use native ATM.

2.4.1 WinSock 2 Specifications

- The WinSock 2 API is described in *Windows Socket 2 Application Programming Interface*.
- The WinSock 2 protocol specific extensions are described in *Windows Sockets 2 Protocol Specific Annex*.
- The WinSock 2 SPI is described in *Windows Sockets 2 Service Provider Interface*.



Note: The SPI and API specifications exist in two versions: 2.20 and 2.21. Version 2.20 is used for Windows NT 4.0, and version 2.21 is used for Windows 95 in the current release. This is to comply with current Microsoft releases.

The documents are available from Microsoft.:

2.5 Traffic Profiles for VCCs

The following sections describe how Traffic Profiles are used to control the cell flow in Olicom's comprehensive drivers.

2.5.1 Introduction

Traffic Profiles describe the characteristics of the transmitted data. Each VCC (SVC or PVC) created by the driver software and the LES is assigned a traffic profile. For the typical ATM LAN setup, the default profile is sufficient.

However, under certain circumstances it may be necessary to change the Traffic Profiles and their usage. This can often be the case with ATM WAN connections, where bandwidth is pre-configured and/or priced, or where multiple switches using multiple line-speeds (for example 25 Mbps, 34 Mbps, 43 Mbps, 100 Mbps or 155 Mbps) are used together with adapters that are unable to perform or to signal speed conversion.

Each traffic profile is characterized through a number of parameters:

Traffic Type

This value tells the switches involved in forwarding data traffic on a particular VCC what type of traffic to expect.

Peak Rate (cells/sec)

This value specifies the maximum rate of VCC data transmission.

Sustained Rate (cells/sec)

This value specifies the average rate of VCC data transmission.

Maximum Burst Size (cells)

This value specifies the maximum number of cells sent at peak rate before the subsequent cells are sent at sustained rate.

Quality of Service

This value specifies to the forwarding switches the data traffic priority or QoS on a particular VCC.

The ATM adapter hardware supports up to 11 concurrent Traffic Profiles. In addition to this a “hardware default” traffic profile (full line rate) is defined. If more than 11 Traffic Profiles are defined in the configuration file, the additional Traffic Profiles will be mapped to the closest match among the first 11 profiles. The maximum number of defined profiles is 4096.

The cell rates are approximated by the hardware, so the actual Peak/Sustained cell rates used are as close to the specified values as permitted by the hardware. See *Supported Peak Rate and Sustained Rate Values for Traffic Profiles* in appendix E for the list of possible cell transfer rates. Statistics programs may therefore display rates slightly different from the rates specified in the configuration file.

In the following sections you will find typical examples on the usage of Traffic Profiles.

In addition to configuration of Traffic Profiles, the comprehensive drivers also support configuration of a simple overall limit for the total peak-rate of the physical link between the adapter and the switch. It will affect all VCs, regardless of their individual traffic profile settings. In RapidConfig this parameter is called “Max Adapter Throughput”. Refer to *Supported Max Adapter Throughput Values* in appendix E for a list of supported values.

2.5.2 Configuration in mixed Rate Environments

When running an ATM network with links and interfaces of different speeds (for example 155Mbps and 25Mbps), a speed conversion is required. This is often done by letting the switches in the network buffer the cells until they can be sent on the slow(er) interface, leaving it up to the flow control mechanisms of the higher layer protocols to limit the amount of cells to be buffered.

For heavily loaded networks this scheme is likely to cause overflow in the buffer mechanisms of the involved switches. Therefore, you should to ensure that the connection between device A and B is established at a rate which both can cope with.

If, for example, “A” is a 25Mbps device and “B” is a 155Mbps device, then “A” should never create connections to anyone with a peak rate higher than 25Mbps, and “B” should never create connections to “A” with a peak rate higher than 25Mbps.

The Olicom ATM PCI adapters provide two ways to ensure appropriate peak rates for connections in mixed rate environments. They are described in the two sections below.

2.5.3 Rate Negotiation

If all the ATM devices in a network support the rate negotiation scheme described in the ATM Forum LANE 1.0 specification, then the scheme described in detail below can be used.

By default the Olicom ATM PCI adapters (both 25Mbps and 155Mbps) will attempt to create outgoing connections at “their own rate” (that is 25Mbps and 155Mbps respectively). If this fails with a cause code indicating “User cell rate unavailable”, the Olicom driver will retry at a lower rate. This scheme continues until either a connection is established or all rates have been tried. The list of rates to be tried is set during the TrafficProfileList configuration (see section 5.13)

When the Olicom driver receives an incoming connection, the requested rate is analyzed to check if it is a supported rate. If it is not a supported rate, the call is cleared using a “User cell rate unavailable” cause code.

The behavior above is controlled by two configurational parameters:

“Maximum Accepted Cell Rate Difference, Transmit” and

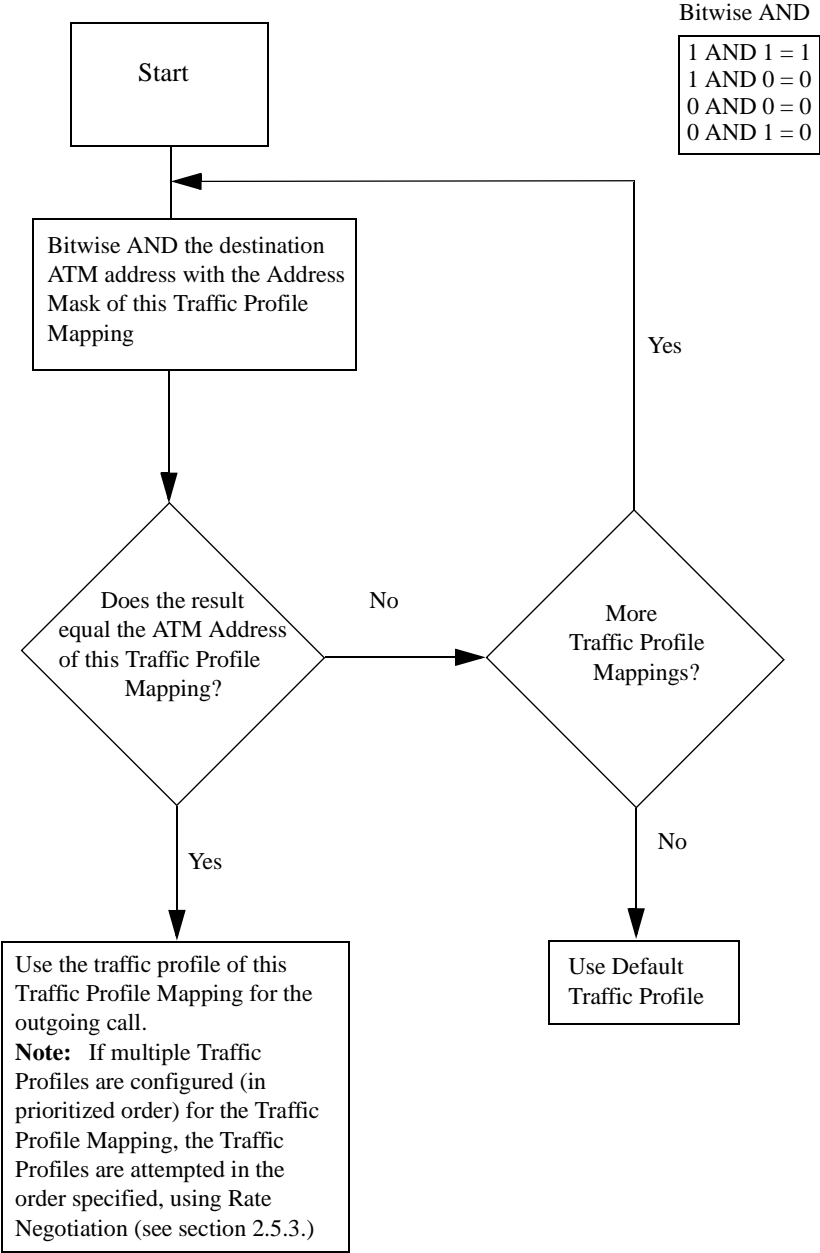
“Maximum Accepted Cell Rate Difference, Receive”

By default these values are so high that the driver will accept any rate for incoming connections, and thereby avoid problems with devices not supporting the rate negotiation scheme. To enable rate negotiation, the “Maximum Accepted Cell Rate Difference” parameters must therefore be changed to a smaller value, for example 1Mbps (see section 5.13).

2.5.4 Address Controlled Rate Selection

The Olicom ATM PCI adapters allow the selection of traffic profile for outgoing connections to be based on the address of the device to which the connection is being established. This scheme is preferable to the rate negotiation scheme because it generates less signalling traffic in the network. However, it requires ATM addresses to be assigned in a way that makes it possible to deduce the rate of their interface from the ATM address.

When a traffic profile is to be chosen for an outgoing call (in a configuration where traffic profile mappings are configured), the algorithm presented on the following page is applied.



Example

In a network consisting of both 25Mbps and 155Mbps PCI adapters as well as other ATM equipment with 100 Mbps interfaces, the ATM addresses for the various equipment are assigned in a way that makes it possible to deduce the rate of its interface from the address.

(x = do not care)

25Mbps devices:

xx xx xx xx xx xx xx xx xx xx xx xx 00 xx xx xx xx xx xx xx

100Mbps devices:

xx xx xx xx xx xx xx xx xx xx xx xx 01 xx xx xx xx xx xx xx

155Mbps devices:

xx xx xx xx xx xx xx xx xx xx xx xx 02 xx xx xx xx xx xx xx

Using this address scheme the following traffic profile configuration must be made (see section 5.13) for all involved 155Mbps adapters:

Traffic Profiles

| | Profile Type | Quality of Service | Maximum Burst Size | Peak Rate | Sustained Rate |
|-----|--------------|--------------------|--------------------|-----------|----------------|
| TP0 | UBR | None | N/A | 25Mbps | N/A |
| TP1 | UBR | None | N/A | 100Mbps | N/A |
| TP2 | UBR | None | N/A | 155Mbps | N/A |

Traffic Profile Mappings

| Traffic Profile Mapping 0 | |
|---------------------------|--|
| VCC Type | Any |
| ATM Address | 00 |
| Address Mask | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 00 |
| Prioritized order to use | Tp0 |
| Traffic Profile Mapping 1 | |
| VCC Type | Any |
| ATM Address | 00 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 |
| Address Mask | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 00 |
| Prioritized order to use | Tp1 |
| Traffic Profile Mapping 2 | |
| VCC Type | Any |
| ATM Address | 00 00 00 00 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 |
| Address Mask | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 00 |
| Prioritized order to use | Tp2 |

Default Traffic Profile: Tp2

This configuration file will ensure that outgoing connections from the 155Mbps adapter are always established with a peak rate corresponding to the capabilities of the destination device.

For the 25Mbps adapters there is no need for traffic profile configuration. They will by default establish all outgoing connections with a peak rate of 25Mbps.

2.5.5 Traffic Profiles for PVCs

PVCs are assigned a designated traffic profile when they are created during driver software startup. The designated profile is configured during PVCs configuration.

2.5.6 Default Traffic Profile Configuration

If nothing has been configured regarding Traffic Profiles, the following configuration will be used:

Traffic Profiles

| | Profile Type | Quality of Service | Maximum Burst Size | Peak Rate | Sustained Rate |
|-----|--------------|--------------------|--------------------|-----------|----------------|
| TP0 | UBR | None | N/A | 155Mbps | N/A |
| TP1 | UBR | None | N/A | 25Mbps | N/A |

Traffic Profile Mappings

| Traffic Profile Mapping 0 | |
|---------------------------|---|
| VCC Type | Any |
| ATM Address | 00 |
| Address Mask | 00 00 00 0000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Prioritized order to use | Tp0, Tp1 |

Since the Traffic Profile Mapping above matches any destination ATM address. 155Mbps UBR will used by default. If that fails (with rate negotiation), 25 Mbps UBR will be attempted.

Accepted Cell Rate Differences

Maximum Accepted Cell Rate Difference, Transmit:7 GBps

Maximum Accepted Cell Rate Difference, Receive: 7GBps

The above - very high - accepted differences between the rate requested in an incoming cell and the available traffic profiles effectively causes any peak rate in incoming calls to be accepted by the driver.



3. Hardware Installation

This section describes how to install the adapter in one of the expansion slots in your computer. See the documentation that came with your computer if you need additional information on how to install expansion cards.

- **Note:** Static electricity can be destructive to sensitive components of the adapter. Discharge yourself by touching a metal part of a grounded unit before removing the adapter from the anti-static packing bag.

3.1 Installation Requirements

The Operations Guide for your computer and a screwdriver.

3.2 Adapter Card Installation

1. Switch all computer system components *off* and disconnect all cables.
2. Place the peripheral units: keyboard, monitor, etc. away from the PC, and position the PC itself to give yourself an easy access to the back panel.
3. Remove the PC top cover to expose the inside of the PC, and choose one of the free PCI expansion slots.
4. Remove the screw from the top of the panel which holds the metal bracket on the back panel corresponding to the chosen slot.
5. Tilt the adapter card to let the interface connector slip through the opening in the back panel, and then press the edge connector firmly into the chosen expansion slot.
6. Secure the card with the screw from the previously removed metal bracket and reinstall the PC cover.

- **Note:** The OC-6152 ATM PCI 155 Adapter with fiber interface is shipped with a protective dust cover on the optical connectors. Put this dust cover on whenever cables are not connected to the adapter.

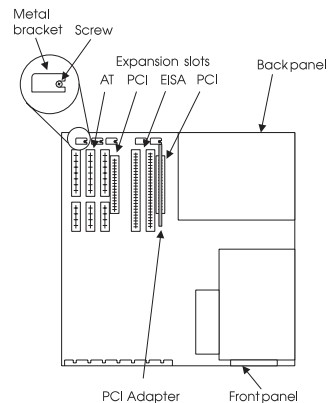


Figure 8. Top view of PC

3.3 Connecting the Adapter Cables

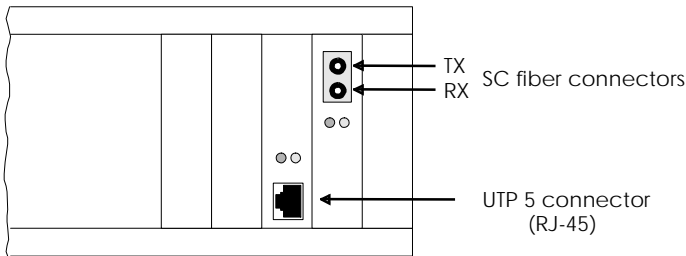


Figure 9. ATM PCI 155 Adapter Connectors

OC-6151, ATM PCI 155 UTP Adapter

1. Insert the modular jack in the UTP connector shown in figure 3.

➤ **Note:** Make absolutely sure that you connect the cable to the adapter you have just installed. Connecting the cable to *any other* expansion card than the ATM Adapter could result in serious damage to the card and/or the network.

2. Connect the other end of the cable to a wall connection or an attachment unit.

OC-6152, ATM PCI 155 Fiber Adapter

1. Connect an SC-type fiber optic cable to the pair of SC-type connectors on the adapters. If needed, to ensure proper connection clean the fiber connectors with soft tissue dipped in alcohol.
2. Connect the opposite end of the cable to a switch in the network:
 - 2.1. Connect the adapter's RX connector (RX=receive, see figure 3) to the switch TX port
 - 2.2. Connect the adapter's TX connector (TX=transmit, see figure 3) to the switch RX port

➤ **Note:** If there is no proper connection to the switch, swap the RX and TX connectors at one end of the cable only. The lack of connection is indicated by no illumination of control LEDs on the switch after the PC is powered on and the driver is installed.



4. Software Installation

To use the adapter in an operational network you need to install software drivers which link the adapter hardware to the operating system software in your PC.

The required software drivers are available on both CD-ROM and on floppy disks. It is assumed throughout this installation chapter that the Olicom CD-ROM is the source media, and that the CD-ROM disc drive is “D:”. If the CD-ROM drive is different from “D:”, change to the drive letter in question.

If the source media is one of the enclosed disks, or a disk generated from the Olicom CD-ROM, the installation procedure will emphasize this and provide detailed instructions (including drive and path).

4.1 Olicom CD-ROM and Disks

The Olicom CD-ROM

The CD-ROM contains a menu program which will start automatically when the CD-ROM is placed in the drive, except for the case when the Windows AutoPlay function is disabled. The menu program can also be started by executing SETUP.EXE placed in the root of the CD-ROM.

The following items can be selected from the menu:

- Launch the Setup Program
This option launches the main Setup Program. The Setup Program will show a series of dialogues where the desired components (programs/documentation) and settings can be chosen. When the last dialogue is accepted, the selected components will be installed on the system. The Setup program can install LANscout, RapidConfig/ATM, and Windows 95 driver upgrades.
- Install Adobe Acrobat Reader
- Launch RapidConfig/ATM
RapidConfig/ATM is executed directly from the CD-ROM.
- View Online Documentation in PDF format
This option launches Adobe Acrobat Reader with the online documentation in PDF format. If Adobe Acrobat Reader is not already installed on the system, the installation can be performed.
- Make Install Disks
A utility for generating installation disks for installation on PCs without a CD-ROM.

The Diagnostics and Windows NT Driver Disk

The Olicom Driver Disk contains the NDIS 3 driver for Windows NT for installation on PCs without a CD-ROM drive and the hardware diagnostic program for testing the ATM adapter hardware.

Refer to section 4.2 for guidelines on installation of the Windows NT driver and to section 8.2 for guidelines on the usage of the hardware diagnostic program.

The Configuration Disk

The Olicom Configuration Disk contains RapidConfig for installation on PCs without a CD-ROM drive. Refer to chapter 5 for details.

4.2 Microsoft Windows NT - NDIS 3 Driver

The NDIS 3 driver for Windows NT is a comprehensive driver, which includes Olicom's comprehensive suite of ATM protocols (LAN Emulation, Classical IP and RFC 1483). The NDIS 3 driver emulates one or more Ethernet or Token-Ring adapters to Windows NT. See chapter 2 for details.

The NDIS 3 driver for Windows NT can be used under Windows NT 3.51 and 4.0.

The installation procedures for Microsoft Windows NT workstation and Windows NT Server operating system are identical.

To install and configure the NDIS 3 driver under Windows NT follow these steps:

1. Install LANscout Manager and LANscout Agent
LANscout allows you to see the network status after driver installation.
See section 6.2 for installation details.
2. Install RapidConfig/ATM
RapidConfig is used to configure the driver. RapidConfig creates a configuration file on the hard disk, which the driver will read during start-up.
RapidConfig is easily installed from the CD-ROM, as described in section 5.3.
3. Create a configuration file with RapidConfig/ATM
If no configuration file has been created, the driver will use the default configuration: one virtual adapter running Ethernet LAN Emulation. It will join the default Ethernet ELAN indicated by the LECS.
For other configurations create a configuration file with RapidConfig.
See chapter 5 for details.

4. Install the driver under Windows NT as described section 4.2.1.

During installation of the NDIS 3 driver it is convenient to have the *Windows NT System Guide* at hand. Prior to installation, review the sections *Installing Windows NT* and *Configuring the Network*.

As the result of the NDIS 3 installation procedure described below all necessary setup files will be copied to the Windows NT System32 directory and the driver will be placed in the SYSTEM32\DRIVERS directory.

The NDIS 3 driver installation can be performed either during or after Windows NT installation. If the driver is installed during Windows NT installation, please refer to section 4.2.1 *Installing NDIS 3 Driver during Windows NT Installation*. If Windows NT has already been installed, proceed to section 4.2.2 *Adding Adapters - Windows NT 3.51*, or section 4.2.3 *Adding Adapters - Windows NT 4.0*.

For each virtual adapter configured in RapidConfig, one adapter must be added in Windows NT.

5. Use LANscout to verify correct network/driver operation

When Windows NT has been restarted, start LANscout Manager and choose “ATM Network Statistics” to view the event log. You can click on any message to display help in the box below the event log.

Check that there are no yellow or red crosses on the physical adapter icons in the upper right corner of the LANscout Manager window. A red cross means that the connection to the switch cannot be established, a yellow cross means that one or more LE Client have not been able to join. Please refer to chapter 8 for troubleshooting details.

4.2.1 Installing NDIS 3 Driver during Windows NT Installation

1. Follow the instructions in the *Windows NT System Guide* to start Windows NT installation.
2. If custom setup has been chosen, choose “Do Not Detect” when the “Network Adapter Card Detection” window is displayed.
3. If the message “Setup did not detect a network card” is displayed, select “Continue” to proceed with the adapter set-up phase.
4. Continue with step 2 in the *Adding Adapters* section below.

4.2.2 Adding Adapters - Windows NT 3.51

When installing an adapter *after* Windows NT installation, log on with administrative rights. This is necessary in order to be able to add, configure and remove adapters in Windows NT.

1. Activate the “Control Panel” in the “Main” window, select the “Network” icon and choose “Add Adapters” in the “Network Settings” panel.
2. Select “<Other> Requires disk from manufacturer” in the list of adapters and select “Continue”.
3. Enter the full path to the setup files, for example: “D:\” for the Olicom CD-ROM.
4. Highlight the required adapter driver type and select “OK”.
5. Select proper values in the adapter configuration dialog box for adapter settings. If further details are required, select “Help” for help.
The installation then suggests appropriate values for Virtual Adapter Number and PCI Bus Number.

➤ **Note:** The LAN type parameter must match the LAN Type selected for this virtual adapter in RapidConfig/ATM. If default configuration is used, the LAN Type is Ethernet.

6. Select “OK” when all parameters have been set correctly.
7. Select “Bindings” if reviewing the binding settings is required and “OK” to exit the “Network Bindings” windows.

➤ **Note:** If running Classical IP (RFC1577), make sure that the IP protocol is bound and that an IP address is configured. Other protocol bindings to this Virtual Adapter are not needed.
Network Services which depend on broadcasts (for example Network Neighborhood in Windows NT 4.0) do not function correctly for Classical IP, because broadcasting is not supported.

8. Select “OK” in the “Network” control panel when all adapters have been added.
9. The settings will not take effect until the system is restarted. If the adapter is added after Windows NT installation, the system restart can be initiated by selecting “Reboot Now” option in the dialog box shown when exiting “Network” control panel.

4.2.3 Adding Adapters - Windows NT 4.0

1. Activate the Network Setup program by selecting “Start”, “Settings”, “Control Panel” and then double-click the “Network” icon.
2. Select the “Adapters” tab, click “Add” and choose “Have Disk”.
3. Enter the full path to the setup files, for example: “D:\” for the Olicom CD-ROM.
4. Select the required adapter driver and click “OK”.
5. Select the required values in the adapter configuration dialog box for adapter settings.

If further details are needed, select “Help”. The installation then suggests appropriate values for Virtual Adapter Number and PCI Bus Number.

➤ **Note:** The LAN type parameter must match the LAN Type selected for this virtual adapter in RapidConfig/ATM, if default configuration is used the LAN Type is Ethernet.

6. Select “OK” when all parameters have been set correctly.
7. Select “Bindings” if reviewing the binding settings is required, and click “OK” to exit the “Network Bindings” windows.

➤ **Note:** If running Classical IP (RFC1577), make sure that the IP is bound, and that an IP protocol address is configured.

Other protocol bindings to this ELAN are not needed.

Network Services which depend on broadcasts (for example Network Neighborhood in Windows NT 4.0) do not function correctly for Classical IP, because broadcasting is not supported.

8. Select “Close” in the “Network” control panel when all adapters have been added.
9. The settings will not take effect until the system is restarted. If the adapter is added after Windows NT has been installed on the system, system restart can be initiated by selecting “Yes” option in the dialog box shown when exiting “Network” control panel.

4.2.4 Updating an existing Windows NT Driver

Update an existing Windows NT driver as follows:

1. Copy the file \OCA1PND3.SYS from the Olicom CD-ROM to the drivers directory, for example
 \WINNT\SYSTEM32\DRIVERS.
2. Copy the files \OCA1XND3.DLL and \OCA1XND3.HLP from the Olicom CD-ROM to the system32 directory, for example
 \WINNT\SYSTEM32.
3. Reboot the PC.

4.2.5 NDIS 3 Error Messages

The ATM driver normally responds to network problems by sending messages to Windows NT. They can also be seen from Olicom LANscout.

There are three different types of messages: Informational messages, Warnings and Errors. Below is the message format:

<Message#><Message type> <Physical adapter#>/<Virtual adapter#>: <Message text>

| <i>Field</i> | <i>Description</i> |
|---------------------|--|
| <Message type> | “I” for “Informational”, “W” for “Warning” or “E” for “Error” |
| <Message#> | The number of the message. All messages are assigned a unique number. In appendix B all messages and suggested actions are listed. |
| <Physical adapter#> | The physical adapter to which the message relates. As in RapidConfig, the physical adapters are numbered 1 to 4. |
| <Virtual adapter#> | The virtual adapter to which the message relates. As in RapidConfig, the virtual adapters are numbered 0 to 15. |
| <Message text> | A textual message. |

Example

0005I 1/00: Lan Emulation Server joined successfully! (LanName “Ethernet”)

4.3 Microsoft Windows 95 - NDIS 3 Driver

In this environment the ATM Driver is an NDIS 3 driver emulating an Ethernet or Token-Ring adapter to the higher layers. See *LAN Emulation Concepts* in section 2.1, *Classical IP - RFC1577* in section 2.2 or *MultiProtocol Encapsulation - RFC1483* in section 2.3.

If the default configuration is not sufficient for the network, RapidConfig/ATM should be installed and used for configuring the driver prior to driver installation, so that the driver will function correctly from the beginning (see section 6).

Olicom recommends that LanScout is installed prior to adapter and driver installation in order to have visibility of the network status following the installation (see chapter 6).

The required driver is located in the root directory of the Olicom CD-ROM. It will be copied automatically by the setup procedure described below.

4.3.1 Installing the ATM NDIS 3 Driver

When the ATM Adapter has been installed in the computer and Windows 95 is booted, the operating system will display message informing you that it has found new hardware and is installing software.

Subsequently, it will display a request for a disk supplied by the hardware vendor. Insert the Olicom CD-ROM disc and install from D:\. Windows 95 then copies the driver from the Olicom CD-ROM and other network drivers from the Microsoft Windows 95 CD-ROM or disks.



Important: When file copying is complete and the network software is already installed, Windows 95 will load the driver. If no configuration file is present at this time, a blue screen may appear on present versions of Windows 95, with a warning that NDIS is using a service that is not accessible at this time. This warning has no effect and will only occur during installation.

By default the driver will use the burned-in MAC address of the adapter. Advanced users may want to configure a different MAC address. It can be done as follows:

1. Open the Control Panel under “Settings” in the “Start” menu.
2. Click the “Network” icon.
3. Select the “Olicom ATM PCI 155 Adapter”.
4. Click “Properties”.
5. Click “Advanced”.
6. Set the appropriate parameter.



Note: If running Classical IP (RFC1577), make sure that the IP is bound and that an IP address is configured. Other protocol bindings to this Virtual Adapter are not needed. Network Services depending on broadcasts (for example Network Neighborhood in Windows 95) do not function correctly for Classical IP, because broadcasting is not supported.

4.3.2 Adding another Virtual Adapter

If the configuration contains more than one virtual adapter on the physical adapter, repeat the following sequence for each extra virtual adapter:

1. Open the Control Panel under Settings in the Start menu and click the “Network” icon.
2. Click “Add” and select “Adapter”.
3. Click “Add” and “Have Disk”.
4. Insert the Olicom CD-ROM and accept to install from D:\.
5. Select “Extra Elan for Olicom ATM PCI 155 Adapter” and click “OK”.
6. Select the newly installed “Extra Elan for Olicom ATM PCI 155 Adapter”.
7. Click “Properties” and “Advanced”.
8. Set the Virtual Adapter Number to the value given by RapidConfig/ATM (0,1,2 and 3).



On some versions of Windows 95 (for example, OSR2) it is necessary to configure a locally administered node address.

4.3.3 Updating Existing Windows 95 Driver

Update an existing Windows 95 driver as follows:

1. Copy the file OCA1PND3.VXD from the “Windows NDIS Driver Disk” to the system directory, for example:
 \WINDOWS\SYSTEM.
2. Reboot the PC.

4.3.4 NDIS 3 Error Messages

The ATM driver normally responds to network problems by sending messages to Windows NT. They can also be seen from Olicom LANscout.

There are three different types of messages: Informational messages, Warnings and Errors. Below is the message format:

<Message#><Message type> <Physical adapter#>/<Virtual adapter#>: <Message text>

| <i>Field</i> | <i>Description</i> |
|---------------------|--|
| <Message type> | “I” for “Informational”, “W” for “Warning” or “E” for “Error” |
| <Message#> | The number of the message. All messages are assigned a unique number. In appendix B all messages and suggested actions are listed. |
| <Physical adapter#> | The physical adapter to which the message relates. As in RapidConfig, the physical adapters are numbered 1 to 4. |
| <Virtual adapter#> | The virtual adapter to which the message relates. As in RapidConfig, the virtual adapters are numbered 0 to 15. |
| <Message text> | A textual message. |

Example

0005I 1/00: Lan Emulation Server joined successfully! (LanName “Ethernet”)

4.4 Novell NetWare Servers - ODI 3.31 Driver

The ODI 3.31 driver for Novell NetWare is a comprehensive driver, which includes Olicom's full set of ATM protocols (LAN Emulation, Classical IP and RFC 1483). The ODI 3.31 driver emulates one or more Ethernet or Token-Ring adapters to NetWare. See chapter 2 for details.

The ODI 3.31 driver can be used under Novell NetWare 3.12 and 4.x. The driver cannot be used under NetWare 3.11 and earlier versions.

4.4.1 Installing and Loading the Driver on a 4.x Server

To install and configure the ODI 3.31 on a NetWare 4.x server:

1. Create a configuration file using RapidConfig/ATM.

When the driver is loaded on the NetWare server, it will attempt to read the configuration file named OC-615X.CFG from the directory where the driver is located (normally SYS:SYSTEM). The configuration file is used to configure the driver.

If no configuration file is found, the driver will use the default configuration: one virtual adapter running Ethernet LAN Emulation. It will join the default Ethernet ELAN indicated by the LECS.

Therefore, if you want to use a default configuration, proceed to step 3.

If you want to create a specific configuration file, run the RapidConfig program on a Windows NT or Windows 95 PC. Save the configuration file to a floppy disk. For more information on installation and the use of RapidConfig refer to chapter 5.

2. Copy the configuration file to the server.

The configuration file can be copied from the floppy disk to the server in one of the following ways:

- 2.1. If you have the Novell Toolbox utility on the server:

- 2.1.1. Copy the file by loading the utility from the console using:

LOAD TOOLBOX

- 2.1.2. Change the directory:

CHDIR SYSTEM

- 2.1.3. Copy the file:

COPY A:OC-615X.CFG

2.2. If you do not have the Novell Toolbox, use the editor to copy and paste the file:

2.2.1. Load the editor from the system console using:

LOAD EDIT

2.2.2. In the field “Enter file to edit ...” type:

A: OC-615X.CFG

2.2.3. In “Current File ...” copy entire content of the file into the paste buffer (use F5 to mark the block and F6 to copy the block into the paste buffer).

2.2.4. Press Esc to return to the “Current file to edit ...”

2.2.5. Type the destination file name:

SYS:SYSTEM\OC-615X.CFG

2.2.6. Choose “Yes” in the “Do you want to create ..” window.

2.2.7. In the “Current File 'sys:system\oc-615x.cfg' ..” copy the entire content of paste buffer into the file by pressing the Ins key.

2.2.8. Press Esc and choose “Yes” to save the file.

2.2.9. Press Esc and “Yes” to exit “Edit”.

3. Remove NetWare modules already running on the server.

When the driver (OCA1PODI.LAN) is installed, it will autoload the necessary versions of the Novell supplied modules: ETHERTSM.NLM, TOKENSM.NLM, MSM.NLM and NBI.NLM, provided that these modules are not already loaded on the server. If any versions of these modules are already loaded, the necessary versions of these files will only be copied to the harddisk, but not actually loaded.

Therefore, to be sure to have sufficient versions of these files autoloaded during driver load, it is recommended to unload any versions of these modules already running on the server. Use the following commands to unload the modules:

UNLOAD ETHERTSM

UNLOAD TOKENSM

UNLOAD MSM

UNLOAD NBI

If any of the above modules cannot be unloaded due to dependencies to other modules, remember to restart the server after completing the installation.

4. Install the driver OCA1PODILAN by using the NetWare Install program.

The driver is located on the Olicom CD-ROM. If the NetWare server does not have a mounted CD-ROM drive, a floppy install disk can be created by starting the Olicom setup program on a Windows PC and choosing "Make Install Disks", "NetWare Disk".

To install the driver from the Olicom CD-ROM or a floppy disk:

- 4.1. Start the Install program from the console using:

LOAD INSTALL

- 4.2. Select "Driver options", "Configure network drivers".

- 4.3. Choose "Select a driver".

- 4.4. Press Ins to "Install an unlisted driver".

- 4.5. Press F3 and enter the path:

D:\NETWARE.

- 4.6. Select the driver type (Ethernet or Token-Ring).

- 4.7. Choose "Yes" to copy the driver OCA1PODILAN.

- 4.8. Choose "Yes" to save existing files or "No" to override them

If you answer "Yes" to any of these questions, the old versions will be saved in a directory named "SYSTEM\DRIVERS.OLD".

- 4.9. Select protocols.

- 4.10. Enter the PCI slot number of the physical RapidFire ATM adapter.

If you do not know the PCI slot number of the installed physical adapter, you may leave the slot number unspecified. You will be prompted to choose the slot number from a list of PCI slot numbers with RapidFire ATM adapters installed.

- 4.11. Enter channel number.

The channel number is used to refer to the corresponding virtual adapter specified in the configuration file with RapidConfig. The mapping between the channel number and the virtual adapter numbers is as follows:

| | | |
|-----------|---|-------------------|
| Channel 1 | - | Virtual Adapter 0 |
| Channel 2 | - | Virtual Adapter 1 |
| Channel 3 | - | Virtual Adapter 2 |

and so on.

- 4.12. Choose "Save parameters and load driver"

If the slot number was left empty, press Ctrl+Esc and switch to Alternate Console Screen to choose the slot number.

5. If you have configured more than one virtual adapter in RapidConfig, continue installing multiple instances of OCA1PODI.LAN, that is repeat steps 4.3. - 4.12. above.
6. Restart the server.
Restarting the server is recommended to verify the configuration in AUTOEXEC.NCF.
 - 6.1. Shut down the server using the command:

DOWN
 - 6.2. Restart the server using the command:

RESTART SERVER
7. Use RapidMon to verify correct network/driver operation.
 - 7.1. Start RapidMon using the command:

LOAD RAPIDMON
 - 7.2. Check the event log in RapidMon by choosing “Event Log” and “OCA1PODI”.



Note: For routed Classical IP or RFC 1483 Encapsulation the protocol frame format should be “Ethernet_II” (Ethernet DIX) or “Token- Ring_SNAP” for Ethernet and Token-Ring, respectively.

4.4.2 Command Line Syntax and Examples

This section describes the syntax used for loading the driver from the command line. It also provides you with a detailed example.

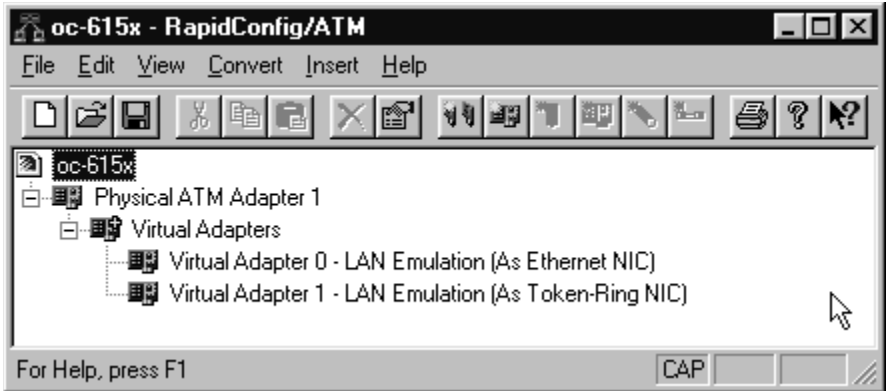
General syntax:

```
LOAD OCA1PODI CHANNEL1=<channel#> SLOT=<slot#> frame=
<frame type> NAME=<symboloc name>
```

| <i>Parameter</i> | <i>Description</i> | | | | | | | | | |
|------------------|---|-------------------|---|-------------------|-----------|---|-------------------|-----------|---|-------------------|
| <channel#> | <p>The channel number is used to refer to the corresponding virtual adapter defined in the configuration file (with RapidConfig). The mapping between channel no. and virtual adapter numbers is:</p> <table><tr><td>Channel 1</td><td>-</td><td>Virtual Adapter 0</td></tr><tr><td>Channel 2</td><td>-</td><td>Virtual Adapter 1</td></tr><tr><td>Channel 3</td><td>-</td><td>Virtual Adapter 2</td></tr></table> <p>and so on</p> <p>Do not use the channel number when loading the driver under NetWare 3.12, where only one virtual adapter is supported.</p> | Channel 1 | - | Virtual Adapter 0 | Channel 2 | - | Virtual Adapter 1 | Channel 3 | - | Virtual Adapter 2 |
| Channel 1 | - | Virtual Adapter 0 | | | | | | | | |
| Channel 2 | - | Virtual Adapter 1 | | | | | | | | |
| Channel 3 | - | Virtual Adapter 2 | | | | | | | | |
| <slot#> | <p>The PCI slot of the corresponding physical RapidFire ATM adapter.</p> | | | | | | | | | |
| <frame type> | <p>Frame type for the virtual adapter</p> <p>The specified frame type must match the LAN Type configured for the corresponding virtual adapter in RapidConfig.</p> <p>If the LAN Type of the virtual adapter is Ethernet, the following frame types are valid:</p> <p>ETHERNET_802.2 (default) ETHERNET_802.3 ETHERNET_II ETHERNET_SNAP</p> <p>If the LAN Type of the virtual adapter is Token-Ring, the following frame types are valid:</p> <p>TOKEN-RING TOKEN-RING_SNAP</p> | | | | | | | | | |
| <symbolic name> | <p>A symbolic name used later in binding protocols to virtual adapters.</p> | | | | | | | | | |

Example

One physical adapter with one Ethernet virtual adapter and one Token-Ring virtual adapter.



Assuming that the physical adapter is installed in PCI slot 2, you should use the following load and bind commands:

```
LOAD OCA1PND3 CHANNEL=1 SLOT=2 FRAME=ETHERNET_802.2 NAME=ETH_ELAN
LOAD OCA1PND3 CHANNEL=2 SLOT=2 FRAME=TOKEN-RING NAME=TR_ELAN
BIND IPX TO ETH_ELAN
BIND IPX TO TR_ELAN
```

4.4.3 Installing and Loading the Driver on a 3.12 Server

➤ **Note:** If you are using Novell Server version 3.12J (Japanese version), follow the guidelines for installing and loading the driver on a 4.x server. See section 4.4.1.

To install and load the ODI 3.31 driver on a 3.12 server follow the steps below:


1. Create a NetWare driver install disk.
 - 1.1. Insert the Olicom CD-ROM.
 - 1.2. Choose “Make Install Disks”.
 - 1.3. Choose “NetWare Disk” and follow the instructions.
2. Create a configuration file using RapidConfig/ATM.

When the driver is loaded on the NetWare server, it will attempt to read the configuration file named OC-615X.CFG from the directory where the driver is located (normally SYS:SYSTEM). The configuration file is used to configure the driver.

If no configuration file is found, the driver will use the default configuration: one virtual adapter running Ethernet LAN Emulation. It will join the default Ethernet ELAN indicated by the LECS.

Therefore, if you want to use a default configuration, proceed to step 3.

If you want to create a specific configuration file, run the RapidConfig program on a Windows NT or Windows 95 PC. Save the configuration file to the root directory of the NetWare driver install disk, created in step 1. For more information on installation and the use of RapidConfig refer to chapter 5.

 **Note:** When running NetWare 3.12 only one virtual adapter is supported.

3. Load necessary support files

To run the ODI 3.31 driver on a NetWare 3.12 server it is necessary to use a special set of Novell supplied support files: MSM31X, ETHERTSM.NLM, TOKENSM.NLM and NBI31X.NLM. These files are located in

`\NETWARE\NW312`

on the NetWare driver install disk. To load them use the following commands:

`LOAD A:\NETWARE\NW312\NBI31X.NLM`

`LOAD A:\NETWARE\NW312\MSM31X.NLM`

`LOAD A:\NETWARE\NW312\ETHERTSM.NLM`

`LOAD A:\NETWARE\NW312\TOKENSM.NLM`

If the modules are already loaded, make sure that MSM31X.NLM, ETHERTSM.NLM and TOKENSM are version 2.50 or higher. This is a driver requirement.

4. Load the adapter driver from the NetWare driver install disk, using the commands explained in section 4.4.2.

5. With the server now accessible from workstations, copy the files:

`\NETWARE\OCA1PODI.LAN`

`\NETWARE\RAPIDMON.NLM`

`\NETWARE\NW312\NBI31X.NLM`

`\NETWARE\NW312\MSM31X.NLM`

`\NETWARE\NW312\ETHERTSM.NLM`

`\NETWARE\NW312\TOKENSM.NLM`

to the SYS:SYSTEM directory on the server.

If you are using a configuration file, copy the file OC-615X.CFG to the SYS:SYSTEM directory on the server.

6. Ensure automatic loading of the NetWare server driver at reboot by inserting the load and bind commands into the server's AUTOEXEC.NCF file.

7. Restart the server to verify the configuration in AUTOEXEC.NCF.

8. Verify correct network/driver operation using RapidMon.

8.1. Start RapidMon using the command:

LOAD RAPIDMON

8.2. To check the event log in RapidMon choose “Event Log”, “OCA1PODI”.

4.4.4 Changing the Configuration File

You can change the configuration file created with RapidConfig in the following ways:

- Mount the sys-volume from a Windows PC and run RapidConfig directly on the configuration file.
- Edit the configuration file with RapidConfig and copy it into the server as described in step 2 of section 4.4.1.
- Edit the configuration file using the NetWare text editor (“load edit”).

This option should only be considered by advanced users. A detailed description of the configuration file format is given in appendix C.

Whenever the configuration file has been changed through a text editor, the event log must be checked thoroughly upon next boot to verify that no syntax errors have been introduced.

4.4.5 Source-Routing for 3.12 and 4.x Servers

Token-Ring source-routing is supported through the Novell supplied NetWare Loadable Module ROUTE.NLM.

1. Activate the module by entering:

LOAD ROUTE or

LOAD ROUTE BOARD = <board number>

where <board number> must be specified if the PCI Adapter is not a board number one (1, 2, 3, ...).

2. Invoke the “SYSTEM OPTIONS” menu under the “INSTALL” utility and insert the command from step 1 in the AUTOEXEC.NCF file.

4.4.6 Error Messages

The ATM driver normally responds to network problems by sending messages to the Novell NetWare console. They can also be seen from RapidMon.

There are three different types of messages: Informational messages, Warnings and Errors. Below is the message format:

| | |
|---|--|
| <Message#><Message type> <Physical adapter#>/<Virtual adapter#>: <Message text> | |
| <i>Field</i> | <i>Description</i> |
| <Message type> | “Info”, “Warning” or “Error” |
| <Message#> | The number of the message. All messages are assigned a unique number. In appendix B all messages and suggested actions are listed. |
| <Physical adapter#> | The physical adapter to which the message relates. As in RapidConfig, the physical adapters are numbered 1-4. |
| <Virtual adapter#> | The virtual adapter to which the message relates. As in RapidConfig, the virtual adapters are numbered 0-15. |
| <Message text> | A textual message. |

Example

Info(0005) 1/00: Lan Emulation Server joined successfully! (LanName “Ethernet”)

4.5 Novell NetWare 4.1x - ATM ODI Driver

The ATM ODI driver is a “thin driver”, which does not include any ATM protocols. Instead, it is used together with the ATM protocols delivered by Novell. The driver is located in the ATMODI directory on the Olicom CD-ROM and is named OCA1PATO.LAN.

1. Install the OCA1PATO.LAN using the Novell NetWare Server Install menu.

The install menu will copy the two files: OCA1PATO.LAN and OCA1PATO.LDI to the SYS/SYSTEM directory on the NetWare server.

The HSM driver interfaces to Novell's Open Data-Link Interface (ODI) for ATM.

When used with the Novell's ATMELEC or ATMTRLEC LAN Emulation clients HSM driver supports Lan Emulation. When used with ATM with Novell's Multiprotocol Router 3.1 (MPR) and the WAN extensions, it supports SVCs and PVCs.

Additional software used for supporting LAN Emulation or MPR 3.1 and its user documentation can be obtained from Novell.



Note: The driver cannot be used together with the ODI 3.2 and 3.31 drivers for NetWare 3.1x and 4.x supplied by Olicom. That is, the OCA1PODI and OCA1PATO drivers cannot run on the server at the same time.

4.6 OS/2 - NDIS 2 Driver

The NDIS 2 driver for OS/2 is a comprehensive driver, which includes Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483). The NDIS 2 driver emulates one or more Ethernet or Token-Ring adapters to OS/2. Maximum four virtual adapters are supported. chapter 2 for details.

The NDIS 2 driver for OS/2 supports OS/2 version 3.0 or later.

The OC-615X software (driver and NIF files) is installed and configured using the same utility as used with any other NDIS 2.0 compliant NIC driver on your specific OS/2 system. See the necessary system documentation.

Configuration and installation under IBM LAN Server 3.0 and 4.0 is described below.

Event logging

Informational, warning and error events from the driver are written to the \IBMCOM\LANTRAN.LOG file which can be viewed with a text editor from an OS/2 window. After driver installation and in case of driver malfunctioning check the event log file.

4.6.1 Before Starting Driver Installation

Before starting the actual driver installation follow these steps:

1. Create a driver installation disk.

From the Olicom CD-ROM start the Setup program and choose “Make Install Disks”, “OS/2 Disk” to generate an OS/2 driver installation disk.

It is recommended not to install the driver directly from the CD-ROM, since the read-only attribute of the driver - when read from the CD-ROM - will cause problems if later updating the driver.

2. Install RapidConfig/ATM on a Windows 95 or Windows NT PC

RapidConfig must be used to create a configuration file which the driver will read during startup.

Since RapidConfig cannot be run under OS/2, the configuration file must be created using another PC and then copying the configuration file to the OS/2 server. Therefore, install RapidConfig on a Windows 95 or Windows NT PC.

3. Create a configuration file using RapidConfig/ATM.

When the driver is loaded on the OS/2 server it will attempt to read a configuration file named OC-615X.CFG from the ConfigPath directory, which is by default “C:\IBMCOM\MACS” at installation.

If no configuration file is found then the driver will use the default configuration: one virtual adapter running Ethernet LAN Emulation. It will join the default Ethernet ELAN indicated by the LECS.

If the default configuration of the driver does not meet your requirements, you must create a configuration file before starting the driver installation. To create the configuration file run the RapidConfig program on a Windows NT or Windows 95 PC. Save the configuration file to a floppy disk. Refer to chapter 5 for more information on installation and use of RapidConfig.

4. Copy the configuration file to the OS/2 server.

Copy the configuration file from the floppy disk to the ConfigPath directory, which is by default:

C:\IBMCOM\MACS

If the configuration file is the same for a number of systems, place it in the OS\2 directory on the installation disk. During installation it will be copied to the \IBMCOM\MACS directory.

4.6.2 IBM LAPS - LAN Server 4.0

You can install the adapter driver either *while* you are installing LAN Adapter and Protocol Support (LAPS) or *after* you have installed it.

Driver Installation *while* installing LAPS

1. Insert the “IBM Network Transport Services/2, LAN Adapter and Protocol Support” disk in drive “A:” and run the LAPS program (A:\LAPS).
2. Select “Install” in the LAPS program main menu.
The program then installs LAPS on your hard disk.
3. During the installation the LAPS program main menu will reappear with the “Install”, “Configure”, “Remove”, “Exit” and “Help” options selectable.
4. Proceed with the installation as described in step 2 of “*Driver Installation after installing LAPS*” below.

Driver Installation *after* installing LAPS

1. Choose:

 \IBMCOM

for your current directory and run the LAPS program from that directory.
2. Select “Install” in the LAPS program main menu.
3. A dialog box labelled “Install Additional Network Drivers” appears prompting for a source path. Insert the OS/2 driver installation disk and type the following path:

 A:\OS2

Select “OK”.
4. When the “Installation Complete” message appears, select OK.
5. Select “Configure” from the LAPS program main menu.
6. Select “Configure LAN Transport” in the Configuration dialog box and select “Continue”.

7. Under “Network Adapters”, select “Olicom ATM 155 Mbps (Token-Ring) Network PCI Adapter” or “Olicom ATM 155 Mbps (Ethernet) Network PCI Adapter”, and add it to the “Current Configuration” by pressing “Add”. Repeat this step until all virtual adapters have been added (no more than four).
- **Note:** Make sure that the OC-615X.CFG file reflects the same number of virtual adapters and LAN types as configured in LAPS, and that they appear in the same order.
- **Note:** If you have or want the OC-615X.CFG file in a drive/directory different from C:\IBMCOM\MACS, you must define it for each virtual adapter in the “Current Configuration group” box by using the “EDIT” button and changing ConfigPath to the desired value.
8. For each virtual adapter, add and configure the protocols to suit your requirements.
9. Select “OK” when the configuration is complete.
10. Select “Exit” in the LAPS main menu.
11. Select “Continue” to allow LAPS update CONFIG.SYS and PROTOCOL.INI on the boot drive.
12. Follow the instructions given by LAPS to complete the installation.
13. Be sure to update the OC-615X.CFG file in accordance with step 7 above.
14. Reboot the system to activate the RapidFire 615x 155 ATM PCI Adapter.
15. Verify correct operation of the driver (for example, for LAN Emulation - check that it has joined the required ELANs). See the event log in:

\\IBMCOM\LANTRAN.LOG

4.6.3 IBM MPTS - LAN Server 4.0

Before installing the adapter driver complete the installation of MPTS (Multi-Protocol Transport Services). After this proceed with the steps below.

1. Start the "OS/2 LAN Services Installation/Configuration" program.
 - 1.1. Open the "LAN Services File and Print" folder on the desktop.
 - 1.2. Start "OS/2 LAN Services Installation/Configuration".

Alternatively you may start the program from the command line:

`\\BMLAN\\INSTALL\\LANINST`

2. Press "OK" at the welcome screen.
3. Select "Tailored".
4. Select "Install or configure this workstation".
5. Choose Server Type.
6. Select "No" to reinstall MPTS.
7. Select "Other adapters..."
8. Enter the path to the OS/2 driver disk, usually A:\
9. Configure each virtual adapter.

For each virtual adapter configured in RapidConfig (maximum 4) configure a corresponding adapter in OS/2. The adapters must be added in the same order as they are defined in RapidConfig, that is, first virtual adapter number 0, then number 1 and so on. If no configuration file was created, only one Ethernet adapter must be added.

- 9.1. Select "Olicom ATM 155 Mbps (Ethernet) Network PCI Adapter" or "Olicom ATM 155 Mbps (Token Ring) Network PCI Adapter" in the "Network Adapters list" according to the LAN Type of the corresponding virtual adapter in RapidConfig.
- 9.2. Click "Add".
- 9.2. Add the protocols to use for the adapter.
10. Click "OK"
11. Select "Apply the changes"
12. Click "OK" in the "Install and Remove" window.
13. Select "Configure a component" and configure any components with status "Configuration required".

14. When back to the “Installation and Configuration” window, choose “Apply the changes” and click “OK”.
15. Respond to any additional questions from the installation program and click “OK” in the “The LAN Server product installation is complete” window to exit the installation program.
16. Make sure that the configuration file (OC-615X.CFG) was copied to the ConfigPath directory as described in section 4.6.1.
17. Reboot the system to activate the RapidFire 615x 155 ATM PCI Adapter.
18. Verify correct operation of the driver (for example, for LAN Emulation - check that it has joined the required ELANs). See the event log in:
\\IBMCOM\\LANTRAN.LOG

4.7 WinSock2 for Windows NT

Microsoft WinSock 2 components are shipped with Windows NT 4.0.

Note for Developers

When developing WinSock 2 applications for ATM, be aware that the necessary WinSock 2 header files and libraries exist in different versions in the various SDKs provided by Microsoft for WinSock 2.

The WinSock 2 applications for ATM should use the header files from the following SDKs:

- winsock2.h: Win32 SDK for NT 4.0
- ws2atm.h: WinSock 2 SDK for Windows 95
- ws2_32.lib: Win32 SDK for NT 4.0

The Win32 SDK for NT 4.0 and the WinSock 2 SDK for Windows 95 are available from Microsoft.

The reason for the different versions of header files is that the NT 4.0 ws2_32.dll is only compatible with the winsock2.h file from the Win32 SDK, while the ws2atm.h file from this SDK has been corrected and updated by Microsoft in the WinSock 2 SDK for Windows 95.

4.7.1 WinSock 2 Installation

Install the NDIS 3 driver for Windows NT as described in section 4.2.

Install the WinSock 2 Transport and WinSock 2 Service Provider as described below. The WinSock 2 Transport Driver is an NT protocol. During installation of this protocol the WinSock 2 Service Provider is installed.

1. Activate the Network Setup program by selecting “Start”, “Settings”, “Control Panel” and then double-click the “Network” icon.
2. Select the “Protocols” tab, click “Add” and choose “Have Disk”.
3. Enter the path to the WinSock 2 transport INF file.
For example:

D:\

4. Select “Olicom WinSock 2 Transport” and click “OK”.
5. Install the WinSock 2 Service Provider by choosing “Install WS2 Service Provider”, and click “OK” in the dialog box.
6. Select the “Bindings” tab.
7. Disable all bindings to the Olicom virtual adapter from protocols other than Olicom WinSock2 Transport.

➤ **Note:** When the Olicom virtual adapter is configured for WinSock 2, it will reject all rotocols other than the Olicom WinSock 2 Transport. Therefore, steps 6 and 7 must be performed to avoid errors in the NT event log.

4.8 WinSock2 for Windows 95

➤ **Important:** To use WinSock 2 for Windows 95 it is necessary to install the WinSock 2 SDK for Windows 95 before installing the Olicom ATM Service Provider. (See the README.TXT file distributed with the WinSock 2 SDK for Windows 95). This SDK installs several new network components which may later cause file version conflicts during installing WinSock 2 ATM Service Provider. Make sure you keep the most recent version of each file.

MicroSoft WinSock 2 components are shipped as a separate SDK. The WinSock 2 SDK for Windows 95 is available from Microsoft.

Note for Developers

When developing WinSock 2 applications for ATM, be aware that the necessary WinSock 2 header files and libraries exist in different versions in the various tools.

The WinSock 2 applications should use the header files and libraries from the WinSock 2 SDK for Windows 95.

MicroSoft WinSock 2 components are shipped with Windows NT 4.0.

4.8.1 WinSock 2 Installation

Install the NDIS 3 driver for Windows 95 as described in section 4.3 and precede to the WinSock 2 Transport and WinSock 2 Service Provider installation as described below.

The WinSock 2 Transport Driver is a WIN95 protocol. During its installation the WinSock 2 Service Provider is also installed.

1. Activate the Network Setup program by selecting “Start”, “Settings”, “Control Panel” and then double-click the “Network” icon.
2. Click “Add”, select “Protocol”, click “Add” and choose “Have Disk”.
3. Enter the path to the WinSock 2 transport files.
For example:

D:\ATMSPI

4. Select “Olicom WinSock 2 Transport” and click “OK”.
5. Select “Properties” for the Olicom ATM adapter.
6. Disable all bindings to the Olicom ATM adapter from all other protocols than the Olicom WinSock2 Transport and click “OK”.
7. Reboot the PC when prompted.
8. When the PC reboots, it starts up with a small Service Provider installation program. Install the WinSock 2 Service Provider by choosing “Install WS2 Service Provider” and click “OK” in the dialog box.



Note: When the virtual adapter is configured for WinSock 2, it will reject all protocols other than the Olicom WinSock 2 Transport. Therefore, steps 6 and 7 must be performed to avoid errors.



5. Driver Configuration using RapidConfig/ATM

This chapter covers configuration of the comprehensive drivers for RapidFire ATM adapter, that is, the NDIS 3 drivers for Windows NT and Windows 95, the ODI 3.31 driver for Novell NetWare and the NDIS 2 driver for OS/2.

RapidConfig creates a configuration file, which the driver will read during start-up. This configuration file controls the operation of the driver. If no configuration file has been created, the driver will use the default configuration.

5.1 Default Configuration

If you do not use RapidConfig/ATM program to create a configuration file, the driver will use the default configuration: one virtual adapter running Ethernet LAN Emulation. It will join the default Ethernet ELAN indicated by the LECS. UNI version 3.0 will be used for signalling.

If the default configuration does not meet your requirements, create a specific configuration file with RapidConfig.

5.2 Editing the Configuration File Manually

The configuration file is usually edited through RapidConfig. Advanced users may change it using a text editor. Detailed description of the configuration file format is given in appendix C.

If you have changed the configuration file manually, upon next boot you should view the event log thoroughly, to make sure that no syntax errors have been introduced.

5.3 Installing RapidConfig

RapidConfig can be installed from the Olicom Configuration Disk or from the Olicom CD-ROM.

CD-ROM

Insert the CD-ROM, select “Launch the setup program” from the menu and follow the instructions.

Configuration disk

Insert the configuration disk, run the “SETUP.EXE” program and follow the instructions.



Note: RapidConfig requires Windows 95 or Windows NT. It cannot be run under OS/2 or Windows for Workgroups.

5.4 Starting RapidConfig

To view the existing configuration file (OC-615X.CFG), open the Control Panel and click on “OC-615x ATM Configuration”. Alternatively, choose “Start”, “Programs”, “Olicom Applications”, “OC-615x Configuration”. To create a new configuration file, choose “Start”, “Programs”, “Olicom Applications”, “New OC-615x Configuration”.

5.5 Configuration Overview

RapidConfig/ATM provides a graphical user interface to the configuration file. The configuration file is presented in a tree structure with the current configuration file as the root. Physical adapters can be added to the root as nodes, and the virtual adapters can be added to the physical adapters.

When you double-click on a node (for example, a virtual adapter), you can configure its parameters.

RapidConfig features include:

- Extensive help
Press F1 to display help for all parameters, including the advanced ones not described in this Guide to Operation.
- Different Views
By default, RapidConfig does not show the Traffic Profile parameters and the advanced parameters. To change them you need to specifically enable them through the View menu. In most cases it is not necessary to configure these parameters.
- Easy ATM Address Configuration
Under “Options” an ATM address template can be configured. This template can be recalled in any field requiring an ATM address by pressing the Insert key.
- Print/Print-Preview
Use it to print the configuration file.

After initiating RapidConfig program, perform the following steps to complete the configuration. Each step is described in detail in next sections.

1. Select the correct physical adapter type (OC-615x).
2. Add and configure physical adapter(s).
3. Add and configure one or more virtual adapter(s).

For each virtual adapter being added, the operating system also needs to be configured for the additional virtual adapter. This is described in chapter 4. Four different types of virtual adapters are supported:

- LAN Emulation
Virtual adapters of type LAN Emulation should be configured when using the ATM network for traditional LAN traffic.
 - RFC 1577 (Classical IP)
Classical IP may be used for integrating IP traffic in an ATM network, however typically LAN Emulation will be used, since it works with all layer 3 LAN protocols, including IP.
 - RFC 1483
RFC 1483 is sometimes used when a Server PC is sending LAN traffic through the statically configured Permanent Virtual Connections with other devices.
 - WinSock 2
WinSock 2 allows applications to get direct access to the rich features of ATM. The application must be specifically developed to cooperate with WinSock 2.
4. Check that the default LANE resources are sufficient (if any LAN Emulation virtual adapters have been configured).
 5. Save the configuration

If the configuration is to be used on the local PC, RapidConfig will automatically save the configuration file in the correct directory (that is, the directory where the driver is located).

If the configuration file is to be used on a different PC, choose “File”, “Save As” to save the file on a diskette.

The configuration file must be named OC-615X.CFG.

When you copy the configuration file from the diskette to the disk on the target PC, make sure to copy it to the directory, where the driver is located. For example:

| | |
|-------------|---|
| Windows NT: | \\WINNT\\SYSTEM32\\DRIVERS\\OC-615X.CFG |
| Windows 95: | \\WINDOWS\\SYSTEM\\OC-615X.CFG |
| NetWare: | SYS:\\SYSTEM\\OC-615X.CFG |
| OS/2: | \\IBMCOM\\MACS\\OC-615X.CFG |

Apart from the configuration steps and parameters covered in this and the following sections, RapidConfig also allows advanced parameters configuration. To enable inspection and configuration of these parameters choose “Advanced” and/or “Traffic Profiles” from the “View” menu.

For most parameters, RapidConfig provides a default value. This default value is not actually being written into the configuration file, but is used by the driver when no specific value has been specified in the configuration file.

5.6 Configuring Physical Adapters

After RapidConfig has been started, perform the following steps:

1. Add physical adapter(s) by clicking the “New Adapter” button in the toolbar.

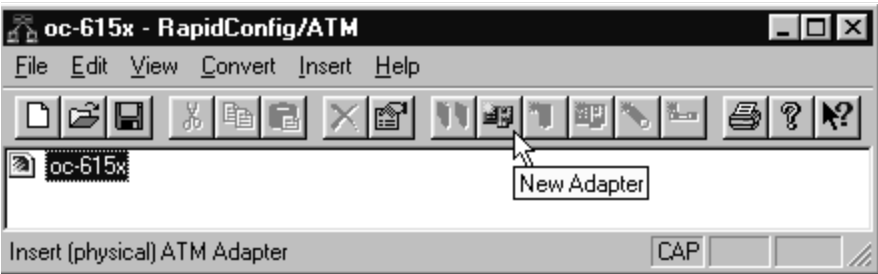


Figure 10. Configuring a Physical Adapter

2. Select UNI version. If you do not know the UNI version supported by your ATM switch, try using the default value: UNI 3.0

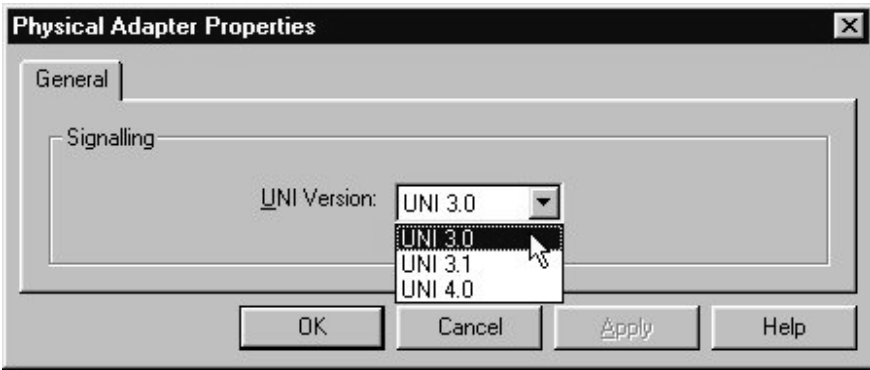


Figure 11. Physical Adapter Properties

It is possible to configure more advanced parameters for the physical adapter. To do so, “Advanced” needs to be enabled in the “View” menu. Once it is enabled, you can return to the configuration of the physical adapter by double-clicking on its icon.

For most purposes it is not necessary to configure Advanced parameters.

5.7 Configuring Virtual Adapters

1. Add virtual adapter(s) by clicking the “New Virtual Adapters” button in the toolbar.

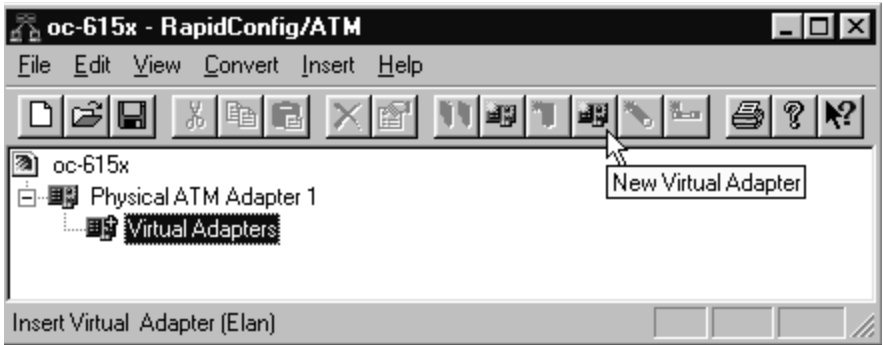


Figure 12. Configuring a Virtual Adapter

2. Choose the type of the Virtual Adapter. “LAN Emulation” is the default.,

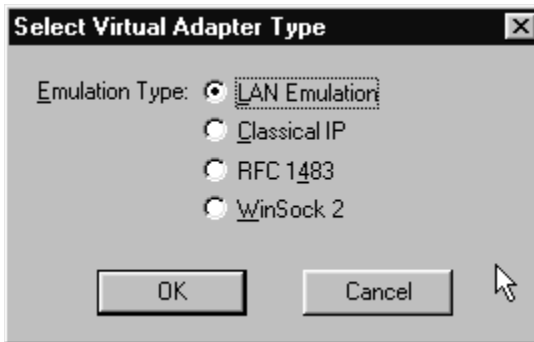


Figure 13. Select Virtual Adapter Type

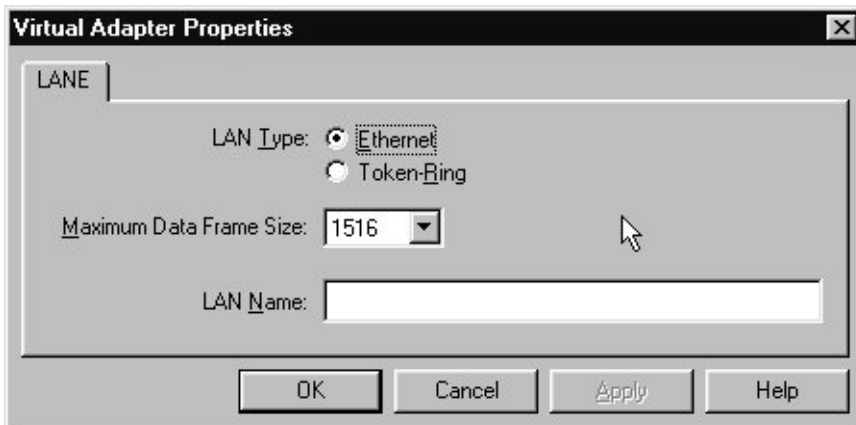
3. Configure the parameters specific to the virtual adapter type. These parameters are described in the following sections. Some parameters have a Driver Default box. When this box is checked, the driver default value for the parameter is used. The parameter value may be changed by deselecting the Driver Default box and choosing other values.



Note: For each added virtual adapter, the corresponding operating system also needs to be configured. See chapter 4 for details on operating systems configuration.

5.8 Configuring LAN Emulation Virtual Adapter

When you add a new LAN Emulation virtual adapter or select an existing one, you can set its LAN Emulation parameters.



The following parameters can be set:

- **LAN Type**
Choose Ethernet or Token-Ring according to the type of the ELAN to which the virtual adapter will be connected.
- **Maximum Data Frame Size**
Value for Ethernet ELANs: 1516.
Value for For Token-Ring: various, the default is 4544.
- **LAN Name**
The name must be specified if the ATM Network hosts multiple ELANs. The name determines the ELAN to which this specific virtual adapter will be attached.
If there is only one ELAN, the name usually does not need to be configured.

Click “OK” when the configuration has been completed



Note: For each added virtual adapter, the operating system also needs to be configured. See chapter 4 for details on operating systems configuration.

It is possible to configure advanced parameters for each LAN Emulation virtual adapter. To enable inspection and/or configuration of these parameters choose “Advanced” and “Traffic Profiles” from the “View” menu. Return to the configuration of the virtual adapter by double-clicking on its icon.

For most purposes it is not necessary to configure Advanced parameters.

5.9 Configuring LANE Resources

The LAN Emulation virtual adapter requires some memory to hold information about the other LE Clients which it is communicating with on the ELAN. The driver will attempt to calculate appropriate default values for the amount of memory set aside for this purpose. However, these defaults will not suit all configurations and may therefore need to be manually configured. Especially if a large server with many users is being configured, it is likely that you will need to manually reconfigure LANE resources.

To reconfigure LANE resources perform the following steps:

1. Double-click on “OC-615X” and choose “LANE Resources”.

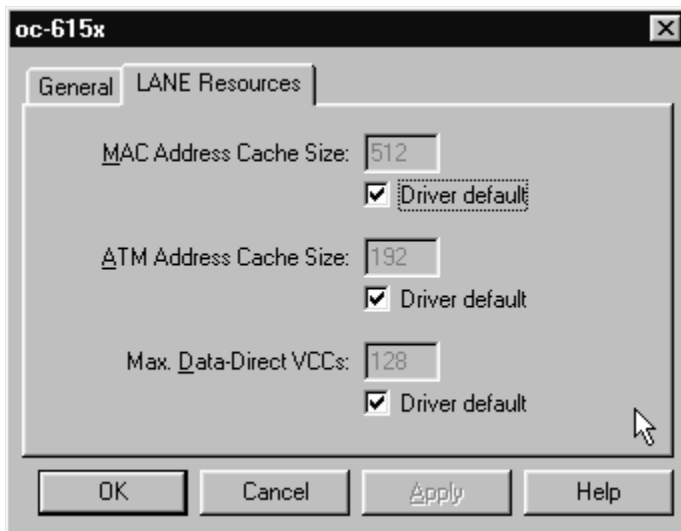


Figure 14. Properties

2. Configure the following parameters:

- **MAC Address Cache Size**

The number of MAC addresses that the LANE Virtual Adapters can communicate with. This number must be at least as large as the maximum number of users that will be using the server at the same time. If the number is too low, some users may be unable to access the server.

- **ATM Address Cache Size**

The number of ATM addresses about which the server will keep information.

This number must be at least as large as the number of LE Clients that will be communicating with the server. Since some users often attach to the ATM network through ATM Uplinks (interconnecting Token-Ring or Ethernet with ATM), the value of this parameter may be significantly smaller than the “MAC Address Cache Size”.

- **Max. LANE Data-Direct VCCs**

The maximum number of VCCs to other LE Clients that can be concurrently established at any time. If a VCC is to be established, but the maximum has already been reached, the least active of the existing VCCs will be disconnected.

LANE Resources for OS/2 Driver

For the NDIS 2 driver for OS/2 LANE resources cannot be configured in RapidConfig. You must define them manually in the configuration file, using a text editor. The following keywords are used in the DefineAdapter section to define LANE resources for each virtual adapter for the OS/2 driver:

| | |
|------------------------|--|
| MaxDdVccs | The maximum number of known ATM addresses, that is the maximum number of ATM addresses that the client can hold in the address cache. |
| MaxDestinations | The maximum number of MAC addresses of other ELAN stations, that is the maximum number the client can hold in the MAC Address cache. Because a LANE client may communicate with stations on real LANs through LAN-to-ATM bridges, this figure may be larger than the value of the MaxDdVccs parameter. |
| MaxOpenCircuits | The maximum number of active VCCs (including connections to LES, BUS or ATMARP server) that a client may have at any time. Maximum value for this parameter is (MaxDdVccs - 2). |

The valid ranges for these parameters are interdependent, that is, all parameters cannot be increased to their maximum values at the same time. The following table shows parameter ranges, provided that one of the other parameters is kept at its default value.

| | Default Values | Valid Ranges | |
|-----------------|----------------|-------------------|----------|
| MaxDdVccs | 128 | 5-500 | 128 |
| MaxDestinations | 300 | 300 | 5 - 500 |
| MaxOpenCircuits | 64 | 5 - (MaxDdVccs-2) | 64 - 126 |

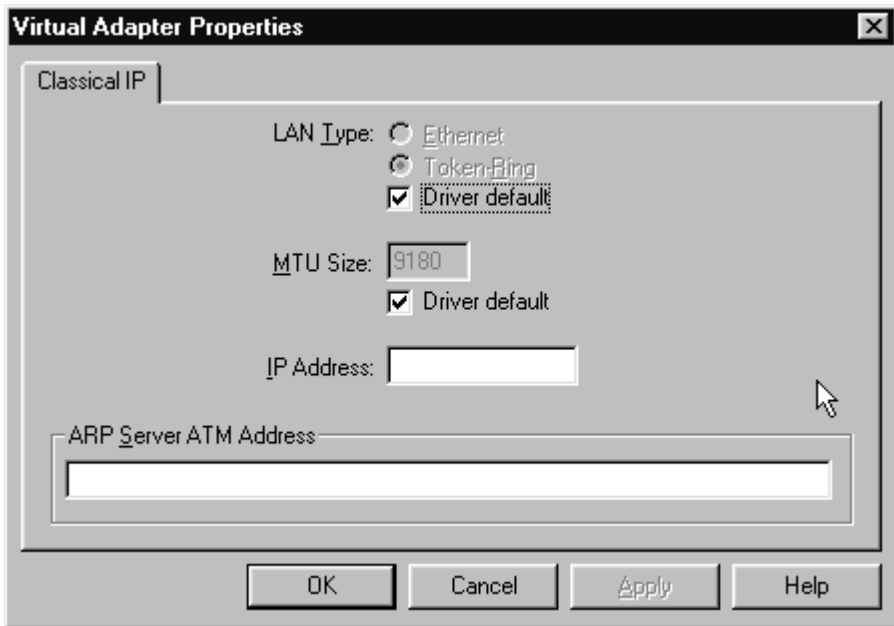
These OS/2 LANE resource parameters are specified for each virtual adapter.

5.10 Configuring Classical IP Virtual Adapter

When you add a new Classical IP virtual adapter or select an existing one, you can set its Classical IP parameters.

If you are running a SVC operation, the ATM ARP Server address must be configured.

If you are running a PVC or mixed operation, the PVCs must be configured as described in section 5.14.



The following parameters can be configured:

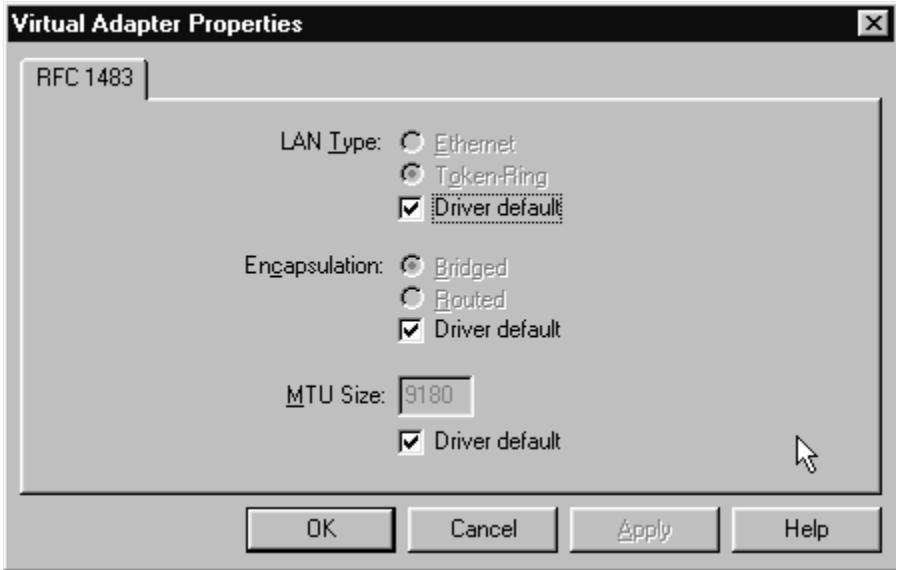
- **LAN Type**
The type of network the virtual adapter will emulate. The LAN Type parameter affects the maximum allowed frame size. The data sent on the ATM network will have no LAN-specific information.
- **MTU Size**
The maximum frame (excluding encapsulation length which is 8 bytes). Selecting “Ethernet” restricts the MTU Size to 1514 bytes on Novell Servers. The data sent on the ATM network will have no LAN-specific information.
- **IP Address**
The IP address of this virtual adapter. If not specified, the IP address will be learned automatically according to the settings in the operating system.
- **ATM ARP Server ATM Address**
The ATM Address of the ATM ARP server. Only applicable for SVC operation.

It is possible to configure advanced parameters for each Classical IP virtual adapter. To enable inspection and/or configuration of these parameters choose “Advanced” and “Traffic Profiles” from the “View” menu. Return to the configuration of the virtual adapter by double-clicking on its icon.

For most purposes it is not necessary to configure Advanced parameters.

5.11 Configuring RFC 1483 Virtual Adapter

When you add a new RFC 1483 virtual adapter or select an existing one, you can set its RFC 1483 parameters:



- LAN Type
The type of network the virtual adapter will emulate.

- Encapsulation
The encapsulation applied on the ATM network, either straight LLC snap (Routed) or the special “bridged” snap (Bridged) with network type and 2 bytes padding.

➡ **Note:** When you select the Routed encapsulation type, the LAN Type setting will only affect the MTU Size as described above. The data sent on the ATM network will have no LAN-specific information. For the Routed encapsulation type, special considerations will apply for certain protocols. When network data is presented to receiving protocols, the MAC header is artificially generated according to the LAN Type setting. The source address may not appear as when originally transmitted, unless it is assured during PVC (see below). IP does NOT assure it (as truly routed protocols mostly do), while IPX requires specific configuration of the source address on the PVC. The general recommendation is to use the Bridged setting whenever possible.

- MTU Size

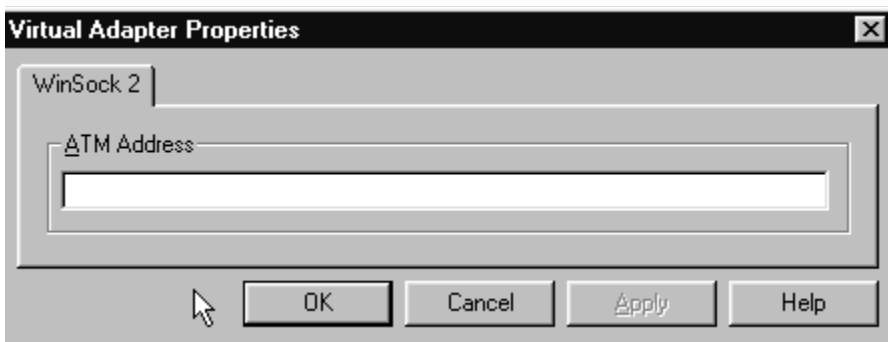
The maximum frame (excluding encapsulation length which is 8 bytes for LlcSnap or 10 bytes for LlcSnapBridged).

➤ **Note:** The “LanType” parameter affects the maximum allowed frame size. Selecting “Ethernet” restricts the MTU Size to 1514 bytes on Novell servers, and only on these servers.

➤ **Important:** When you select the Routed encapsulation type, the protocol frame format used by the operating system should be “Ethernet II” (Ethernet DIX) or “Token-Ring” for Ethernet and Token-Ring, respectively. This note is specifically important for the Novell environment, where the frame types are selected manually. Other environments and/or protocols may not allow specific LAN encapsulation configuration.

5.12 Configuring WinSock 2

When you add a new WinSock 2 adapter or select an existing one you can set its parameters.



The only non-advanced parameter to be configured for a WinSock 2 virtual adapter is the ATM address (only applicable for SVC operation).

If not specified, the driver will use the default values:

| | |
|--------------------|--|
| Prefix (13 bytes): | Requested from the switch through ILMI |
| ESI (6 bytes): | The burned-in MAC address of the adapter |
| Selector (1 byte): | The virtual adapter number |

It is possible to configure advanced parameters for each WinSock 2 virtual adapter. To enable inspection and/or configuration of these parameters choose “Advanced” and “Traffic Profiles” from the “View” menu. Return to the configuration of the virtual adapter by double-clicking on its icon.

5.13 Configuring Traffic Profiles

To enable traffic profile configuration enable Traffic Profiles in the “View” menu of RapidConfig/ATM. Then perform the configuration as described below. For additional explanation on using traffic profiles section 3.5.

Traffic Profile Properties

Generate a list of traffic profiles as follows:

1. Select the “Traffic Profiles” icon connected to the “Physical ATM Adapter” icon.
2. Click on the “New Traffic Profile” icon.
3. Fill in the relevant information in the “Traffic Profile Properties” dialog box.

Repeat steps 2 and 3 as required.

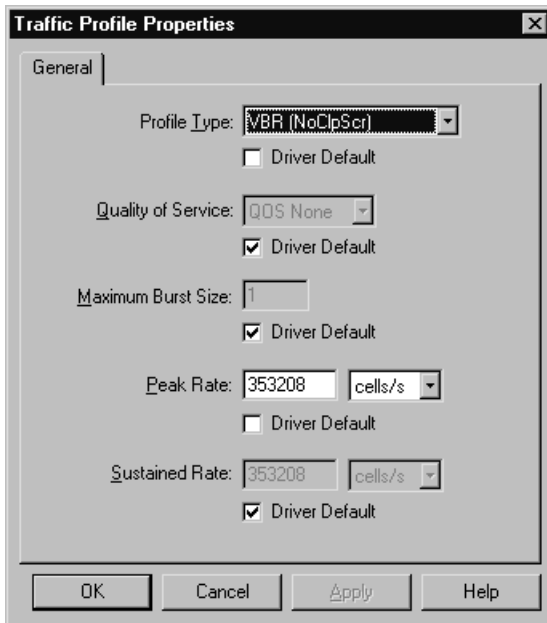


Figure 15. Traffic Profile Properties

Traffic Profile Mappings

To define a traffic profile mapping:

1. Select the “Virtual Adapter” icon for the virtual adapter that the traffic profile mapping is intended for.
2. Click the “New Traffic Profile Mapping” icon.
3. Fill in the “VCC Type”, “Address” and “Mask” fields of the “General” tab.
4. Click on the “Mapping” tab.
5. Add the traffic profiles in the order they are intended to be used.

Virtual Adapter Traffic Parameters

To set the traffic profile parameters a virtual adapter:

1. Double-click the “Virtual Adapter” icon for the virtual adapter that the traffic parameters are to be set for.
2. Click the “Traffic Parameters” tab.
3. Fill in the “Maximum Accepted Cell Rate Differences” field and select the “Default Traffic” profile.

5.14 Configuring Permanent Virtual Connections

If you are using a PVC operation (either pure PVC operation or mixed PVC/SVC operation), the PVCs that makes up connections between two hosts must be configured. PVC configuration is done using RapidConfig/ATM, as described below:

1. Select the configured Virtual Adapter to enable the “Create PVC” icon.
2. Choose the “Create PVC” icon.
3. Select the VPI and VCI values in the general tab.
4. If necessary, choose a remote IP address in the RFC1577/RFC1483 tab (only applicable for Classical IP Virtual Adapters).
5. If necessary, choose a remote MAC address in the RFC1577/RFC1483 tab (only applicable for RFC1483 routed Virtual Adapters).
6. If necessary, choose a remote ATM address in the WinSock 2 tab (only applicable for WinSock 2 Virtual Adapters).
7. If necessary, choose a traffic profile for the PVC.
8. Press the “OK” button to accept the chosen values.

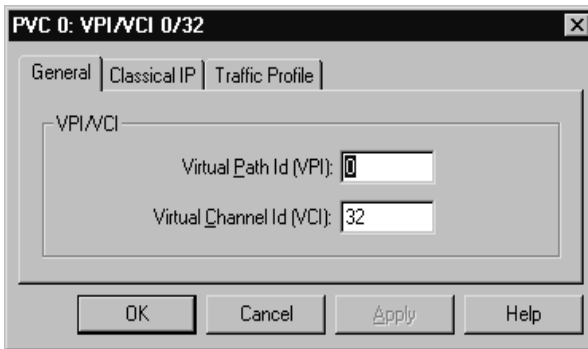


Figure 16. PVC Configuration



6. LANscout

With the LANscout management application you can - from a single workstation - get essential information about all Olicom adapters installed in Windows-based PCs in your network.

LANscout has two components: the LANscout Agent and the LANscout Manager.

The LANscout Agent must be installed on all managed Windows workstations and servers. It gathers extensive information about the adapter and driver.

The information gathered by the LANscout Agent can be viewed with the LANscout Manager from anywhere in the network. The LANscout Manager can automatically discover any LANscout Agents in the network and provide a list from which you can choose the device to monitor.

For the comprehensive NDIS 3 drivers, extensive ATM information can be accessed through LANscout, including:

- Event log information
A history of messages and warnings indicating whether any abnormal network events have occurred.
- A list of VCCs with associated statistics
- LE_ARP cache information (for LANE virtual adapters)

LANscout Manager includes extensive context-sensitive help which is displayed by pressing F1.

If the driver/adapter behaves unexpectedly, always check the event log in the LANscout Manager. When reporting problems to Olicom Technical Support, always include a LANscout report, which is generated by pressing F3.

A subset of the information gathered by the LANscout Agent from the ATM driver can also be accessed with a Web-browser from anywhere in the network.

6.1 System Requirements

Microsoft Windows 95 or Windows NT.

6.2 Installing LANscout

LANscout can be installed from the Olicom CD-ROM.

1. Insert the Olicom CD-ROM. If the autorun feature is enabled for your CD-ROM drive, a menu will popup. If not, run SETUP.EXE from the Olicom CD-ROM (D:\SETUP.EXE)
2. Select “Launch the setup program” and follow the instructions to install LANscout.
The installation process will create a new program group called “Olicom Applications” in which the LANscout icons are located.

See chapter 1 for details about the Olicom CD-ROM.

6.3 Starting LANscout Manager

The LANscout Agent will be started each time you boot and immediately after installation.

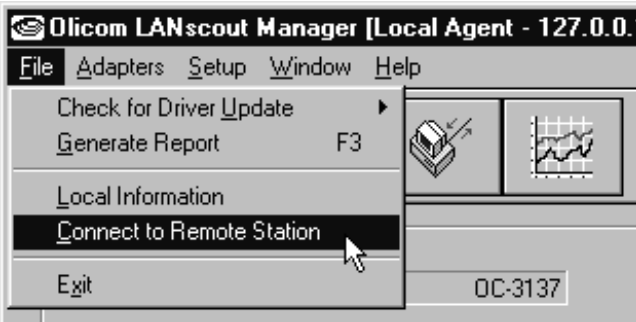
When running, the LANscout Agent program is visible as an icon in the “System Tray” (the small area in your task bar, where the clock is normally displayed).

The LANscout Manager is launched either by double-clicking the icon or by selecting it from the popup menu activated by right-clicking the icon.

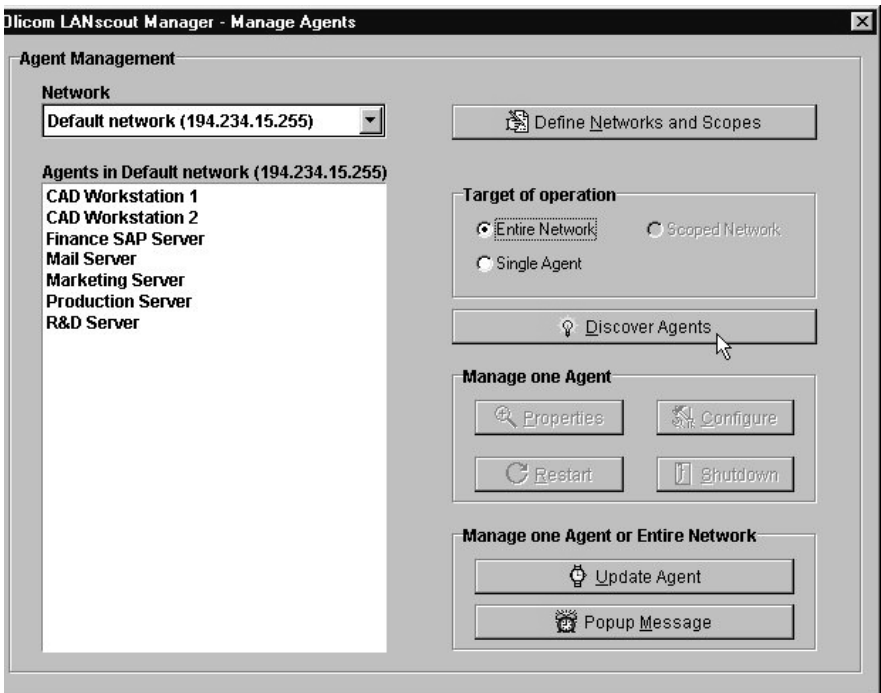
If the LANscout agent is not running, start the LANscout Manager by selecting “Start”, “Programs”, “Olicom Applications”.

6.4 Using LANscout Manager

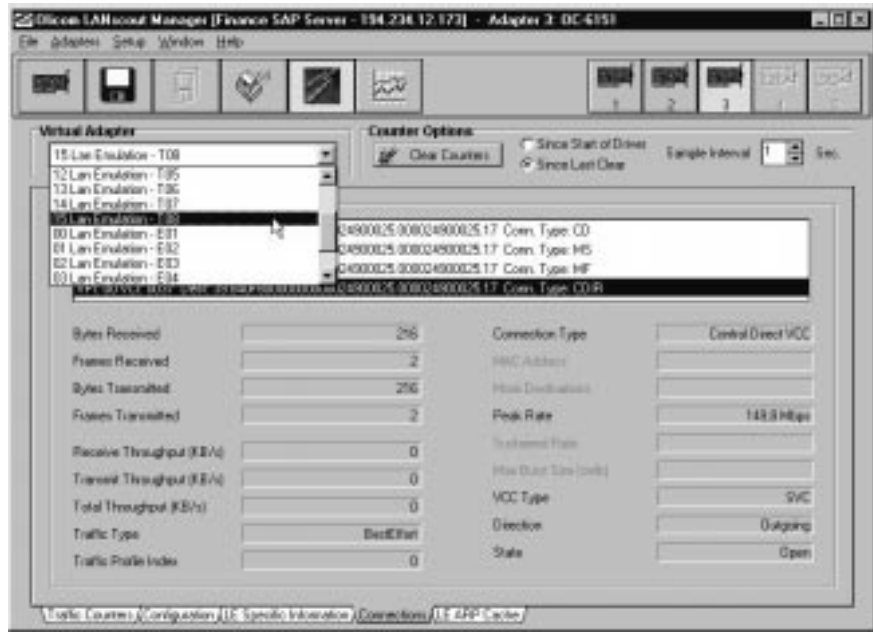
When LANscout Manager is started, it will show information about the Olicom adapters installed in the local PC. To monitor a remote PC, choose “File” and “Connect to Remote Station”.



The remote station to monitor must then be chosen. Initially the list of remote stations is empty, but when you click on “Discover Agents”, LANscout Manager will search for any LANscout agents on the specified network. After having completed the search, LANscout Manager will show the available LANscout Agents to monitor.



When you click on the ATM button in the toolbar, ATM specific information can be monitored. In the example below, virtual adapter number 15 is selected and the VCCs for this virtual adapter monitored



LANscout has a number of other facilities. Please refer to the built-in help for details.



7. RapidMon for NetWare

In NetWare environments information about the adapter and the driver can be monitored with RapidMon.

The RapidMon NetWare Loadable Module displays information about physical adapters, event log, LAN Emulation, RFC 1483 and Classical IP configuration and statistics. Connections and destinations can be displayed as well.

An ASCII report file can be generated containing all information mentioned above.

The module, which is self-contained, is installed with the driver during the driver installation process. You can also install the module manually by copying the RAPIDMON.NLM file to the NetWare server \SYSTEM directory.

The RapidMon program is started by entering the command `LOAD RAPIDMON` at the server console. The program requires that the `OCAIPODI.LAN` driver has already been loaded. The primary screen displays virtual adapters menu. This menu contains for example entries for report generation and event log viewing. Select a virtual adapter to display its details, including the information about its corresponding physical adapter.



8. Troubleshooting and Diagnostics

The following sections can help you troubleshoot problems with getting your ATM adapter hardware working properly.

Troubleshooting is also provided for the comprehensive drivers which include Olicom's comprehensive set of ATM protocols (LAN Emulation, Classical IP and RFC 1483).

8.1 Troubleshooting

8.1.1 General Troubleshooting

In case of problems in getting your ATM adapter and your ATM driver working properly, the following steps may be helpful:

1. Check the diagnostic LEDs on the adapters metal bracket.
 - 1.1. If neither of the two LEDs is on, the driver has probably not been loaded by the operating system:
 - 1.1.1. Check the operating system's event log
 - 1.1.2. Check the status of the driver using LANscout (Windows NT and Windows 95), RapidMon (Novell NetWare) or the message log in the \IBMCOM\LANTRAN.LOG file (OS/2 server).
 - 1.2. If the yellow LED is on:

there is a problem with the connection to the ATM switch. Check the cable. If it is a fiber cable, try swapping the two fiber connectors or the ATM adapter and the switch use different framing mode (the ATM adapter defaults to SONET, but SDH can be configured in RapidConfig).
 - 1.3. Green LED informs that no problems were encountered on this level. The clock is synchronized on the receive path.
2. Check the status of the driver using LANscout (Windows NT and Windows 95) or RapidMon (Novell NetWare). The following section below describes what you should check in the LANscout or the RapidMon for the various types of Virtual Adapters.
For OS/2 check the message log in:
 \IBMCOM\LANTRAN.LOG.
 All messages from the driver and suggested actions are listed in appendix B .
3. In case of problems with the ATM adapter hardware, check it with the hardware diagnostic program, see section 8.2.
4. See appendix B, *Error Messages*.

8.1.2 Troubleshooting LAN Emulation

1. Start LANscout/RapidMon (see chapter 6 or chapter 7).
If LANscout/RapidMon cannot find the adapter, the driver has not been loaded properly. Check the event log of the operating system.
2. To troubleshoot with LANscout, check the symbols for the physical adapters in the upper right corner of the LANscout Window.
 - A red cross indicates problems in connecting the adapter to the switch (typically the yellow LED on the adapter's metal bracket will be on).
Check the connection to the switch.
 - A yellow cross indicates that one or more virtual adapter(s) on the physical adapter have been unable to join the ELAN.
Check the Event Log in LANscout.
3. To troubleshoot with RapidMon, check the status of the virtual adapter(s). Select the "Adapter", "Virtual Adapter", "Configuration" and "Statistics" menu and check the "Status" field. The status must be "Open" for a virtual adapter, which has joined the ELAN successfully (use online help to get an explanation of the different Status values).
If one or more virtual adapters have not joined the ELAN successfully, check the Event Log in RapidMon.
4. Check the Event Log.
The event log in the LANscout/RapidMon contains a number of messages from the driver. All the messages are numbered and a detailed description of each message is available in appendix B. When using LANscout you can also display the help text in the box below the event log by clicking on the message. Most messages in the event log are preceded by two numbers, separated by a slash ("/"). The first number is the number of the physical adapter, the second number is the number of the virtual adapter, to which the message relates. For example, "1/00" means that the physical adapter number is 1 and the virtual adapter number is 0.
The messages in the event log are divided into three categories: "Informational", "Warning" and "Error". The category is indicated by a "I", "W" or "E" appended to the message number.
5. All virtual adapters have joined, but connectivity problems remain.
Check in the LANscout/RapidMon that the virtual adapters have joined the correct ELANs (correct name).

8.1.3 Troubleshooting Classical IP

1. Start the LANscout or the RapidMon (see chapter 6 or chapter 7).
If the LANscout/RapidMon cannot find the adapter, the driver has not been loaded properly. Check the event log of the operating system.
2. To troubleshoot the LANscout/RapidMon, check the status of the virtual adapter(s)
 - check the “Status” field for the virtual adapter(s). The status must be “Open” for a virtual adapter, which has connected to the ATM ARP successfully or which is only configured for PVC operation (no ATM ARP in use). The online help provides explanation of the different status values.
 - if one or more virtual adapters have not connected to the ATM ARP successfully, check the Event Log in LANscout/RapidMon.
3. Check the Event Log.
The event log in the LANscout/RapidMon contains a number of messages from the driver. All the messages are numbered and help for each message is available in appendix B. To use message-specific online help for LANscout click on a message to display help window.
Most messages in the event log are preceded by two numbers, separated by a slash (“/”). The first number is the number of the physical adapter, the second number is the number of the virtual adapter, to which the message relates. For example, “1/00” means that the physical adapter number is 1 and the virtual adapter number is 0.
The messages in the event log are divided into three categories: “Informational”, “Warning” and “Error”. The category is indicated by an “I”, “W” or “E” appended to the number of the message.
4. All virtual adapters have connected to an ATM ARP, but connectivity problems remain.
Check in the LANscout/RapidMon whether all the Classical IP clients within the same IP subnet are configured to use the same ATM ARP server.
5. A PC without more than one virtual adapter (for example, running both LAN Emulation and Classical IP) cannot ping another Classical IP client.
Make sure the IP addresses bound to the virtual adapters on the PC does not belong to the same IP subnet. Otherwise IP traffic might be directed to the wrong virtual adapter.
6. A Classical IP client does not respond to the pings.
Check whether the Classical IP client is registered in the ATM ARP cache. If not, try to ping from the Classical IP client in question to another Classical IP client and check if it gets registered with the ATM ARP.
When it gets registered, it should now be possible to ping the Classical IP client in question from another Classical IP client.

8.1.4 Troubleshooting RFC 1483

1. Start LANscout/RapidMon (see chapter 6 or chapter 7).
If the LANscout/RapidMon cannot find the adapter, the driver has not been loaded properly. Check the event log of the operating system.
2. To troubleshoot the LANscout/RapidMon, check the status of the virtual adapter(s).
Check the “Status” field of the virtual adapter(s). The status must be “Open” for a virtual adapter, which has initialized successfully. The online help provides explanation of the different status values.
If one or more virtual adapters have not initialized successfully, check the Event Log in the LANscout/RapidMon.
3. Check the Event Log.
The event log in the LANscout/RapidMon contains a number of messages from the driver. All messages are numbered and help for each message is available in appendix B. To use message-specific online help for LANscout click on a message to display help window.
Most messages in the event log are preceded by two numbers, separated by a slash (“/”). The first number is the number of the physical adapter, the second number is the number of the virtual adapter, to which the message relates. For example, “1/00” means that the physical adapter number is 1 and the virtual adapter number is 0.
The messages in the event log are divided into three categories: “Informational”, “Warning” and “Error”. The category is indicated by an “I”, “W” or “E” appended to the number of the message.
4. All Virtual Adapters seem to be correctly configured, but connectivity problems remain.
Use LANscout/RapidMon to make sure that each virtual adapter has only one correctly configured and functioning PVC. PVCs are shown under “Connections” for a given virtual adapter.
If running back-to-back, check that one of the workstation has MasterTiming configured using the RapidConfig/ATM.
If using a switch, check that the PVC for each adapter is correctly configured in the switch.

8.1.5 Troubleshooting WinSock 2

1. Start LANscout (see chapter 6).
LANscout cannot find the adapter, the driver has not been loaded properly.
Check the event log of the operating system.
2. To troubleshoot the LANscout, check the status of the virtual adapter(s).
The status must be “Open” for a virtual adapter, which has initialized successfully. The online help provides explanation of the different status values.
If one or more virtual adapters have not initialized successfully, check the Event Log in the LANscout.
3. Check the Event Log.
The event log in the LANscout contains a number of messages from the driver. All messages are numbered and help for each message is available in appendix B. To use message-specific online help for LANscout click on a message to display help window.
Most messages in the event log are preceded by two numbers, separated by a slash (“/”). The first number is the number of the physical adapter, the second number is the number of the virtual adapter, to which the message relates. For example, “1/00” means that the physical adapter number is 1 and the virtual adapter number is 0.
The messages in the event log are divided into three categories: “Informational”, “Warning” and “Error”. The category is indicated by an “I”, “W” or “E” appended to the number of the message.
4. All virtual adapters have initialized, but problems remain.
Make sure that the WinSock 2 protocol is correctly installed and bound to the WinSock 2 Virtual Adapter.
Make sure that no other protocols are bound to the WinSock 2 Virtual Adapter.
Make sure that the ATM Service Provider is correctly installed (see section 4.7 and section 4.8).

8.1.6 Novell NetWare Specific Troubleshooting

Below you find a list of problems and corresponding solutions specific to the Novell NetWare driver.

- “Spurious hardware interrupt XX detected”
You may see “Spurious hardware interrupt XX detected” being reported on the console of the NetWare server. These messages are harmless and can be disabled by the command:

SET DISPLAY SPURIOUS INTERRUPT ALERTS=OFF

- “Primary interrupt controller detected a lost hardware interrupt”
You may see “Primary interrupt controller detected a lost hardware interrupt” being reported on the console of the Netware server. These messages are harmless and can be disabled by the command:

SET DISPLAY LOST INTERRUPT ALERTS=OFF

- Using secondary PCI bus under NetWare 3.12.

For PCs with multiple PCI buses (that is, more than 3 PCI slots), installing the ATM adapter in a slot in the secondary PCI bus and then specifying the slot number on the command line when loading the driver will not work. Leaving the slot number unspecified on the command-line and choosing the slot number from the list instead (as shown by NetWare) works correctly, but is not feasible for loading through AUTOEXEC.NCF.

An easy work-around for the problem is to move the adapter to a PCI slot in the primary PCI bus. The problem does not occur in NetWare version 4.10 and later.

8.2 Diagnostics Program - Hardware

Run the diagnostics if you suspect malfunctioning of the adapter. The Olicom CD-ROM contains the DOS diagnostics DIAG615X.EXE program and the DOS4GW.EXE program (used to run DIAG615X in 32-bit flat memory, model mode).

When the hardware diagnostics program is used, only one 615x ATM PCI Adapter can be installed in the PC. The program will not work correctly if two or more adapters are installed.

Activation

1. Select or create a directory on a hard disk and make it the current directory.
2. Insert the Olicom CD-ROM and type the following command to copy the files DIAG615X.EXE and DOS4GW.EXE:

```
COPY D:\DIAG615X.EXE
COPY D:\DOS4GW.EXE
```

3. Activate the program from DOS by typing:

```
DIAG615X
```



Note: DIAG615x must be invoked from DOS, but *not* from a DOS box under Windows.

The PC must be configured to run without memory managers like HIMEM.SYS, QEMM or EMM386. You should use a color monitor.

Test Modes

The diag program will use the PC display to show the status and will also write to the DIAG.LOG file to record progress and additional details. See appendix C, *Error Messages* for a list of messages and suggested actions.

Start the diagnostic test by running DIAG615X, all options disabled.

The program performs the following tests:

- Locates the adapter on the PCI bus.
- Tests the EEPROM.
- Tests the 512 KB shared memory.
- Tests DMA transfers to and from the adapter.
- Performs two internal loopback tests - numbered 2 and 3 - each in turn involving more of the adapters hardware.
See the pin connections for a UTP loop-back connector in figure 17 on the following page.

Pin# Connection

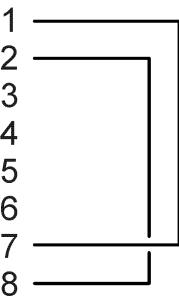


Figure 17. Loop-back Pin Connections

Example

DIAG.LOG log file content for the adapter that passed all tests.

```

Adapter found, Irq 3  Shared Mem Addr 41000000/
Port Mem Addr 41080000
Found 1 board(s)
Starting test for adapter 0
Shared RAM size 510 KBytes
Memory test Passed
DMA test Passed
Traffic params : Peakrate = 235849 Sustrate = 235849/
(bw = 100, util = 1/1)
Product:OC-6152 Ver.01 ECO 0 Serial 01002 Date:22/02/97
Mac addr: 00:00:83:00:10:02
ALC version 3
NTC version 2
Press any key to continue with loop level 2 (Q to
abort)..
Press any key to continue with loop level 3 (Q to
abort)..
Loopback tests passed
Last xmit complete status : 0000
Last recv complete status : 0000
Number of total xmits :      3
Number of total recvs :      3
Last recv frame length :    240
Number of bad xmits :        0
Number of bad recvs :        0
Number of interrupts :      6 (0010)
ALC only interrupts:         0
NTC only interrupts:         0
Receive status statistics:
NORMAL receives:             3
OVERFLOW receives:           0
MAXLEN receives:             0
CRCERR receives:             0
FRAME SHORT receives:        0
UNKNOWN VC receives:         0
ADP: CLOSED receives:        0
Transmit status statistics:
NORMAL transmits:            3
DISCARDS transmits:          0
ERROR transmits:             0
Test done

```

If none of the tests failed, and you still suspect adapter malfunction, run the program with the advanced options. See the section below.

Advanced Test Mode Options

The ATM diagnostics program has five test modes.

- Continuous memory test mode
- Continuous DMA test mode
- Single station test mode (fiber loop back) - default mode
- Continuous receive mode
- Continuous transmit and receive mode

Each of these modes is described in the sections that follow. The mode is selected by command line options as shown below.

Continuous Memory Test Mode

Initiated by a command line: `diag615x -m`

The diag program will test shared memory on the adapter. For each iteration the program displays a period (.) for a successful pass, and a plus (+) for an unsuccessful pass. Details about the failures can be found in the log file.

Continuous DMA Test Mode

Initiated by a command line: `diag615x -d`

The diag program will test the master mode DMA transfer on the adapter. For each iteration the program displays a period (.) for a successful pass, and a plus (+) for an unsuccessful pass. Details about the failures can be found in the log file.

Single Station Test Mode

Initiated by a command line: `diag615x -B`

The test is assumed to be run on the adapter with a physical loop back cable connecting the TX output of the board to the RX input. This test will initialize the adapter, test shared memory and DMA transfer, and then try to transmit a frame and receive it with different modes of loop back enabled.

The loop back points are:

- ATM layer loop back
- Transmission frame loop back
- External loop back (using a loop back fiber cable)

Continuous Receive Test Mode

Initiated by a command line: `diag615x -dr`

The test mode is assumed to be used in conjunction with another test PC running the “Continuous transmit and Receive” test mode. The PCs must be connected to a switch, and this switch must have a VCI set up to match either the default VCI of 37, or one specified by the ‘-v’ option to the `diag615x.exe` command line (see command line parameters on the following page). The VPI is always set to 0 for diagnostics.

The test will initialize the adapter, and set up a number of receive buffers.

Any received frames will be checked for the expected length, and the data will be checked for a specific pattern. The frame length can be controlled with the “-l” option, and the pattern check can be disabled with the “-C” parameter.

In this test the display will be updated each second, with throughput numbers calculated for the past 1 second.

Continuous Transmit and Receive Test Mode

Initiated by a command line: `diag615x -dt`

The test is assumed to be run in the same set-up as in Continuous Receive Test Mode with the other computer running (see above). The “-l” option controls the frame length of the frames sent, and the “-b” option controls the bandwidth reserved for the transmission rate.

In this test the display is updated every second, with throughput numbers calculated for the past one second.

Advanced Command Line Options Guide

This section lists all command line options and their usage. All figures specified in the command line are decimal.

► **Note:** The use of capital letters for the command line options is significant.

Command format (contained on *one* line):

```
DIAG615X.EXE [-qCBdmrt] [-dt | -dr] [-n<framecount>]
               [-l<length>] [-v<vci>] [-b<bandwidth>] [-u<util>]
```

with the following optional parameters:

- q Quit if the test fails
- C Disable comparison frames
- B Enable the external loop back. Normally the adapter uses the recovered network clock as the transmit clock (loop timing). For loop back testing it uses the internal clock.
- d Continuous DMA test
- m Continuous memory test
- r Repeat transmit/receive indefinitely
- t Use time-out on transmit/receive
- dr Direct (continuous) receive
- dt Direct (continuous) transmit and receive
- n<framecount> Specify the frame count for each test
- l<length> Use/expect frames of length bytes (<9188, default 240)
- v<vci> Use specified VCI (>32, default 37), VPI is set to 0
- b<bandwidth> Use the specified bandwidth in Mbps (>0, <=135, default 100)
- u<util> Set the average utilization share, 1/n (n=1,2,4,8, default 1)

► **Note:** The command line options can also be entered one by one. See the example below.

Example:

```
DIAG615X -q -d -t -b50
```



9. Getting in Touch with Technical Support

If support is not provided by your organization or the local vendor, you can at any time relay information to or contact Olicom Technical Support via one of the listed services. In addition, e-mail, FTP or WWW provide up-to-date software updates, application notes, quick fixes and various utilities which may solve your problem.

Before You Contact Olicom Technical Support

- Create a report from LANscout or RapidMon. ☐
- Run the adapter diagnostics and write down the message(s) ☐
- Simplify the environment by removing memory managers, etc. ☐
- Change the configuration if you suspect a resource conflict ☐
- Remove other devices one by one to detect a possible conflict ☐
- Fill in as much as possible in the included Problem Report Form ☐

Hotline Support

Call the following numbers for help with *any* problem you may encounter when installing Olicom software and hardware products:

- Europe:** (+45) 4527 0102 (Denmark, Monday to Friday, 8 am to 6 pm GMT + 1)
 (+48) 39 125 071 (Poland, Monday to Friday, 8 am to 6 pm GMT + 1)
 (+44) 1494 556 611 (UK, Monday to Friday, 9 am to 6 pm GMT)
 0 800 919 508 (inside the UK, Monday to Friday, 9 am to 6 pm GMT)
- USA:** (+1) 1-800-OLICOM-1 (24 hours a day, 7 days a week)
 (+1) 972 516 4638 (24 hours a day, 7 days a week)

Fax Support

For assistance with any problem you may encounter when installing Olicom software and hardware products, Olicom's Support department will reply either by fax or by telephone within 24 hours, Monday to Friday. Use one of the following fax numbers:

- Europe:** (+45) 4527 0240 (Denmark)
 (+48) 58 346 1238 (Poland)
 (+44) 1494 556 616 (UK)
- USA:** (+1) 972 671 7524

Bulletin Board Service

All Olicom's support services are available via our BBS: software updates, application notes, quick fixes, various utilities, etc. The Bulletin Board Service (BBS) can be contacted using either a standard modem or an ISDN modem.

Standard Modem Requirements

Modem speed: 2400, 4800, 7200, 9600, 12000, 14400, 28800 bps
Modem standard: CCITT V21/V22/V22bis/V32/V34/V42bis/HST/MNP5
Parity: N (none)
Databits: 8
Stop bits: 1
Transfer protocols: Xmodem, Ymodem, Zmodem, Kermit and Sealink.

Use one of the following numbers:

Europe: (+45) 45 27 01 00 (and create your own account)

USA: (+1) 972 422 9835

ISDN Modem

Use the following number:

Europe: (+45) 45 96 32 48 (Denmark)

Internet E-Mail

Olicom customer support is available on e-mail through Internet. Use one of the following e-mail addresses:

Europe: support@olicom.dk

USA: support@olicom.com

Anonymous Internet FTP Server

All Olicom's support services can be obtained from our anonymous FTP server: software updates, application notes, quick fixes, etc. To connect, open an FTP session to:

Europe: ftp.olicom.dk

USA: ftp.olicom.com

Internet World Wide Web Server (WWW)

The Olicom WWW server contains up-to-date information about Olicom products, newsletters and press releases. It also contains addresses of all Olicom offices and support centers worldwide. Our software library contains the latest driver and software revisions. The WWW server can be accessed using the following web addresses:

Europe: <http://www.olicom.dk>

USA: <http://www.olicom.com>

Olicom Support WEB

The Olicom Support WEB contains technical support hints, a problem report form, drivers and software updates.

Europe: <http://www.olicom.dk>

USA: <http://www.olicom.com>

Select “SERVICES & SUPPORT” from the main menu to access the area with technical support hints and problem report form registration.

Select “SOFTWARE” from the main menu to access the software library.

[illegible]

| Adapter Information | | |
|--|--|--|
| Adapter type | | |
| ECO level/serial no. | | |
| Driver Information | | |
| Driver type (Win95, WinNT, Novell server, OS/2) | | |
| Driver version (see hints below) | | |
| Operating system/version | | |
| PC Information | | |
| PC type/vendor/model | | |
| Processor | | |
| Memory | | |
| Additional PCI boards | | |
| BIOS version | | |
| ATM Switch/LES Configuration | | |
| Type of LAN Emulation Services (Olicom or other) | | |
| Type of ATM switch (brand/product name) | | |
| Version of ATM switch software | | |
| Log Information | | |
| <p>Exact contents of the ATM driver log of the relevant operating system.</p> <p>Reports from LANscout or RapidMon.</p> <p>Windows 95 and Windows NT: AIW report. Press F3 in AIW to generate the report.</p> <p>NetWare: The log in RapidMon.</p> | | |
| Print out and attach these configuration files: | | |
| OC-615X.CFG - for all emulation clients and servers | | |
| AUTOEXEC.NCF - for NetWare servers | | |
| STARTUP.NCF - for NetWare servers | | |

For Windows 95: Use Windows Explorer "Properties" function on driver file.
 For Windows NT: Use Windows Explorer "Properties" function on driver file.
 For NetWare server: Use "Monitor LAN/WAN Statistics" function.

Name: _____ Company: _____

Address: _____ Country: _____

Telephone/FAX: _____

E-mail address: _____

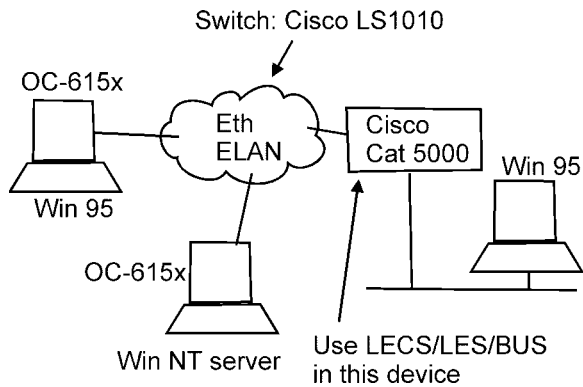


Figure 18. Example Drawing of a Configuration



Appendix A. Abbreviations

| | |
|-----------------|--|
| AAL | ATM Adaptation Layer |
| ARP | Address Resolution Protocol |
| ATM | Asynchronous Transfer Mode |
| BUS | Broadcast and Unknown Server |
| CD-VCC | Control Distribute VCC |
| CDIR-VCC | Control Direct VCC |
| DD-VCC | Data Direct VCC |
| ELAN | Emulated LAN |
| ESI | End System Identifier |
| FCS | Frame Check Sequence |
| HEC | Header Error Control |
| ILMI | Interim Local Management Interface |
| IP | Internet Protocol |
| IPX | Integrated Packet Exchange |
| LANE | LAN Emulation |
| LEC | LAN Emulation Client |
| LECS | LAN Emulation Configuration Server |
| LME | Layer Management Entity |
| LES | LAN Emulation Services or LAN Emulation Server |
| LLC | Logical Link Control |
| MACIF | MAC Interface |
| MF-VCC | Multicast Forward VCC |
| MS-VCC | Multicast Send VCC |
| MTU | Maximum Transmission Unit |
| NDIS | Network Driver Interface Specification |
| OC-n | Optical Carrier level n |
| PCI | Peripheral Component Interconnect |
| PVC | Permanent Virtual Circuit |

| | |
|--------------|---|
| QoS | Quality of Service |
| RFC | Request for Comments |
| SDH | Synchronous Digital Hierarchy |
| SDU | Service Data Unit |
| STS-n | Synchronous Transport Signal level n, electrical equivalent of OC-n |
| SONET | Synchronous Optical Network |
| SSCOP | Service Specific Connection Oriented Protocol |
| SVC | Switched Virtual Circuit |
| TLV | Type/Length/Value |
| UNI | User Network Interface |
| VCI | Virtual Channel Identifier |
| VPI | Virtual Path Identifier |
| VCC | Virtual Channel Connection |



Appendix B. Error Messages

This appendix lists all driver messages as listed by message number (the 4 digit hexadecimal number). A short explanation is given for each message.

By default the messages are send both to the operating system (for example, Windows NT event log) and to LANscout. You can disable sending the error messages to the operating system using RapidConfig. To do so, enable “Advanced” view, double-click on “OC615x.CFG” node and choose “Message Logging”.

Most error messages have “x/yy” attached:

- “x” is the physical adapter number and indicates to which physical adapter the event relates. The numbering is 1, 2, 3, ...
- “yy” is the Virtual Adapter number and indicates to which Virtual Adapter the event relates. The numbering is 0, 1, 2, ...

B.1 LAN Emulation Client Messages and Common Messages

0001 x/yy Lan Emulation Server join timeout - Retrying!

The LAN Emulation Server did not answer the JOIN request.

This message is only a warning. The LAN Emulation Client will retry the JOIN request. If all JOIN request retries fail, the LAN Emulation Client will report error 0002.

0002 x/yy Lan Emulation Server join timeout - Retry exhausted!

The LAN Emulation Server did not answer any JOIN requests.

Action: Check the LAN Emulation Server configuration.

0003 x/yy Lan Emulation Server reports frame size mismatch!

The maximum frame size reported by the LAN Emulation Server in a JOIN response does not match the maximum frame size used by the LAN Emulation Client.

Action: Correct configuration of MaxDataFrameSize.

0004 x/yy Lan Emulation Server join failed Code: <xxx>

The LAN Emulation Server responded to the JOIN request with an error code.

The following error codes are defined:

1. Invalid Version.
2. Invalid Parameters.
4. Duplicate LAN Address.
5. Duplicate ATM Address.
6. No Resources.
7. Access Denied.
8. Invalid LEC ID.
9. Invalid LAN Destination.
10. Invalid ATM Address.
20. No Configuration.
21. LECsError.
22. Insufficient Information.

Action: Depending on the error code.

0005 x/yy Lan Emulation Server joined successfully!

Informational message: The LAN Emulation Client has joined the LES successfully.

0006 x/yy Lan Emulation Server connection failed.

The connection between the LAN Emulation Client and the LAN Emulation Server has been lost.
Action: Check whether the LES is running and if the cable is connected to the switch.

0007 x/yy Lan Emulation Server BUS ARP failed. <xx>

The LAN Emulation Client got a wrong response from the Broadcast and Unknown Server (BUS).
Action: Check the BUS setup.

0008 x/yy Lan Emulation Config Server connection setup failed Code <xx>.

Failure connecting to the LAN Emulation Configuration Server.
 See also the error codes for 0004.
Action: Check the LAN Emulation Configuration Server configuration.

0009 x/yy Lan Emulation Config Server timeout - Retry exhausted.

The LAN Emulation Configuration Server did not answer any of the CONFIG requests.
Action: Check the LAN Emulation Configuration Server configuration.

000A x/yy Lan Emulation Config Server timeout - Retrying.

The LAN Emulation Configuration Server did not answer the CONFIG request.
 This message is only a warning. The LAN Emulation Client will retry the CONFIG request. If all CONFIG request retries fail, the LAN Emulation Client will report error 0009.

000B x/yy Lan Emulation Config Server failed Code: <xx>

The LAN Emulation Configuration Server responded to the CONFIG request with an error code. See description of message 0004 for details on the error codes.
Action: Depending on the error code.

000C x/yy Lan Emulation Config Server reports frame size mismatch!

The maximum frame size reported by the LAN Emulation Configuration Server in a CONFIG response does not match the maximum frame size used by the LAN Emulation Client.
Action: Correct the configuration.

000D x/yy Lan Emulation Server Mf Vcc timeout!

The LAN Emulation Broadcast and Unknown Server (BUS) has not established a connection to the LAN Emulation Client within the number of seconds specified by the JoinTimeout value in the configuration file (the JoinTimeout default value is 5 seconds).
Action: Check the configuration of the BUS and/or increase the JoinTimeout value in the configuration file.

000F x/yy Lan Emulation Config Value out of range, TLV- type: <xx>, Value: <xxxx>

The TLV (Type Length Value) encoded parameter from the LAN Emulation Configuration Server (LECS) was either not supported or not within the range supported by the LAN Emulation Client. TLV encoded configuration parameters can be sent from the LECS to the LAN Emulation Client to configure various LAN Emulation Client parameters.

The TLV-types supported by the LAN Emulation Client are:

1. JoinTimeout
2. MaxUnknownFrameCount
3. MaxUnknownFrameTime
4. VccTimeoutPeriod
5. MaxArpRetryCount
6. AgingTime
7. ForwardDelayTime
8. ArpResponseTime
9. FlushTimeout
- C. MsVccType
- D. MsVccAvgRate
- E. MsVccPeakRate

Action: Correct configuration of LECS.

0010 x/yy LECS Address: <xxxxxxxxxxxxxxxxxxxxxxxx-xxxxxxxxxx-xx>

Informational message: The ATM address of the LECS for which the LAN Emulation Client has successfully established a connection (when LECS is used).

0011 x/yy Lan Emulation Config Failed opening PVC to LECS, cc: <xx>

The LAN Emulation Client failed to opening the PVC to LECS.

Action: Check the configuration.

001B x/yy LES Address: <xxxxxxxxxxxxxxxxxxxxxxxx-xxxxxxxxxx>

Informational message: The ATM address of the LES for which the LAN Emulation Client successfully has established a connection.

0020 x/yy Client joined other ELAN than active client

The message is ClearServer/ATM-specific. It indicates that the clients on the different physical adapters have not joined the same ELAN, and that the ATM network has been split.

Action: Investigate potential problems between the ATM switches.

0022 x/yy Failed allocating resource for <LAN destination>

The message indicates that the driver could not allocate a resource for a MAC address (or source-route address) and therefore had to drop frames to that LAN destination.

Action: Increase the parameter "LANE MAC Address Cache Size" in RapidConfig.

0201 x/yy Outg. call failed: <Called ATM address> <Failure code>

An outgoing call setup has failed, with a completion code, and possibly also a cause code. The following completion codes may be returned:

- 0F Timeout
- 43 Out of local signaling resources.
- 45 Call setup aborted by local user.
- 46 Call setup cleared by network or remote user.
- 47 Link is not active (being started).
- 49 Call failed because protocol is being reset (by user).
- 4A Link failure (during call setup).
- 4B Remote user signaling state mismatch.
- 4C Received message from remote user with protocol error.
- 4D Temporary out of local signaling resources.
- 4E Remote user does not understand out call setup parameters.

The cause code is only valid if a cause Information Element (IE) has been received from the network. If no IE cause was received, a zero cause code is shown. The cause code is defined by the relevant UNI implementation agreement (see the tables below).

Action: Depending on the error and cause codes.

0202 x/yy Virtual connection Bind failed Code: <xx>

The requested virtual connection on the adapter could not be established.

The following error codes are defined:

- 1. The VCI -VPI number is outside the range of the adapter. Change switch configuration.
- 4. All supported connections are in use. Change configuration in the configuration file.

0203 x/yy Virtual connection Parameters Unsupported Code: <xx>

The parameters received from the network for an incoming connection cannot be set in the adapter.

Action: Contact technical support.

0204 x/yy Outg. call rejected by remote party: <Called ATM address> <Location Code>:<Cause Code>

An outgoing call has been rejected by the called device. Location Code is always 0 (remote party).

The cause code indicates why the call was rejected:

UNI Cause Codes

- 1 Unallocated (unassigned) number
- 2 No route to specified transit network
- 3 No route to destination
- 4 VccTimeOut
- 10 VPCI/VCI unacceptable
- 13 MultiCastSend VccType
- 16 Normal call clearing
- 17 User busy
- 18 No user responding
- 21 Call rejected
- 22 Number changed
- 23 User rejects all calls with calling line identification restriction (CLIR)
- 27 Destination out of order
- 28 Invalid number format
- 30 Response to STATUS ENQUIRY
- 31 Normal, unspecified

| | |
|-----|---|
| 35 | Requested VPCI/VCI not available |
| 36 | VPCI/VCI assignment failure |
| 37 | User cell rate not available |
| 38 | Network out of order |
| 41 | Temporary failure |
| 43 | Access information discarded |
| 45 | No VPCI/VCI available |
| 47 | Resource unavailable, unspecified |
| 49 | Quality of Service unavailable |
| 51 | User cell rate not available |
| 57 | Bearer capability not authorized |
| 58 | Bearer capability not presently available |
| 63 | Service or option not available, unspecified |
| 65 | Bearer capability not implemented |
| 73 | Unsupported combination of traffic parameters |
| 78 | AAL parameters cannot be supported |
| 81 | Invalid call reference value |
| 82 | Identified channel does not exist |
| 88 | Incompatible destination |
| 89 | Invalid endpoint reference |
| 91 | Invalid transit network selection |
| 92 | Too many pending add parties requests |
| 93 | AAL parameters cannot be supported |
| 96 | Mandatory information element is missing |
| 97 | Message type non-existent or not implemented |
| 99 | Information element non-existent or not implemented |
| 100 | Invalid information element contents |
| 101 | Message not compatible with call state |
| 102 | Recovery on timer expiry |
| 104 | Incorrect message length |
| 111 | Protocol error, unspecified |

0205 x/yy Outg. call rejected by remote party: <Called ATM address> <Location Code>:<Cause Code>

An outgoing call has been rejected by the called device. Location Code is always 0 (remote party). Cause code is one of the following:

| | |
|----|---------------------|
| 21 | Call rejected |
| 31 | Normal, unspecified |

This message may occur under normal operation in a LAN Emulation network, in particular when the ATM NIC is operating in a network with ATM equipment from Cisco Systems (such as Catalyst 5000). To avoid filling up the event log in the operating system with this message you can disable it with RapidConfig.

0206 x/yy Outg. call rejected by network: <Called ATM address> <Location Code>:<Cause Code>

An outgoing call has been rejected by the network (that is, a switch in the network has rejected the call).

The location code is normally 1, but may also be one of the following:

| | |
|----|------------------------------|
| 1 | Local Private Network |
| 2 | Local Public Network |
| 3 | Transit Network |
| 4 | Remote Public Network |
| 5 | Remote Private Network |
| 7 | International Network |
| 10 | Beyond International Network |

The cause code indicates why the call was rejected:

UNI Cause Codes

| | |
|----|--|
| 1 | Unallocated (unassigned) number |
| 2 | No route to specified transit network |
| 3 | No route to destination |
| 4 | VccTimeOut |
| 10 | VPCI/VCI unacceptable |
| 13 | MultiCastSend VccType |
| 16 | Normal call clearing |
| 17 | User busy |
| 18 | No user responding |
| 21 | Call rejected |
| 22 | Number changed |
| 23 | User rejects all calls with calling line identification restriction (CLIR) |

| | |
|-----|---|
| 27 | Destination out of order |
| 28 | Invalid number format |
| 30 | Response to STATUS ENQUIRY |
| 31 | Normal, unspecified |
| 35 | Requested VPCI/VCI not available |
| 36 | VPCI/VCI assignment failure |
| 37 | User cell rate not available |
| 38 | Network out of order |
| 41 | Temporary failure |
| 43 | Access information discarded |
| 45 | No VPCI/VCI available |
| 47 | Resource unavailable, unspecified |
| 49 | Quality of Service unavailable |
| 51 | User cell rate not available |
| 57 | Bearer capability not authorized |
| 58 | Bearer capability not presently available |
| 63 | Service or option not available, unspecified |
| 65 | Bearer capability not implemented |
| 73 | Unsupported combination of traffic parameters |
| 78 | AAL parameters cannot be supported |
| 81 | Invalid call reference value |
| 82 | Identified channel does not exist |
| 88 | Incompatible destination |
| 89 | Invalid endpoint reference |
| 91 | Invalid transit network selection |
| 92 | Too many pending add parties requests |
| 93 | AAL parameters cannot be supported |
| 96 | Mandatory information element is missing |
| 97 | Message type non-existent or not implemented |
| 99 | Information element non-existent or not implemented |
| 100 | Invalid information element contents |
| 101 | Message not compatible with call state |
| 102 | Recovery on timer expiry |
| 104 | Incorrect message length |
| 111 | Protocol error, unspecified |

0301 x/yy The signaling control link is active

The signaling control link (via the SSCOP protocol) is now active, and the Signaling protocol is now able to communicate through the switch. If the signaling control link was previously lost or inactive, the signaling protocol will at this time check the state of all its active SVCs with its peer in the ATM switch. If the SVS states in both peers are not compatible, the SVC will be released by the Signaling protocol.

0302 x/yy The signaling control link is INACTIVE

The signaling control link (via the SSCOP protocol) is no longer active, and the Signaling protocol is no longer able to communicate through the switch. As a result, currently no more SVCs can be established. Additionally, the signaling protocol will release all SVCs currently under establishment. Note that all SVCs that are already fully established will not be released because of the inactive link - only if the link is not re-established within a timeout, will the active SVCs be released by the Signaling protocol. However, any "Data Direct" SVCs may be cleared by the LAN Emulation protocol due to inactivity, assuming that data traffic has also ceased.

The inactive signaling control link may be caused by the ATM switch restarting (or failing), the ATM switch being overloaded, or by a poor physical (cable) connection.

Action: Check the ATM switch - if it has failed, then restart it - if it is overloaded, then take steps to reduce its load. Check the physical (cable) connection and fix any problems.

0401 x/yy SSCOP: Receipt of unsolicited or inappropriate PDU-<PDU Type>

A PDU of type <PDU Type> has been received, which is not expected in the current protocol context. The <PDU Type> may be one of the following:

SD PDU
BGN PDU
BGAK PDU
BGREJ PDU
END PDU
ENDAK PDU
POLL PDU
STAT PDU
USTAT PDU
RS PDU
RSAK PDU
ER PDU (not if UNI 3.0)
ERAK PDU (not if UNI 3.0)

Action: Ensure proper physical connection and/or correct the configuration so that the UniVersion matches the one supported by the ATM switch.

0402 x/yy SSCOP: VT(CC) >= MaxCC - Unsuccessful command retransmission

Maximum number of control command PDU retransmissions have been performed, but without success.
The control command PDU is one of the following:

BGN
END
RS

ER (not if UNI 3.0)

Action: Ensure proper physical connection and/or correct the configuration so that the UniVersion matches the one supported by the ATM switch. The problem may also be caused by the switch being in an inoperational state (for example, due to it restarting).

0403 x/yy SSCOP: Timer_NO_RESPONSE expiry - No response to POLLs

During the time period defined by Timer_NO_RESPONSE, no response to any of the sent POLL PDUs was received.

Action: Ensure proper physical connection. The problem may also be caused by the switch being in an inoperational state (for example, due to it restarting).

0404 x/yy SSCOP: SD PDUs lost - N(S) error in SD or POLL PDU

A SD or POLL PDU has been received containing an unexpected value in the N(S) field. This indicates that SD PDUs must have been lost. Link recovery is performed and Signaling protocol is notified.

Action: Ensure proper physical connection.

0405 x/yy SSCOP: STAT PDU - N(PS) error

A STAT PDU has been received, containing an unexpected value in the N(PS) field. Link recovery is performed and Signaling protocol is notified.

Action: Ensure proper physical connection.

0406 x/yy SSCOP: STAT PDU - N(R) or list elements error

A STAT PDU has been received, containing either an unexpected value in the N(R) field, or an error in list elements. Link recovery is performed and Signaling protocol is notified.

Action: Ensure proper physical connection.

0407 x/yy SSCOP: USTAT PDU - N(R) or list elements error

A USTAT PDU has been received, containing either an unexpected value in the N(R) field, or an error in list elements. Link recovery is being performed and Signaling protocol is notified.

Action: Ensure proper physical connection.

0408 x/yy SSCOP: PDU length violation

A PDU with a length invalid for that PDU type has been received. The PDU has been discarded.

Action: Ensure proper physical connection and/or correct the configuration so that the UniVersion matches the one supported by the ATM switch..

0409 x/yy SSCOP: <count> SD PDUs being retransmitted

The indicated number of SD PDUs are being retransmitted due to request in a STAT or USTAT PDU sent by the ATM switch.

Action: In case of excessive retransmissions check the physical connection.

040A x/yy SSCOP: Credit condition - Lack of credit

SSCOP is currently blocked from transmitting any more SD PDUs, due to lack of "credit", that is, the top of the transmit window has been reached.

Action: Usually there is no need for intervention, because the credit is obtained from the peer automatically. However, if the problem persists, check whether the ATM is operating correctly on the. Repeated occurrence of the problem may be caused by an overloaded ATM switch.

040B x/yy SSCOP: Credit condition - Credit obtained

Informational message: It annuls a previous "Lack of credit" message. SSCOP has obtained the "credit" and is again allowed to transmit SD PDUs.

Action: None.

0501 x/yy Adapter open timeout - Hardware error.

A hardware error with the adapter..

Action: Run the Diagnostics program to verify the hardware problem. Replace the adapter card.

0502 x/yy Adapter TAC timeout - Hardware error.

A hardware error with the adapter.

Action: Run the Diagnostics program to verify the hardware problem. Replace the adapter card.

0503 x/yy Cable-problem with connection to switch.

A problem with the cable between the adapter and the switch.

Action: Check the cable.

0504 x/yy CRC checksum failure on adapter Eeprom.

A hardware error with the adapter.

Action: Run the Diagnostics program to verify the hardware problem. Replace the adapter card.

0505 x/yy Adapter memory self-test failed during open.

A hardware error with the adapter.

Action: Run the Diagnostics program to verify the hardware problem. Replace the adapter card.

0506 x/yy Adapter requires a hardware update.

An outdated hardware part has been found on the adapter.

Action: Contact Technical Support.

0507 x/yy Adapter not found.

The adapter could not be found in the computer. This can be a configuration problem or a hardware problem.

Action: Check the adapter configuration, and if no errors are found, contact Technical Support.

0601 x/yy Registered Prefix did not match configuration.

The Prefix registered by switch does not match the ATM address of any configured ELAN. This does not necessarily indicate a problem.

Action: Check ELAN configuration against the switch configuration.

0602 x/yy Configured Prefix remained unregistered after time-out.

The ATM address of one or more configured ELANs was not registered before the adapter opening timed out. Opening of (one of) the affected ELAN(s) will fail with Completion Code:

CC_LME_ADDR_NOT_REG (0x6D).

Action: Check ELAN configuration against the switch configuration.

0603 x/yy Configured Prefix overridden by registered Prefix,

Elan No: <xx>

Warning message: For the present driver version the first registered Prefix is used for all configured ELANs, regardless of the configured ELAN ATM address.

Action: Verify that any reference to the LEC or LESaddress in the configuration files of other stations contains the prefix actually used.

0604 x/yy Registration/de-registration of address (SNMP SET) failed,

cc: <xx>.

The address table in the switch could not be updated.

Action: Check for configuration problems such as duplicate ATM address. Ensure proper physical connection and the state of the switch (should be operating).

0605 x/yy Attempt to register the same Elan twice, Elan No: <xx>.

The Operating system has tried to register twice with the same ELAN number.

Action: Change the ELAN number for one of the ELANs, or remove one of the ELANs from the Operating system network configuration.

0703 x/yy ILMI: Parsing of SNMP PDU failed, cc = <xx>.

Parsing of the received PDU failed with one of the following causes:

2: PDU not SNMP version 1.

4: Illegal or unsupported ASN1 encoding.

5: Out of Workspace memory.

Action: Check compatibility of the clients and LAN Emulation services participating in emulated LAN.

0707 x/yy ILMI: Prefix Registration time-out, Cold Start retried.

Informational message: The time-out of Prefix registration from the switch occurred. Address registration procedure is restarted by re-sending the Cold Start trap.

Action: See code 602 for additional information.

0708 x/yy ILMI: Get Response time-out, Get Request retried.

Informational message: The time-out of switch response to Get Next request occurred. The Get Next request is re-sent.

Action: See also code 602 for additional information..

0709 x/yy ILMI: Cold Start Trap received from switch.

Informational message: The switch has re-initialized the port.

Action: The end stations should automatically recover lost connections.

070A x/yy ILMI: MIB access failed: <text>.

Switch access to the local ILMI MIB failed for one of the following reasons:

TooBig: Response larger than supported PDU size (448).

BadValue: Set operation with illegal value.

ReadOnly: Set operation to read-only variable.

GenErr.

Action: Check compatibility of clients and LAN Emulation services participating in emulated LAN.

0803 x/yy PVC Response only on CDIR-VCC or CD-VCC.

The LAN Emulation Server and the LAN Emulation Client configuration of the ControlDirect or of the ControlDistribute PVC do not match.

Action: Correct the configuration of the ControlDirect or the ControlDistribute PVC.

0804 x/yy PVC Request with multicast only on MD-VCC or MS-VCC.

The LAN Emulation Server and the LAN Emulation Client configuration of the MulticastSend or of the MulticastForward PVC do not match.

Action: Correct the configuration of the MulticastSend or MulticastForward PVC.

0805 x/yy PVC Request with multicast only sent on MS- VCC.

The LAN Emulation Server and the LAN Emulation Client configuration of the MulticastSend PVC do not match.

Action: Correct the configuration of the MulticastSend PVC.

0806 x/yy A System PVC has been defined twice.

A system PVC (ControlDirect, ControlDistribute, MulticastSend or MulticastForward) has been defined twice in the configuration file.

Action: Correct PVC definition in the configuration file.

0807 x/yy PVC User Index too large.

The UserIndex parameter of a PVC definition for the Lan Emulation Server identifies a specific client and must have a value from 1 to MaxClients (default value: 50).

Action: Adjust MaxClients or correct PVC configuration.

0808 x/yy PVC ATM address is wrong <xx> <xx> ... <xx>

The PVC ATM address specification in the configuration file is wrong. Possible errors:

1. The PVC ATM address has not been specified.

2. The NULL PVC ATM address has been specified.

3. The specified ATM address does not match the ATM address specified in the destination.

Action: Correct the PVC address in the configuration file.

0809 x/yy PVC ATM address is reused.

The same ATM address has been assigned to more than one client in the PVC configuration of the Lan Emulation Server.

Action: Use unique ATM addresses.

080A x/yy PVC VpiVci is reused.

The same pair of VPI, VCI values is used for more than one PVC in the Lan Emulation Server configuration.

Action: Use unique PVC VPI, VCI value pairs.

080B x/yy PVC ATM address is redefined.

Two PVCs to the same client in the Lan Emulation Server configuration are specified with different client ATM address.

Action: Check that PVCs to the same client are configured with same ATM addresses.

080C x/yy PVC VpiVci is redefined.

Either the Control direct or the Multicast send VCC for the same client has been configured more than once in the Lan Emulation Server configuration.

Action: Correct the PVC definition.

080D x/yy PVC type not Cdir or Ms.

Only the Control direct and the Multicast send VCCs can be defined in the Lan Emulation Server configuration.

Action: Use ControlDirect or MulticastSend values for the PvcType parameters.

080E x/yy PVC CdirVcc or MsVcc not configured.

Either the ControlDirect or the MulticastSend PVC has not been defined in the configuration file.

Action: Correct the PVC definition in configuration file.

080F x/yy Frame size not one of the valid values <x>

The MaxDataFrameSize value specified in the configuration file is invalid for the DataFrameFormat.

Valid values are:

For Ethernet: only 1516.

For TokenRing: 1516, 4544 and 9234.

Action: Correct MaxDataFrameSize parameter value.

0810 x/yy Missing Value in configuration line <x>

The keyword in line <x> of the configuration file is not followed by all necessary value parameters. The line of the configuration file has therefore been ignored.

Action: Add the missing value(s).

0811 x/yy Illegal Value in configuration line <x>

Parameter value in line <x> of the configuration file is invalid.

Action: Correct the parameter value.

0812 x/yy Illegal Keyword in configuration line <x>

The keyword in line <x> of the configuration file is unrecognized. Misspelling is a possible cause.

Action: Correct the keyword.

0813 x/yy Not enough free memory to support config value <x>

The parameter value in line <x> of the configuration file requires allocation of an amount of additional memory, which is not available.

Action: Provide more free memory.

0814 x/yy Config file read error <x>, cc <xx>

Operating system returned completion code <xx> when reading line <x> from the configuration file.

Action: Depends on OS specific completion code.

0815 x/yy Illegal characters in line <x>

Line <x> of the configuration file contains excess characters, which are not preceded by ";".

Action: Remove excess characters or insert ";".

0816 x/yy Local Node Address format illegal for <"Token-Ring"> | <"Ethernet">

The format of the Local Administered Node address must comply with the emulated ELAN.

For Token Ring: 400000000000 - 7FFFFFFFFFFFFF

For Ethernet: X2XXXXXXXXXX, X6XXXXXXXXXX, XAXXXXXXXXXXX or XEXXXXXXXXXXX

Action: Correct the Node Address configuration.

0817 x/yy Lme Register Adapter failed with cc = <xx>

This error message is preceded by another, most likely a configuration error message.

Action: Check preceding messages to assess the problem or contact technical support.

0818 x/yy Unable to map Adapter memory to virtual memory space.

Possible computer configuration problem or an incompatibility between the computer and the operating system.

Action: Check computer configuration and/or contact technical support.

0819 x/yy Lme Add Adapter failed with cc = <xx>

This error message is preceded by another, most likely a configuration error message.

Action: Check preceding messages to assess the problem or contact technical support.

081A x/yy Failure getting the interrupt connection.

Interrupt conflict with another device.

Action: Check computer configuration.

081B x/yy Failure getting OS resources.

Either a hardware conflict or memory shortage.

Action: Check computer configuration and/or call technical support.

081C x/yy DMA buffer memory allocation failed.

Either normal memory shortage or a problem with operating system not having enough memory for DMA purpose.

Action: Install more memory or call technical support.

081D x/yy Memory allocation failed.

Memory shortage.

Action: Install more memory.

081E x/yy Elan not configured in config file. Elan number: <xx>

The ELAN number or for the Netware Channel number to be opened is not defined in the configuration file.

Action: Choose a configured ELAN number or configure the presently used ELAN .

081F x/yy LAN Type in OS different from LAN Type in configuration file

The LAN Type configured in the operating system for this virtual adapter is different from the LAN type configured in the configuration file with RapidConfig.

Action: Make the configuration in the operating system and in RapidConfig consistent.

0821 x/yy Traffic Profile map refers to non-existing traffic profile in ELAN, Map: <xx> <yy>

The traffic profile <yy> (referenced by "TrafficProfileList" statement) in ELAN <xx> does not match the traffic profile defined for ELAN <xx>.

Action: Change the TrafficProfileList mapping <yy> to an existing traffic profile or define the presently used traffic profile <yy>.

0822 x/yy Default Traffic Profile refers to non-existing traffic profile in ELAN <xx>

The default traffic profile (referenced by "DefaultTrafficProfile" statement) in ELAN <xx> does not match the traffic profile defined for ELAN <xx>.

Action: Change the DefaultTrafficProfile mapping to an existing traffic profile or define the presently used traffic profile.

0823 x/yy PVC traffic Profile refers to non-existing traffic profile <xx>

The traffic profile <xx> defined for the PVC does not match the defined traffic profile for that ELAN.

Action: Change the TrafficProfileSelector for the PVC to an existing traffic profile or define the presently used traffic profile.

0824 x/yy Sum of MaxVpiBits and MaxVciBits must not exceed 10

The sum of the specified MaxVpiBits and MaxVciBits must not exceed 10 (the maximum value for the adapter).

Action: Decrease the MaxVpiBits and/or the MaxVciBits value so the sum does not exceed 10.

0825 x/yy PVC VPI value too large. VPI=<xx>, VCI=<yy>, Max VPI=<zz>

The VPI value for the PVC <xx>:<yy> is too large, the maximum VPI value is <zz>.

Action: Decrease the VPI value or increase the MaxVpiBits value.

0826 x/yy PVC VCI value too large. VPI=<xx>, VCI=<yy>, Max VPI=<zz>

The VCI value for the PVC <xx>:<yy> is too large, the maximum VCI value is <zz>.

Action: Decrease the VCI value or increase the MaxVciBits value.

0828 x/yy Too many VCCs configured. Configured=<xxxx>, Maximum=<xxxx>.

Too many VCCs have been configured.

Action: Use the MaximumOpenCircuits command to decrease the number of configured VCCs.

0829 x/yy MaxDdVccs should be larger then MaximumOpenCircuits + <xxxx>

The number of configured potential VCCs (MaxDdVccs for LAN Emulation) should always be higher than the maximum number of open VCCs (MaximumOpenCircuits + <xxxx>).

Action: Increase the number of potential VCCs (MaxDdVccs).

082A x/yy PVC UserInstance error. VPI=<xx>, VCI=<yy>, UserInstance=<zz>.

The UserInstance for the PVC with VPI=<xx>, VCI=<yy> does not match any ELAN.

Action: Change the UserInstance.

B.2 RFC1577 and RFC1483 Error Messages

0902 x/yy RFC 1483 Bridged virtual adapter up, PVC <vci>/<vpi>, <lan-type>

Informational message: The virtual adapter is ready for network traffic.

0903 x/yy RFC 1483 Routed virtual adapter up, PVC <vci>/<vpi>, <lan-type>

Informational message: The virtual adapter is ready for network traffic.

0904 x/yy RFC 1577 virtual adapter up, # of PVC's: <#-pvc>, <lan-type>

Informational message: The virtual adapter is ready for network traffic.

0905 x/yy RFC 1577: My IP address configured: <ip-address>

Informational message: The IP address is specified in the configuration file.

0906 x/yy RFC 1577: My IP address learned: <ip-address>

Informational message: The IP address is NOT specified in the configuration file, but the driver acquired it through network activity.

0909 x/yy RFC 1483/1577: No PVC's defined for elan #<elan-no>

The virtual adapter configuration does not have any PVC's configured.

Action: Specify a VC in the configuration file.

090A x/yy RFC 1483: Only one PVC allowed per elan, elan #<elan-no>

The RFC 1483 virtual adapter configuration has more than one PVC configured.

Action: Limit the number of PVC's to one for the RFC 1483 virtual adapter.

090B x/yy RFC 1577 Arp server connected, VC <vci>/<vpi>

Informational message: The ARP server has been connected.

With some ARP servers this message may occur under normal operation, particularly when the ATM NIC is operating in a network with ARP server from Cisco Systems (for example, an ARP server located in Catalyst 5000).

To avoid filing up the event log in the operating system with this message you can disable it using RapidConfig.

090D x/yy RFC 1577 Arp server disconnected, VC <vci>/<vpi>

Warning message: The connection to the ARP server is cannot be established.

With some ARP servers this message may occur under normal operation, particularly when the ATM NIC is operating in a network with ARP server from Cisco Systems (for example, an ARP server located in Catalyst 5000).

To avoid filing up the event log in the operating system with this message you can disable it using RapidConfig.

090F x/yy RFC 1577 Arp server call failed.

Warning message: The call to the configured ARP server address fails.

0910 x/yy RFC 1577 End system call failed. IP <ip- address>

Warning message: The call to the IP end system fails.

0911 x/yy RFC 1577 Arp Server fails to locate <ip-address>

Warning message: The ARP server fails the IP to ATM address mapping. Failure occurs when a user tries to connect to an IP host not currently connected to the ARP server, which is therefore not a part of the Logical IP Subnetwork (LIS).

B.3 Winsock 2 Error Messages

1101 x/yy WinSock 2 could not open

Warning message: The WinSock 2 Virtual Adapter failed to open.

1102 x/yy WinSock 2 open

Information message: The WinSock 2 adapter has been opened successfully.

1103 x/yy WinSock 2 could not close

Warning message: The WinSock 2 Virtual Adapter failed to close.

1104 x/yy More PVCs configured for WinSock 2 than for adapter: <pvc-count>

Warning message: The WinSock 2 Virtual Adapter has too many PVCs configured.

Action: Correct the configuration file.

B.4 Novell Server Error Messages

FATAL: OCA1PODI-NW-400 Frame mismatch with Elan configuration.

Action: Change the "FRAME=" command line parameter or LanType parameter in the configuration file.

FATAL: OCA1PODI-NW-401 Failed to register Elan.

Action: Change the "FRAME=" command line parameter or LanType parameter in the configuration file.

FATAL: OCA1PODI-NW-402 Channel number used on another slot.

Action: Use another (unassigned) ELAN number.

FATAL: OCA1PODI-NW-403 Failed to initialize Lan emulation.

Action: Change the "FRAME=" command line parameter or LanType parameter in the configuration file and/or use another (unassigned) ELAN number.

FATAL: OCA1PODI-NW-404 Invalid local Node Address for emulated LAN.

Action: Correct the node address, and/or change the "FRAME=" command line parameter or LanType parameter in the configuration file, and/or use another (unassigned) ELAN number.

FATAL: OCA1PODI-NW-405 Failed to open Elan.

Action: Correct the node address, and/or change the "FRAME=" command line parameter or LanType parameter in the configuration file, and/or use another (unassigned) ELAN number.

FATAL: OCA1PODI-NW-406 Failed to reset Elan.

Action: Correct the node address, and/or change the "FRAME=" command line parameter or LanType parameter in the configuration file, and/or use another (unassigned) ELAN number.

FATAL: OCA1PODI-NW-407 Elan (channel) not configured.

Action: Configure the ELAN in the configuration file.

FATAL: OCA1PODI-NW-408 Cannot use IRQ 7 or 15. Please reconfigure adapter.

IRQ 7 and 15 is not available for use under Netware.

Action: As suggested.

FATAL: OCA1PODI-NW-409 Mismatch in CHANNEL specification. Use CHANNEL parameter consistently!

Action: When you use multiple Virtual Adapters (ELANs) under Netware, each driver LOAD statement should contain the 'CHANNEL' parameter. Parameter value: ELAN number + 1 (for example: ELAN 0, CHANNEL=1).

FATAL: OCAIPODI-NW-410 No supported adapters found.

The adapter could not be found in the computer. This can be a configuration problem or a hardware problem.

Action: Check the adapter configuration, and if no errors are found, contact Technical Support.

FATAL: OCAIPODI-NW-411 SLOT is already in use by another Adapter.

The driver attempted to load with the same SLOT parameter for a CHANNEL configured on another adapter in the configuration file.

Action: Change the configuration, or load with a different SLOT parameter.

FATAL: OCAIPODI-NW-412 Invalid CHANNEL number, refer to manual.

Channel number value: Virtual Adapter number + 1. Range: 1 to 16.

Action: Correct the channel number.

B.5 Diagnostics Messages

If an unrecoverable error occurs in the process of testing the adapter with DIAG615X, one of the following messages will appear on the screen and will be added to the DIAG.LOG file in the format below.

All these error are fatal and if they occur you should contact Olicom Technical Support.

Format: Diag Fatal: <text>, Code 0x<cc>

where <cc> is a hexadecimal completion code and <text> is one of the messages below.

Eeprom Access failed

Initial memory test FAILED

Initial DMA test FAILED

Open Adapter for diag Failed

Open Adapter Failed

Open Aborted

Buffer Memory Shortage

Data Memory Shortage

Driver Registration Failure 1

Driver Registration Failure 2

Unexpected Transmit Failure

Terminate Adapter failed

Read default Traffic Profile failed

Internal Error

Create Traffic Profile failed

Bind failed

Unbind failed

Delete Traffic Profile failed
Close Adapter failed
Terminate Driver failed
Unexpected empty Transmit Pool
Read Traffic Profile Aborted
Create Traffic Profile Aborted
Bind Vcc Aborted
Unbind Vcc Aborted
Delete Traffic Profile Aborted
Close Aborted



Appendix C. Configuration File Description

For configuration of the ATM drivers, a configuration file (OC-615X.CFG) is used, and this file must be located in the same directory as the driver itself. If the configuration file is not found, the driver will start a default configuration.

The configuration file is a text file, divided into sections. Each section starts with a keyword `Define<sectionname>` and ends with an `End<sectionname>` keyword, for example the virtual adapter section starts with the keyword `DefineVirtualAdapter` and ends with the keyword `EndVirtualAdapter`.

To enhance the readability of the configuration file, comments may be inserted. Comments must be preceded by a semicolon “;”. For example:

```
; This is a comment
```

For the LANE client, the Classical IP client, the RFC 1483 client or the WinSock 2 client the overall structure of the configuration file is as shown below. Typically, most sections can be left out, for example if default traffic profile configuration is used, no traffic profile sections (`DefineTrafficProfile`, `DefineProfileMapping`) are needed.

Configuration File Structure

`<Global parameters>`

`DefineAdapter`

`DefineTrafficProfile 0`

`<Traffic Profile Parameters>`

`EndTrafficProfile`

`DefineTrafficProfile 1`

`<Traffic Profile Parameters>`

`EndTrafficProfile`

`; More traffic profiles can be defined here ...`

`<Adapter configuration parameters>`

`DefineVirtualAdapter (LanEmulation|ClassicalIp| \`
`Rfc1483|WinSock2)`

`DefineProfileMapping`

`<Traffic profile mapping parameters>`

`EndProfileMapping`

`; More traffic profile mappings can be defined \`
`here`

```

    <Virtual adapter parameters>
EndVirtualAdapter
; More virtual adapters can be defined here ...
DefinePvc
    <PVC parameters>
EndPvc
; More PVCs can be defined here ...
EndAdapter
: More adapters can be defined here ...

```

C.1 Configuration File Parameters

Global Parameters

LaneDdVccs 32..<Adapter Count> x 992

Not applicable for OS/2 driver.

The maximum number of simultaneously active VCCs across all LAN Emulation Virtual Adapters.

The same ATM destination will take up one VCC for each ELAN that it is currently active.

Default for Netware and NT: 64 x <Adapter Count> x <ELAN Count>

Default for others: 32 x <Adapter Count> x <ELAN Count>

LaneMacAddressCache 32, ..., 8192

Not applicable for OS/2 driver.

The maximum number of known MAC addresses across all LAN Emulation Virtual Adapters.

The same client will take up one resource for each known ELAN, but normally the client will be known by a different address on each ELAN.

Default: 4 x LaneDdVccs. Minimum: 512

LaneAtmAddressCache32..8192

Not applicable for OS/2 driver.

The maximum number of known ATM addresses across all LAN Emulation Virtual Adapters.

The same ATM destination will take up one resource for each known ELAN, but usually the selector part of the address will be different for each ELAN.

Default: 1.5 x LaneDdVccs.

DefineAdapter

EmptyCells (Idle | Unassigned)

Default: Idle.

EnableSvcSupport (No | Yes)

SVC support implies enabling/disabling ILMI, SSCOP (Q.SAAL) and signaling functions for the adapter.

Default: Yes. Setting "EnableSvcSupport = No" indicates PVC only.

FramingMode (SONET | SDH)

Default: SONET

IlmiRegisterAddresses (No | Yes)

Enable/disable ILMI address registration.

Default: Yes

LeccsAtmAddress <20 2-digit hexadecimal numbers>

Only applicable to the LANE Client configuration file

Configures the ATM address of the LAN Emulation Configuration Server (LECS). This address is used by all ELANs, for which no LeccsAtmAddress or ServerAtmAddress is configured in the DefineVirtualAdapter section.

Default: See page 17.

MaxVpiBits (0 | 1 | ... | 5)

The maximum number of bits in the Vpi part of the VCC identifier.

Default: 0 (MaxVpiBits + MaxVciBits = 10).

MaxVciBits (5 | 6 | ... | 10)

The maximum number of bits in the Vci part of the VCC identifier.

Default: 10 (MaxVpiBits + MaxVciBits = 10).

MaxLineRate (<Cells/sec> | <Kbits/sec>Kbps | <Mbits/sec>Mbps | MaxRate)

The maximum total peak-rate of the physical links between the adapter and the switch. This rate affect all VCs regardless of their individual traffic profile settings.

Allowed value ranges depend on the unit used:

No unit specified (ie. Cells/sec): 1 - 353208

Kbps (excl. SONET/SDH overhead): 1 - 149700

Mbps (excl. SONET/SDH overhead): 1 - 149

The symbol "MaxRate" equals 353208 cells/sec ~ 149Mbps (excl. SONET/SDH overhead).

Default: MaxRate

MaxPvcs (1 | 2 | ... | 128)

The maximum number of PVCs.

Default: 16

MasterTiming (No | Yes)

When running back-to-back (that is, two adapters are connected directly to one-another with no switch in-between), the MasterTiming must be set to Yes for one of the two adapters. This is necessary to make sure that the two devices agrees on whose clock to use. When the adapter is connected to a switch the switch will always be the master and therefore the MasterTiming parameter does not need to be set.

Default: No

UniVersion (Uni3.0 | Uni3.1 | Uni4.0)

Default: Uni3.0.

DefineVirtualAdapter
AtmAddress <20 2-digit hexadecimal numbers>

Only applicable to the virtual adapters of type LanEmulation , ClassicalIP or WinSock2 type

Configures the ATM address of the client. All clients and LAN Emulation Servers in the ATM network must have a unique ATM addresses.

If the ATM address is not specified, it will be constructed using an address prefix provided by the switch through ILMI, the burnt-in MAC address of the adapter and a selector:

<prefix (13 bytes)><burnt-in MAC address (6 bytes)><selector (1 byte)>

When multiple virtual adapters are defined, the selector is used to distinguish between the virtual adapters. The first virtual adapter will be assigned the selector 00, the second 01, and so on.

When the ILMI address registration is disabled, the ATM address must be specified.

LanName <text, up to 32 characters>

Only applicable to the virtual adapters of LanEmulation type

Default: none.

LanType (Ethernet | Token-Ring)

This is the LAN type of the ELAN. All clients in the ELAN must use the same LAN type.

Default (LanEmulation): Ethernet.

Default (Classical IP and RFC1483): Token-Ring.

LecsAtmAddress <20 2-digit hexadecimal numbers>

Only applicable to the virtual adapters of LanEmulation type

Configures the ATM address of the LAN Emulation Configuration Server (LECS) to be used for this ELAN.

MaxDataFrameSize (1516 | 4544 | 9234 | 18190)

Only applicable to the virtual adapters of LanEmulation type

The maximum size of data frames exchanged between the clients. If the LAN type is Ethernet, only the value 1516 is valid. All clients in an ELAN must use the same maximum frame size.

Default (Ethernet): 1516.

Default (Token-Ring): 4544.

ServerAtmAddress <20 2-digit hexadecimal numbers>

Only applicable to the virtual adapters of LanEmulation type

The ATM Address of the LES for this ELAN.

No default.

The following ELAN parameters are for fine-tuning of the LAN Emulation protocol. After each parameter name a C<x> number is shown. This number is a reference to the “LAN Emulation Over ATM, version 1.0” name of the variable. The “LAN Emulation Over ATM” document is available from the ATM Forum.

AgingTime (10 | 11 | .. | 300)

Only applicable to the virtual adapters of LanEmulation type

ATM Forum: C17

The maximum time (in seconds) the LANE client will maintain a local LAN destination in its ARP cache in the absence of a verification.

Default: 300.

ArpResponseTime (1 | 2 | .. | 30)

Only applicable to the virtual adapters of LanEmulation type

ATM Forum: C20

The maximum time (in seconds) the LANE client will wait for an ARP request/response to take, before retrying.

Default: 1.

ArpServer <20 2-digit hexadecimal numbers>

Only applicable to the virtual adapters of the ClassicalIP type

The ATM Address of the ATM ARP server. Only applicable for SVC operation.

Default: none

ArpTimeout (1 | ... | 6000)

Only applicable to the virtual adapters of the ClassicalIP type

The period between ATMARP refresh, that is, the time it will take before an Inverse ATMARP is generated to verify the address of the remote party on a virtual connection. See PVC configuration.

Default: 600 seconds

DefaultTrafficProfile (0 | 1 | 2 | ...)

Only applicable to the virtual adapters of the LanEmulation, ClassicalIP or WinSock2 type

The traffic profile to be used if no other traffic profile mapping matches the VC to be opened. Values: The maximum value depends on the number of defined traffic profiles.

Default: Hardware default profile.

Encapsulation (LlcSnap | LlcSnapBridged)

Only applicable to the virtual adapters of the Rfc1483 type

The applied encapsulation on the ATM network, either straight LLC snap or the special “bridged” snap with network type and 2 bytes padding.

Default: LlcSnapBridged

FlushTimeout (1 | 2 | 3 | 4)

Only applicable the virtual adapters of the LanEmulation type

ATM Forum: C21

The maximum time the (in seconds) the LANE client will wait for a FLUSH response after sending a FLUSH request.

Default: 4.

ForwardDelayTime (4 | 5 | ... | 30)

Only applicable the virtual adapters of the LanEmulation type

ATM Forum: C18

The maximum time (in seconds) the LANE client will maintain a remote LAN destination in its ARP cache in the absence of a verification.

Default: 15.

IpAddress <ddd.ddd.ddd.ddd>

Only applicable to the virtual adapters of the ClassicalIP type

The IP address of this virtual adapter. If left unconfigured, the IP address will be learned automatically according to the setting in the operating system.

Default: Auto-detected

JoinTimeout (5 | 6 | ... | 300)

Only applicable to the virtual adapters of the LanEmulation type

ATM Forum: C7

Timeout period used for timing out most request / response control frame interactions.

Default 5.

MaxArpRetryCount (0 | 1 | 2)

Only applicable to the virtual adapters of the LanEmulation type

ATM Forum: C13

The maximum number of times the LANE client will retry sending an LE_ARP request for a given LAN destination after the first LE_ARP request for the same frame's LAN destination.

Default: 1

MaximumAcceptedConnections (1 | 2 | ... | 2048)

Only applicable to the virtual adapters of the WinSock2 type

Maximum number of simultaneously open connections accepted by *one* socket.

Defaults: Windows NT: 10, Windows 95: 5

MaximumOpenCircuits (2 | 3 | ... | 992)

Only applicable to the virtual adapters of the ClassicalIP, RFC1483 and WinSock 2 type

Maximum active Vccs (including the connections to LES, BUS or ATM ARP server) that a client may have at any time. The minimum value is 2.

Default (NetWare and NT): 64.

Default (Windows 95): 32

MaxUnknownFrameCount (1 | 2 | ... | 10)

Only applicable to the virtual adapters of the LanEmulation type

ATM Forum: C10

The maximum number of frames that the LANE client will send to the BUS within a time period of MaxUnknownFrameTime (see below) seconds for a given unicast LAN Destination, before the LANE client starts resolving the LAN destination ATM address (using the address resolution protocol).

Default: 1.

MaxUnknownFrameTime (1 | 2 | ... | 60)

Only applicable to the virtual adapters of the LanEmulation type

ATM Forum: C11

See the description of the MaxUnknownFrameCount parameter.

Default: 1.

MaxReceiveRateDifference (<Cells/sec> | <Kbits/sec> Kbps | <Mbits/sec> Mbps)

Only applicable to the virtual adapters of the LanEmulation, ClassicalIP or WinSock2 type

This is the maximum difference there can be between the requested receive rate of an incoming call (called the forward rate) and the line rate (155Mbps) before a call is rejected by the CellDriver with a note "User cell rate not available".

The default value of this parameter (max value) effectively disables checking the requested receive rate. This ensures interoperability with equipment, which does not handle call-rejection (with cause "User cell rate not available"), according to the ATM Forum LANE 1.0 specification.

To enable checking set a smaller value, for example 1 Mbps.

Allowed value ranges depend on the unit used:

No unit specified (ie. Cells /sec): 0 - 16777215

Kbps (excl. SONET/SDH overhead): 0 - 7113000

Mbps (excl. SONET/SDH overhead): 0 - 7113

Default: 16777215 cells/sec

MaxTransmitRateDifference (<Cells/sec> | <Kbits/sec> Kbps | <Mbits/sec> Mbps)

Only applicable to the virtual adapters of the LanEmulation, ClassicalIp or WinSock2 type

This is the maximum difference between the requested transmit rate of an incoming call (called the backward rate) and the closest matching traffic profile, before the call is rejected with the cause "User cellrate not available".

Note that the default value of this parameter (max value) effectively disables checking the requested transmit rate. This ensures interoperability with the equipment, which does not handle call-rejection (with cause "User cell rate not available"), according to the ATM Forum LANE 1.0 specification.

To enable the check set a smaller value, for example 1 Mbps.

No unit specified (ie. Cells /sec): 0 - 16777215

Kbps (excl. SONET/SDH overhead): 0 - 7113000

Mbps (excl. SONET/SDH overhead): 0 - 7113

Default: 16777215 cells/sec

MtuSize <number of bytes>

Only applicable to the virtual adapters of the ClassicalIp or Rfc1483 type

The maximum frame excluding encapsulation length.

Encapsulation length is 8 bytes for Classical IP, 8 bytes for RFC1483 with Encapsulation LlcSnap and 10 bytes for RFC 1483 with Encapsulation LlcSnapBridged.

Default: 9180.



Note: For Novell NetWare, setting the LanType to Ethernet affects the maximum allowed frame size used.

For Classical IP and RFC1483 LlcSnap the value is set to 1514.

For RFC1483 LlcSnapBridged the value is set to a maximum of 1514.

If a configured MtuSize does not comply with these rules, the driver changes it and the changed value will be displayed by AIN.

These frame size restrictions do not apply to Windows 95 and Windows NT.

PromiscuousMode (No | Yes)

Applies only for Windows 95 and Windows NT. Configures whether the driver shall report to the operating system that it is running in PromiscuousMode.

When using Microsoft Network Monitor (Netmon), this parameter should be set to Yes.

Default: No

TraceMask <Hexadecimal value>

Bitmask, used to enable additional messages for the event log.

These messages are not described in this manual, but they allow Olicom to retrieve further information in case of complex problems, such as interoperability problems with other ATM equipment.

To enable all traces use the value FFFFFFFF (all 32 bits set).

Values: 0 ... FFFFFFFF

VccTimeoutPeriod (0 | 1 | ... | 1080)

Only applicable to the virtual adapters of the LanEmulation type

ATM Forum: C12

Number of minutes a DD-VCC is kept before it is released by the LANE client if it has not been used. "0" disables releasing of unused DD-VCCs.

Default: 20.

C.2 PVC Parameters

DefinePvc

AtmAddress <20 2-digit hexadecimal numbers>

Only applicable to the PVCs used by the virtual adapters of the LanEmulation, ClassicalIp or WinSock 2 type

IpAddress <ddd.ddd.ddd.ddd>

Only applicable to the PVCs used by the virtual adapters of the ClassicalIp type

The IP address of the remote IP host. If not specified, the IP address will be discovered by the ATMARP protocol. Default: none

MacAddress <6 2-digit hexadecimal numbers>

Only applicable to the PVCs used by the virtual adapters of the Rfc1483 type
MAC address of the remote virtual adapter. Applies only to RFC 1483 routed operation("LlcSnap" encapsulation).
Default: none

PvcType (Unknown | ControlDirect | ControlDistribute | MulticastSend | MulticastForward)

Only applicable to the PVCs used by the virtual adapters of the LanEmulation type.
The type of the configured PVC.

TrafficProfileSelector (0 | 1 | 2 | ...)

Used to select the traffic profile for this PVC. Relevant only when non-default traffic profiles are needed. By default all PVCs will use a "full bandwidth" traffic profile.
The maximum value depends on the number of defined virtual adapters.

UserInstance (0 | 1 | 2 | ...)

The virtual adapter number of the virtual adapter, which this PVC belongs to. The virtual adapter numbers are assigned sequentially to the virtual adapters in the order they are defined (0, 1, 2 ...).
The maximum value depends on the number of defined virtual adapters.

Vci

Virtual channel identifier. See description of MaxVciBits in appendix D.
Values: 0 - (2MaxVciBits -1)
Default: none

Vpi

Virtual path identifier. See description of MaxVpiBits in appendix D
Values: 0 - (2MaxVpiBits -1)
Default: none

C.3 Traffic Profile Parameters

The ATM adapter hardware supports up to 11 concurrent traffic profiles. In addition to this a "hardware default" traffic profile (full line rate) is defined. If more than 11 traffic profiles are defined in the configuration file (up to 4096 can be defined), the additional traffic profiles will be mapped to the closest match among the first 11 profiles.

When no traffic profiles are defined in the configuration file, the default traffic profiles listed on page 51 are used. However, note that whenever one or more traffic profiles are defined in the configuration file, then all the default traffic profiles are removed.

DefineTrafficProfile

DescrType (NoClpNoScr | ClpNoTaggingNoScr | ClpTaggingNoScr | NoClpScr | ClpNoTaggingScr | ClpTaggingScr | BestEffort | Other)

Traffic type description. Please refer to the ATM Forum UNI 3.x specification for further explanation. For the purposes of LAN Emulation and Classical IP BestEffort should be used.

Values: BestEffort

MaxBurstSize (1 | 2 | ... | 255)

The maximum number of cells sent at peak rate before it is reduced to sustained rate.

Default: 1

PeakRate (<Cells/sec> | <Kbits/sec> Kbps | <Mbits/sec> Mbps | MaxRate)

The peak rate for cells transmitted using this traffic profile.

Allowed value ranges depend on the unit used:

No unit specified (ie. Cells/sec): 1 - 353208

Kbps (excl. SONET/SDH overhead): 1 - 149700

Mbps (excl. SONET/SDH overhead): 1 - 149

The symbol "MaxRate" equals 353208 cells/sec ~ 149Mbps (excl. SONET/SDH overhead)

Default: MaxRate

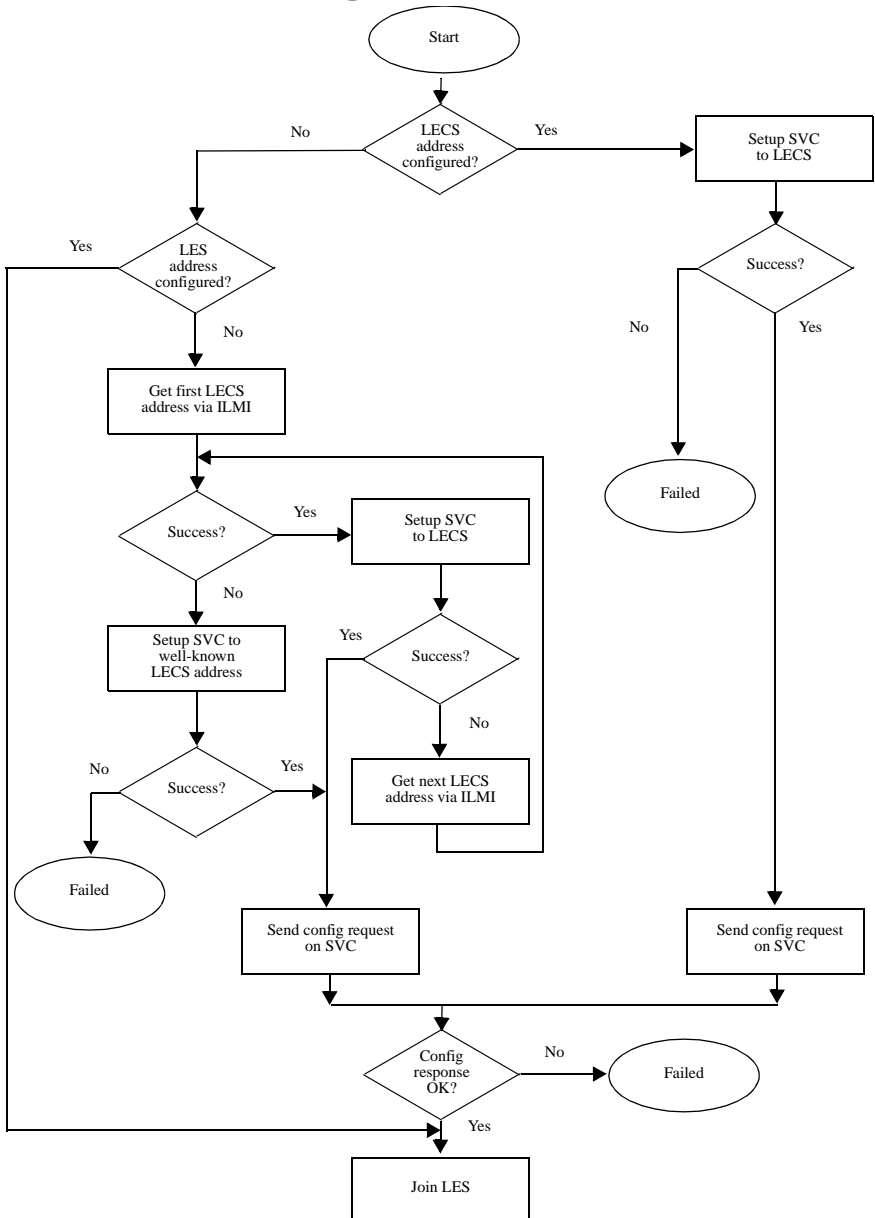
QosClass (QOS_NONE | QOS_1 | QOS_2 | QOS_3 | QOS_4)

The Quality of Service class for VCCs using this traffic profile.

See the ATM Forum Uni 3.x specifications for details.

Default: QOS_NONE

Appendix D. LE Client Getting Configuration from LECS



Appendix E. Supported Cell Rates

E.1 Supported Peak Rate and Sustained Rate Values for Traffic Profiles

Listed below are the physical cell transfer rates for Peak Rate and Sustained Rate in traffic profiles supported by OC-615X RapidFire ATM adapter.

The maximum transfer rate is limited by the physical line rate, 353208 cells/sec (147760 Kbps).

| | | |
|----------------------------|-----------------------------|-----------------------------|
| 306 cells/sec (130 Kbps) | 5411 cells/sec (2294 Kbps) | 10504 cells/sec (4454 Kbps) |
| 451 cells/sec (191 Kbps) | 5555 cells/sec (2355 Kbps) | 10683 cells/sec (4530 Kbps) |
| 600 cells/sec (254 Kbps) | 5707 cells/sec (2420 Kbps) | 10869 cells/sec (4608 Kbps) |
| 751 cells/sec (318 Kbps) | 5868 cells/sec (2488 Kbps) | 10964 cells/sec (4649 Kbps) |
| 908 cells/sec (385 Kbps) | 6009 cells/sec (2548 Kbps) | 11160 cells/sec (4732 Kbps) |
| 1055 cells/sec (447 Kbps) | 6157 cells/sec (2611 Kbps) | 11261 cells/sec (4775 Kbps) |
| 1201 cells/sec (509 Kbps) | 6313 cells/sec (2677 Kbps) | 11467 cells/sec (4862 Kbps) |
| 1352 cells/sec (573 Kbps) | 6476 cells/sec (2746 Kbps) | 11574 cells/sec (4907 Kbps) |
| 1502 cells/sec (637 Kbps) | 6613 cells/sec (2804 Kbps) | 11792 cells/sec (5000 Kbps) |
| 1653 cells/sec (701 Kbps) | 6756 cells/sec (2865 Kbps) | 11904 cells/sec (5047 Kbps) |
| 1806 cells/sec (766 Kbps) | 6906 cells/sec (2928 Kbps) | 12019 cells/sec (5096 Kbps) |
| 1953 cells/sec (828 Kbps) | 7062 cells/sec (2994 Kbps) | 12254 cells/sec (5196 Kbps) |
| 2111 cells/sec (895 Kbps) | 7225 cells/sec (3063 Kbps) | 12376 cells/sec (5247 Kbps) |
| 2264 cells/sec (960 Kbps) | 7352 cells/sec (3117 Kbps) | 12500 cells/sec (5300 Kbps) |
| 2403 cells/sec (1019 Kbps) | 7530 cells/sec (3193 Kbps) | 12626 cells/sec (5353 Kbps) |
| 2561 cells/sec (1086 Kbps) | 7668 cells/sec (3251 Kbps) | 12755 cells/sec (5408 Kbps) |
| 2717 cells/sec (1152 Kbps) | 7812 cells/sec (3312 Kbps) | 13020 cells/sec (5520 Kbps) |
| 2866 cells/sec (1215 Kbps) | 7961 cells/sec (3375 Kbps) | 13157 cells/sec (5579 Kbps) |
| 3004 cells/sec (1274 Kbps) | 8116 cells/sec (3441 Kbps) | 13297 cells/sec (5638 Kbps) |
| 3156 cells/sec (1338 Kbps) | 8278 cells/sec (3510 Kbps) | 13440 cells/sec (5699 Kbps) |
| 3324 cells/sec (1409 Kbps) | 8445 cells/sec (3581 Kbps) | 13586 cells/sec (5760 Kbps) |
| 3472 cells/sec (1472 Kbps) | 8561 cells/sec (3630 Kbps) | 13736 cells/sec (5824 Kbps) |
| 3633 cells/sec (1540 Kbps) | 8741 cells/sec (3706 Kbps) | 13888 cells/sec (5889 Kbps) |
| 3765 cells/sec (1596 Kbps) | 8865 cells/sec (3759 Kbps) | 14044 cells/sec (5955 Kbps) |
| 3906 cells/sec (1656 Kbps) | 9057 cells/sec (3840 Kbps) | 14204 cells/sec (6022 Kbps) |
| 4058 cells/sec (1721 Kbps) | 9191 cells/sec (3897 Kbps) | 14367 cells/sec (6092 Kbps) |
| 4222 cells/sec (1790 Kbps) | 9328 cells/sec (3955 Kbps) | 14534 cells/sec (6162 Kbps) |
| 4401 cells/sec (1866 Kbps) | 9469 cells/sec (4015 Kbps) | 14705 cells/sec (6235 Kbps) |
| 4528 cells/sec (1920 Kbps) | 9615 cells/sec (4077 Kbps) | 14880 cells/sec (6309 Kbps) |
| 4664 cells/sec (1978 Kbps) | 9765 cells/sec (4140 Kbps) | 15060 cells/sec (6385 Kbps) |
| 4807 cells/sec (2038 Kbps) | 9920 cells/sec (4206 Kbps) | 15243 cells/sec (6463 Kbps) |
| 4960 cells/sec (2103 Kbps) | 10080 cells/sec (4274 Kbps) | 15432 cells/sec (6543 Kbps) |
| 5102 cells/sec (2163 Kbps) | 10245 cells/sec (4344 Kbps) | 15625 cells/sec (6625 Kbps) |
| 5252 cells/sec (2227 Kbps) | 10416 cells/sec (4416 Kbps) | 15822 cells/sec (6709 Kbps) |

| | | |
|------------------------------|------------------------------|------------------------------|
| 16025 cells/sec (6795 Kbps) | 24154 cells/sec (10241 Kbps) | 31446 cells/sec (13333 Kbps) |
| 16233 cells/sec (6883 Kbps) | 24390 cells/sec (10341 Kbps) | 31645 cells/sec (13417 Kbps) |
| 16447 cells/sec (6974 Kbps) | 24509 cells/sec (10392 Kbps) | 31847 cells/sec (13503 Kbps) |
| 16666 cells/sec (7066 Kbps) | 24630 cells/sec (10443 Kbps) | 32051 cells/sec (13590 Kbps) |
| 16891 cells/sec (7162 Kbps) | 24752 cells/sec (10495 Kbps) | 32258 cells/sec (13677 Kbps) |
| 17123 cells/sec (7260 Kbps) | 25000 cells/sec (10600 Kbps) | 32467 cells/sec (13766 Kbps) |
| 17361 cells/sec (7361 Kbps) | 25125 cells/sec (10653 Kbps) | 32679 cells/sec (13856 Kbps) |
| 17605 cells/sec (7465 Kbps) | 25252 cells/sec (10707 Kbps) | 32894 cells/sec (13947 Kbps) |
| 17857 cells/sec (7571 Kbps) | 25380 cells/sec (10761 Kbps) | 33112 cells/sec (14039 Kbps) |
| 18115 cells/sec (7681 Kbps) | 25510 cells/sec (10816 Kbps) | 33333 cells/sec (14133 Kbps) |
| 18382 cells/sec (7794 Kbps) | 25773 cells/sec (10928 Kbps) | 33557 cells/sec (14228 Kbps) |
| 18656 cells/sec (7910 Kbps) | 25906 cells/sec (10984 Kbps) | 33783 cells/sec (14324 Kbps) |
| 18939 cells/sec (8030 Kbps) | 26041 cells/sec (11041 Kbps) | 34013 cells/sec (14422 Kbps) |
| 19230 cells/sec (8154 Kbps) | 26178 cells/sec (11099 Kbps) | 34246 cells/sec (14520 Kbps) |
| 19531 cells/sec (8281 Kbps) | 26315 cells/sec (11158 Kbps) | 34482 cells/sec (14620 Kbps) |
| 19685 cells/sec (8346 Kbps) | 26455 cells/sec (11217 Kbps) | 34722 cells/sec (14722 Kbps) |
| 19841 cells/sec (8413 Kbps) | 26595 cells/sec (11276 Kbps) | 34965 cells/sec (14825 Kbps) |
| 20000 cells/sec (8480 Kbps) | 26737 cells/sec (11336 Kbps) | 35211 cells/sec (14929 Kbps) |
| 20161 cells/sec (8548 Kbps) | 26881 cells/sec (11398 Kbps) | 35460 cells/sec (15035 Kbps) |
| 20325 cells/sec (8618 Kbps) | 27027 cells/sec (11459 Kbps) | 35714 cells/sec (15143 Kbps) |
| 20408 cells/sec (8653 Kbps) | 27173 cells/sec (11521 Kbps) | 35971 cells/sec (15252 Kbps) |
| 20576 cells/sec (8724 Kbps) | 27322 cells/sec (11585 Kbps) | 36231 cells/sec (15362 Kbps) |
| 20746 cells/sec (8796 Kbps) | 27472 cells/sec (11648 Kbps) | 36496 cells/sec (15474 Kbps) |
| 20920 cells/sec (8870 Kbps) | 27624 cells/sec (11713 Kbps) | 36764 cells/sec (15588 Kbps) |
| 21008 cells/sec (8907 Kbps) | 27777 cells/sec (11777 Kbps) | 37037 cells/sec (15704 Kbps) |
| 21186 cells/sec (8983 Kbps) | 27932 cells/sec (11843 Kbps) | 37313 cells/sec (15821 Kbps) |
| 21367 cells/sec (9060 Kbps) | 28089 cells/sec (11910 Kbps) | 37593 cells/sec (15939 Kbps) |
| 21459 cells/sec (9099 Kbps) | 28248 cells/sec (11977 Kbps) | 37878 cells/sec (16060 Kbps) |
| 21645 cells/sec (9177 Kbps) | 28409 cells/sec (12045 Kbps) | 38167 cells/sec (16183 Kbps) |
| 21834 cells/sec (9258 Kbps) | 28571 cells/sec (12114 Kbps) | 38461 cells/sec (16307 Kbps) |
| 21929 cells/sec (9298 Kbps) | 28735 cells/sec (12184 Kbps) | 38759 cells/sec (16434 Kbps) |
| 22123 cells/sec (9380 Kbps) | 28901 cells/sec (12254 Kbps) | 39062 cells/sec (16562 Kbps) |
| 22222 cells/sec (9422 Kbps) | 29069 cells/sec (12325 Kbps) | 39370 cells/sec (16693 Kbps) |
| 22421 cells/sec (9507 Kbps) | 29239 cells/sec (12397 Kbps) | 39682 cells/sec (16825 Kbps) |
| 22522 cells/sec (9549 Kbps) | 29411 cells/sec (12470 Kbps) | 40000 cells/sec (16960 Kbps) |
| 22727 cells/sec (9636 Kbps) | 29585 cells/sec (12544 Kbps) | 40322 cells/sec (17097 Kbps) |
| 22831 cells/sec (9680 Kbps) | 29761 cells/sec (12619 Kbps) | 40650 cells/sec (17236 Kbps) |
| 23041 cells/sec (9769 Kbps) | 29940 cells/sec (12695 Kbps) | 40983 cells/sec (17377 Kbps) |
| 23148 cells/sec (9815 Kbps) | 30120 cells/sec (12771 Kbps) | 41322 cells/sec (17521 Kbps) |
| 23255 cells/sec (9860 Kbps) | 30303 cells/sec (12848 Kbps) | 41666 cells/sec (17666 Kbps) |
| 23474 cells/sec (9953 Kbps) | 30487 cells/sec (12926 Kbps) | 42016 cells/sec (17815 Kbps) |
| 23584 cells/sec (10000 Kbps) | 30674 cells/sec (13006 Kbps) | 42372 cells/sec (17966 Kbps) |
| 23809 cells/sec (10095 Kbps) | 30864 cells/sec (13086 Kbps) | 42735 cells/sec (18120 Kbps) |
| 23923 cells/sec (10143 Kbps) | 31055 cells/sec (13167 Kbps) | 43103 cells/sec (18276 Kbps) |
| 24038 cells/sec (10192 Kbps) | 31250 cells/sec (13250 Kbps) | 43478 cells/sec (18435 Kbps) |

| | | |
|------------------------------|-------------------------------|--------------------------------|
| 43859 cells/sec (18596 Kbps) | 72463 cells/sec (30724 Kbps) | 208333 cells/sec (88333 Kbps) |
| 44247 cells/sec (18761 Kbps) | 73529 cells/sec (31176 Kbps) | 217391 cells/sec (92174 Kbps) |
| 44642 cells/sec (18928 Kbps) | 74626 cells/sec (31641 Kbps) | 227272 cells/sec (96363 Kbps) |
| 45045 cells/sec (19099 Kbps) | 75757 cells/sec (32121 Kbps) | 238095 cells/sec (100952 Kbps) |
| 45454 cells/sec (19272 Kbps) | 76923 cells/sec (32615 Kbps) | 250000 cells/sec (106000 Kbps) |
| 45871 cells/sec (19449 Kbps) | 78125 cells/sec (33125 Kbps) | 263157 cells/sec (111579 Kbps) |
| 46296 cells/sec (19630 Kbps) | 79365 cells/sec (33651 Kbps) | 277777 cells/sec (117777 Kbps) |
| 46728 cells/sec (19813 Kbps) | 80645 cells/sec (34193 Kbps) | 294117 cells/sec (124706 Kbps) |
| 47169 cells/sec (20000 Kbps) | 81967 cells/sec (34754 Kbps) | 312500 cells/sec (132500 Kbps) |
| 47619 cells/sec (20190 Kbps) | 83333 cells/sec (35333 Kbps) | 333333 cells/sec (141333 Kbps) |
| 48076 cells/sec (20384 Kbps) | 84745 cells/sec (35932 Kbps) | 357142 cells/sec (151428 Kbps) |
| 48543 cells/sec (20582 Kbps) | 86206 cells/sec (36551 Kbps) | |
| 49019 cells/sec (20784 Kbps) | 87719 cells/sec (37193 Kbps) | |
| 49504 cells/sec (20990 Kbps) | 89285 cells/sec (37857 Kbps) | |
| 50000 cells/sec (21200 Kbps) | 90909 cells/sec (38545 Kbps) | |
| 50505 cells/sec (21414 Kbps) | 92592 cells/sec (39259 Kbps) | |
| 51020 cells/sec (21632 Kbps) | 94339 cells/sec (40000 Kbps) | |
| 51546 cells/sec (21856 Kbps) | 96153 cells/sec (40769 Kbps) | |
| 52083 cells/sec (22083 Kbps) | 98039 cells/sec (41569 Kbps) | |
| 52631 cells/sec (22316 Kbps) | 100000 cells/sec (42400 Kbps) | |
| 53191 cells/sec (22553 Kbps) | 102040 cells/sec (43265 Kbps) | |
| 53763 cells/sec (22796 Kbps) | 104166 cells/sec (44166 Kbps) | |
| 54347 cells/sec (23043 Kbps) | 106382 cells/sec (45106 Kbps) | |
| 54945 cells/sec (23297 Kbps) | 108695 cells/sec (46087 Kbps) | |
| 55555 cells/sec (23555 Kbps) | 111111 cells/sec (47111 Kbps) | |
| 56179 cells/sec (23820 Kbps) | 113636 cells/sec (48182 Kbps) | |
| 56818 cells/sec (24091 Kbps) | 116279 cells/sec (49302 Kbps) | |
| 57471 cells/sec (24368 Kbps) | 119047 cells/sec (50476 Kbps) | |
| 58139 cells/sec (24651 Kbps) | 121951 cells/sec (51707 Kbps) | |
| 58823 cells/sec (24941 Kbps) | 125000 cells/sec (53000 Kbps) | |
| 59523 cells/sec (25238 Kbps) | 128205 cells/sec (54359 Kbps) | |
| 60240 cells/sec (25542 Kbps) | 131578 cells/sec (55789 Kbps) | |
| 60975 cells/sec (25853 Kbps) | 135135 cells/sec (57297 Kbps) | |
| 61728 cells/sec (26173 Kbps) | 138888 cells/sec (58889 Kbps) | |
| 62500 cells/sec (26500 Kbps) | 142857 cells/sec (60571 Kbps) | |
| 63291 cells/sec (26835 Kbps) | 147058 cells/sec (62353 Kbps) | |
| 64102 cells/sec (27179 Kbps) | 151515 cells/sec (64242 Kbps) | |
| 64935 cells/sec (27532 Kbps) | 156250 cells/sec (66250 Kbps) | |
| 65789 cells/sec (27895 Kbps) | 161290 cells/sec (68387 Kbps) | |
| 66666 cells/sec (28266 Kbps) | 166666 cells/sec (70666 Kbps) | |
| 67567 cells/sec (28648 Kbps) | 172413 cells/sec (73103 Kbps) | |
| 68493 cells/sec (29041 Kbps) | 178571 cells/sec (75714 Kbps) | |
| 69444 cells/sec (29444 Kbps) | 18185 cells/sec (78518 Kbps) | |
| 70422 cells/sec (29859 Kbps) | 192307 cells/sec (81538 Kbps) | |
| 71428 cells/sec (30285 Kbps) | 200000 cells/sec (84800 Kbps) | |

E.2 Supported Max Adapter Throughput Values

Listed below are the physical cell transfer rates for the “Max Adapter Throughput” parameter, supported by the OC-615X RapidFire ATM adapter.

Since the hardware does not support values below 9803 cells/sec, “Max Adapter Throughput”-values below this 9803 are silently mapped to 9803 cells/sec.

Other values are mapped to the closest smaller rate supported by the hardware.

The maximum transfer rate is limited by the physical line rate, 353208 cells/sec (147760 Kbps).

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| 9803 cells/sec (4156 Kbps) | 11415 cells/sec (4840 Kbps) | 13661 cells/sec (5792 Kbps) |
| 9842 cells/sec (4173 Kbps) | 11467 cells/sec (4862 Kbps) | 13736 cells/sec (5824 Kbps) |
| 9881 cells/sec (4190 Kbps) | 11520 cells/sec (4884 Kbps) | 13812 cells/sec (5856 Kbps) |
| 9920 cells/sec (4206 Kbps) | 11574 cells/sec (4907 Kbps) | 13888 cells/sec (5889 Kbps) |
| 9960 cells/sec (4223 Kbps) | 11627 cells/sec (4930 Kbps) | 13966 cells/sec (5922 Kbps) |
| 10000 cells/sec (4240 Kbps) | 11682 cells/sec (4953 Kbps) | 14044 cells/sec (5955 Kbps) |
| 10040 cells/sec (4257 Kbps) | 11737 cells/sec (4976 Kbps) | 14124 cells/sec (5989 Kbps) |
| 10080 cells/sec (4274 Kbps) | 11792 cells/sec (5000 Kbps) | 14204 cells/sec (6022 Kbps) |
| 10121 cells/sec (4291 Kbps) | 11848 cells/sec (5024 Kbps) | 14285 cells/sec (6057 Kbps) |
| 10162 cells/sec (4309 Kbps) | 11904 cells/sec (5047 Kbps) | 14367 cells/sec (6092 Kbps) |
| 10204 cells/sec (4326 Kbps) | 11961 cells/sec (5071 Kbps) | 14450 cells/sec (6127 Kbps) |
| 10245 cells/sec (4344 Kbps) | 12019 cells/sec (5096 Kbps) | 14534 cells/sec (6162 Kbps) |
| 10288 cells/sec (4362 Kbps) | 12077 cells/sec (5121 Kbps) | 14619 cells/sec (6198 Kbps) |
| 10330 cells/sec (4380 Kbps) | 12135 cells/sec (5145 Kbps) | 14705 cells/sec (6235 Kbps) |
| 10373 cells/sec (4398 Kbps) | 12195 cells/sec (5171 Kbps) | 14792 cells/sec (6272 Kbps) |
| 10416 cells/sec (4416 Kbps) | 12254 cells/sec (5196 Kbps) | 14880 cells/sec (6309 Kbps) |
| 10460 cells/sec (4435 Kbps) | 12315 cells/sec (5222 Kbps) | 14970 cells/sec (6347 Kbps) |
| 10504 cells/sec (4454 Kbps) | 12376 cells/sec (5247 Kbps) | 15060 cells/sec (6385 Kbps) |
| 10548 cells/sec (4472 Kbps) | 12437 cells/sec (5273 Kbps) | 15151 cells/sec (6424 Kbps) |
| 10593 cells/sec (4491 Kbps) | 12500 cells/sec (5300 Kbps) | 15243 cells/sec (6463 Kbps) |
| 10638 cells/sec (4511 Kbps) | 12562 cells/sec (5326 Kbps) | 15337 cells/sec (6503 Kbps) |
| 10683 cells/sec (4530 Kbps) | 12626 cells/sec (5353 Kbps) | 15432 cells/sec (6543 Kbps) |
| 10729 cells/sec (4549 Kbps) | 12690 cells/sec (5381 Kbps) | 15527 cells/sec (6583 Kbps) |
| 10775 cells/sec (4569 Kbps) | 12755 cells/sec (5408 Kbps) | 15625 cells/sec (6625 Kbps) |
| 10822 cells/sec (4589 Kbps) | 12820 cells/sec (5436 Kbps) | 15723 cells/sec (6667 Kbps) |
| 10869 cells/sec (4608 Kbps) | 12886 cells/sec (5464 Kbps) | 15822 cells/sec (6709 Kbps) |
| 10917 cells/sec (4629 Kbps) | 12953 cells/sec (5492 Kbps) | 15923 cells/sec (6751 Kbps) |
| 10964 cells/sec (4649 Kbps) | 13020 cells/sec (5520 Kbps) | 16025 cells/sec (6795 Kbps) |
| 11013 cells/sec (4670 Kbps) | 13089 cells/sec (5550 Kbps) | 16129 cells/sec (6839 Kbps) |
| 11061 cells/sec (4690 Kbps) | 13157 cells/sec (5579 Kbps) | 16233 cells/sec (6883 Kbps) |
| 11111 cells/sec (4711 Kbps) | 13227 cells/sec (5608 Kbps) | 16339 cells/sec (6928 Kbps) |
| 11160 cells/sec (4732 Kbps) | 13297 cells/sec (5638 Kbps) | 16447 cells/sec (6974 Kbps) |
| 11210 cells/sec (4753 Kbps) | 13368 cells/sec (5668 Kbps) | 16556 cells/sec (7020 Kbps) |
| 11261 cells/sec (4775 Kbps) | 13440 cells/sec (5699 Kbps) | 16666 cells/sec (7066 Kbps) |
| 11312 cells/sec (4796 Kbps) | 13513 cells/sec (5730 Kbps) | 16778 cells/sec (7114 Kbps) |
| 11363 cells/sec (4818 Kbps) | 13586 cells/sec (5760 Kbps) | 16891 cells/sec (7162 Kbps) |

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| 17006 cells/sec (7211 Kbps) | 21834 cells/sec (9258 Kbps) | 27322 cells/sec (11585 Kbps) |
| 17123 cells/sec (7260 Kbps) | 21929 cells/sec (9298 Kbps) | 27472 cells/sec (11648 Kbps) |
| 17241 cells/sec (7310 Kbps) | 22026 cells/sec (9339 Kbps) | 27624 cells/sec (11713 Kbps) |
| 17361 cells/sec (7361 Kbps) | 22123 cells/sec (9380 Kbps) | 27777 cells/sec (11777 Kbps) |
| 17482 cells/sec (7412 Kbps) | 22222 cells/sec (9422 Kbps) | 27932 cells/sec (11843 Kbps) |
| 17605 cells/sec (7465 Kbps) | 22321 cells/sec (9464 Kbps) | 28089 cells/sec (11910 Kbps) |
| 17730 cells/sec (7518 Kbps) | 22421 cells/sec (9507 Kbps) | 28248 cells/sec (11977 Kbps) |
| 17857 cells/sec (7571 Kbps) | 22522 cells/sec (9549 Kbps) | 28409 cells/sec (12045 Kbps) |
| 17985 cells/sec (7626 Kbps) | 22624 cells/sec (9593 Kbps) | 28571 cells/sec (12114 Kbps) |
| 18115 cells/sec (7681 Kbps) | 22727 cells/sec (9636 Kbps) | 28735 cells/sec (12184 Kbps) |
| 18248 cells/sec (7737 Kbps) | 22831 cells/sec (9680 Kbps) | 28901 cells/sec (12254 Kbps) |
| 18382 cells/sec (7794 Kbps) | 22935 cells/sec (9724 Kbps) | 29069 cells/sec (12325 Kbps) |
| 18518 cells/sec (7852 Kbps) | 23041 cells/sec (9769 Kbps) | 29239 cells/sec (12397 Kbps) |
| 18656 cells/sec (7910 Kbps) | 23148 cells/sec (9815 Kbps) | 29411 cells/sec (12470 Kbps) |
| 18796 cells/sec (7970 Kbps) | 23255 cells/sec (9860 Kbps) | 29585 cells/sec (12544 Kbps) |
| 18939 cells/sec (8030 Kbps) | 23364 cells/sec (9906 Kbps) | 29761 cells/sec (12619 Kbps) |
| 19083 cells/sec (8091 Kbps) | 23474 cells/sec (9953 Kbps) | 29940 cells/sec (12695 Kbps) |
| 19230 cells/sec (8154 Kbps) | 23584 cells/sec (10000 Kbps) | 30120 cells/sec (12771 Kbps) |
| 19379 cells/sec (8217 Kbps) | 23696 cells/sec (10047 Kbps) | 30303 cells/sec (12848 Kbps) |
| 19531 cells/sec (8281 Kbps) | 23809 cells/sec (10095 Kbps) | 30487 cells/sec (12926 Kbps) |
| 19607 cells/sec (8313 Kbps) | 23923 cells/sec (10143 Kbps) | 30674 cells/sec (13006 Kbps) |
| 19685 cells/sec (8346 Kbps) | 24038 cells/sec (10192 Kbps) | 30864 cells/sec (13086 Kbps) |
| 19762 cells/sec (8379 Kbps) | 24154 cells/sec (10241 Kbps) | 31055 cells/sec (13167 Kbps) |
| 19841 cells/sec (8413 Kbps) | 24271 cells/sec (10291 Kbps) | 31250 cells/sec (13250 Kbps) |
| 19920 cells/sec (8446 Kbps) | 24390 cells/sec (10341 Kbps) | 31446 cells/sec (13333 Kbps) |
| 20000 cells/sec (8480 Kbps) | 24509 cells/sec (10392 Kbps) | 31645 cells/sec (13417 Kbps) |
| 20080 cells/sec (8514 Kbps) | 24630 cells/sec (10443 Kbps) | 31847 cells/sec (13503 Kbps) |
| 20161 cells/sec (8548 Kbps) | 24752 cells/sec (10495 Kbps) | 32051 cells/sec (13590 Kbps) |
| 20242 cells/sec (8583 Kbps) | 24875 cells/sec (10547 Kbps) | 32258 cells/sec (13677 Kbps) |
| 20325 cells/sec (8618 Kbps) | 25000 cells/sec (10600 Kbps) | 32467 cells/sec (13766 Kbps) |
| 20408 cells/sec (8653 Kbps) | 25125 cells/sec (10653 Kbps) | 32679 cells/sec (13856 Kbps) |
| 20491 cells/sec (8688 Kbps) | 25252 cells/sec (10707 Kbps) | 32894 cells/sec (13947 Kbps) |
| 20576 cells/sec (8724 Kbps) | 25380 cells/sec (10761 Kbps) | 33112 cells/sec (14039 Kbps) |
| 20661 cells/sec (8760 Kbps) | 25510 cells/sec (10816 Kbps) | 33333 cells/sec (14133 Kbps) |
| 20746 cells/sec (8796 Kbps) | 25641 cells/sec (10872 Kbps) | 33557 cells/sec (14228 Kbps) |
| 20833 cells/sec (8833 Kbps) | 25773 cells/sec (10928 Kbps) | 33783 cells/sec (14324 Kbps) |
| 20920 cells/sec (8870 Kbps) | 25906 cells/sec (10984 Kbps) | 34013 cells/sec (14422 Kbps) |
| 21008 cells/sec (8907 Kbps) | 26041 cells/sec (11041 Kbps) | 34246 cells/sec (14520 Kbps) |
| 21097 cells/sec (8945 Kbps) | 26178 cells/sec (11099 Kbps) | 34482 cells/sec (14620 Kbps) |
| 21186 cells/sec (8983 Kbps) | 26315 cells/sec (11158 Kbps) | 34722 cells/sec (14722 Kbps) |
| 21276 cells/sec (9021 Kbps) | 26455 cells/sec (11217 Kbps) | 34965 cells/sec (14825 Kbps) |
| 21367 cells/sec (9060 Kbps) | 26595 cells/sec (11276 Kbps) | 35211 cells/sec (14929 Kbps) |
| 21459 cells/sec (9099 Kbps) | 26737 cells/sec (11336 Kbps) | 35460 cells/sec (15035 Kbps) |
| 21551 cells/sec (9138 Kbps) | 26881 cells/sec (11398 Kbps) | 35714 cells/sec (15143 Kbps) |
| 21645 cells/sec (9177 Kbps) | 27027 cells/sec (11459 Kbps) | 35971 cells/sec (15252 Kbps) |
| 21739 cells/sec (9217 Kbps) | 27173 cells/sec (11521 Kbps) | 36231 cells/sec (15362 Kbps) |

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| 36496 cells/sec (15474 Kbps) | 45662 cells/sec (19361 Kbps) | 57803 cells/sec (24508 Kbps) |
| 36764 cells/sec (15588 Kbps) | 45871 cells/sec (19449 Kbps) | 58139 cells/sec (24651 Kbps) |
| 37037 cells/sec (15704 Kbps) | 46082 cells/sec (19539 Kbps) | 58479 cells/sec (24795 Kbps) |
| 37313 cells/sec (15821 Kbps) | 46296 cells/sec (19630 Kbps) | 58823 cells/sec (24941 Kbps) |
| 37593 cells/sec (15939 Kbps) | 46511 cells/sec (19721 Kbps) | 59171 cells/sec (25089 Kbps) |
| 37878 cells/sec (16060 Kbps) | 46728 cells/sec (19813 Kbps) | 59523 cells/sec (25238 Kbps) |
| 38167 cells/sec (16183 Kbps) | 46948 cells/sec (19906 Kbps) | 59880 cells/sec (25389 Kbps) |
| 38461 cells/sec (16307 Kbps) | 47169 cells/sec (20000 Kbps) | 60240 cells/sec (25542 Kbps) |
| 38759 cells/sec (16434 Kbps) | 47393 cells/sec (20095 Kbps) | 60606 cells/sec (25697 Kbps) |
| 39062 cells/sec (16562 Kbps) | 47619 cells/sec (20190 Kbps) | 60975 cells/sec (25853 Kbps) |
| 39215 cells/sec (16627 Kbps) | 47846 cells/sec (20287 Kbps) | 61349 cells/sec (26012 Kbps) |
| 39370 cells/sec (16693 Kbps) | 48076 cells/sec (20384 Kbps) | 61728 cells/sec (26173 Kbps) |
| 39525 cells/sec (16759 Kbps) | 48309 cells/sec (20483 Kbps) | 62111 cells/sec (26335 Kbps) |
| 39682 cells/sec (16825 Kbps) | 48543 cells/sec (20582 Kbps) | 62500 cells/sec (26500 Kbps) |
| 39840 cells/sec (16892 Kbps) | 48780 cells/sec (20683 Kbps) | 62893 cells/sec (26667 Kbps) |
| 40000 cells/sec (16960 Kbps) | 49019 cells/sec (20784 Kbps) | 63291 cells/sec (26835 Kbps) |
| 40160 cells/sec (17028 Kbps) | 49261 cells/sec (20887 Kbps) | 63694 cells/sec (27006 Kbps) |
| 40322 cells/sec (17097 Kbps) | 49504 cells/sec (20990 Kbps) | 64102 cells/sec (27179 Kbps) |
| 40485 cells/sec (17166 Kbps) | 49751 cells/sec (21094 Kbps) | 64516 cells/sec (27355 Kbps) |
| 40650 cells/sec (17236 Kbps) | 50000 cells/sec (21200 Kbps) | 64935 cells/sec (27532 Kbps) |
| 40816 cells/sec (17306 Kbps) | 50251 cells/sec (21306 Kbps) | 65359 cells/sec (27712 Kbps) |
| 40983 cells/sec (17377 Kbps) | 50505 cells/sec (21414 Kbps) | 65789 cells/sec (27895 Kbps) |
| 41152 cells/sec (17448 Kbps) | 50761 cells/sec (21523 Kbps) | 66225 cells/sec (28079 Kbps) |
| 41322 cells/sec (17521 Kbps) | 51020 cells/sec (21632 Kbps) | 66666 cells/sec (28266 Kbps) |
| 41493 cells/sec (17593 Kbps) | 51282 cells/sec (21744 Kbps) | 67114 cells/sec (28456 Kbps) |
| 41666 cells/sec (17666 Kbps) | 51546 cells/sec (21856 Kbps) | 67567 cells/sec (28648 Kbps) |
| 41841 cells/sec (17741 Kbps) | 51813 cells/sec (21969 Kbps) | 68027 cells/sec (28843 Kbps) |
| 42016 cells/sec (17815 Kbps) | 52083 cells/sec (22083 Kbps) | 68493 cells/sec (29041 Kbps) |
| 42194 cells/sec (17890 Kbps) | 52356 cells/sec (22199 Kbps) | 68965 cells/sec (29241 Kbps) |
| 42372 cells/sec (17966 Kbps) | 52631 cells/sec (22316 Kbps) | 69444 cells/sec (29444 Kbps) |
| 42553 cells/sec (18042 Kbps) | 52910 cells/sec (22434 Kbps) | 69930 cells/sec (29650 Kbps) |
| 42735 cells/sec (18120 Kbps) | 53191 cells/sec (22553 Kbps) | 70422 cells/sec (29859 Kbps) |
| 42918 cells/sec (18197 Kbps) | 53475 cells/sec (22673 Kbps) | 70921 cells/sec (30071 Kbps) |
| 43103 cells/sec (18276 Kbps) | 53763 cells/sec (22796 Kbps) | 71428 cells/sec (30285 Kbps) |
| 43290 cells/sec (18355 Kbps) | 54054 cells/sec (22919 Kbps) | 71942 cells/sec (30503 Kbps) |
| 43478 cells/sec (18435 Kbps) | 54347 cells/sec (23043 Kbps) | 72463 cells/sec (30724 Kbps) |
| 43668 cells/sec (18515 Kbps) | 54644 cells/sec (23169 Kbps) | 72992 cells/sec (30949 Kbps) |
| 43859 cells/sec (18596 Kbps) | 54945 cells/sec (23297 Kbps) | 73529 cells/sec (31176 Kbps) |
| 44052 cells/sec (18678 Kbps) | 55248 cells/sec (23425 Kbps) | 74074 cells/sec (31407 Kbps) |
| 44247 cells/sec (18761 Kbps) | 55555 cells/sec (23555 Kbps) | 74626 cells/sec (31641 Kbps) |
| 44444 cells/sec (18844 Kbps) | 55865 cells/sec (23687 Kbps) | 75187 cells/sec (31879 Kbps) |
| 44642 cells/sec (18928 Kbps) | 56179 cells/sec (23820 Kbps) | 75757 cells/sec (32121 Kbps) |
| 44843 cells/sec (19013 Kbps) | 56497 cells/sec (23955 Kbps) | 76335 cells/sec (32366 Kbps) |
| 45045 cells/sec (19099 Kbps) | 56818 cells/sec (24091 Kbps) | 76923 cells/sec (32615 Kbps) |
| 45248 cells/sec (19185 Kbps) | 57142 cells/sec (24228 Kbps) | 77519 cells/sec (32868 Kbps) |
| 45454 cells/sec (19272 Kbps) | 57471 cells/sec (24368 Kbps) | 78125 cells/sec (33125 Kbps) |

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| 78431 cells/sec (33255 Kbps) | 95693 cells/sec (40574 Kbps) | 122699 cells/sec (52024 Kbps) |
| 78740 cells/sec (33386 Kbps) | 96153 cells/sec (40769 Kbps) | 123456 cells/sec (52345 Kbps) |
| 79051 cells/sec (33518 Kbps) | 96618 cells/sec (40966 Kbps) | 124223 cells/sec (52671 Kbps) |
| 79365 cells/sec (33651 Kbps) | 97087 cells/sec (41165 Kbps) | 125000 cells/sec (53000 Kbps) |
| 79681 cells/sec (33785 Kbps) | 97560 cells/sec (41365 Kbps) | 125786 cells/sec (53333 Kbps) |
| 80000 cells/sec (33920 Kbps) | 98039 cells/sec (41569 Kbps) | 126582 cells/sec (53671 Kbps) |
| 80321 cells/sec (34056 Kbps) | 98522 cells/sec (41773 Kbps) | 127388 cells/sec (54013 Kbps) |
| 80645 cells/sec (34193 Kbps) | 99009 cells/sec (41980 Kbps) | 128205 cells/sec (54359 Kbps) |
| 80971 cells/sec (34332 Kbps) | 99502 cells/sec (42189 Kbps) | 129032 cells/sec (54710 Kbps) |
| 81300 cells/sec (34471 Kbps) | 100000 cells/sec (42400 Kbps) | 129870 cells/sec (55065 Kbps) |
| 81632 cells/sec (34612 Kbps) | 100502 cells/sec (42613 Kbps) | 130718 cells/sec (55424 Kbps) |
| 81967 cells/sec (34754 Kbps) | 101010 cells/sec (42828 Kbps) | 131578 cells/sec (55789 Kbps) |
| 82304 cells/sec (34897 Kbps) | 101522 cells/sec (43045 Kbps) | 132450 cells/sec (56159 Kbps) |
| 82644 cells/sec (35041 Kbps) | 102040 cells/sec (43265 Kbps) | 133333 cells/sec (56533 Kbps) |
| 82987 cells/sec (35186 Kbps) | 102564 cells/sec (43487 Kbps) | 134228 cells/sec (56913 Kbps) |
| 83333 cells/sec (35333 Kbps) | 103092 cells/sec (43711 Kbps) | 135135 cells/sec (57297 Kbps) |
| 83682 cells/sec (35481 Kbps) | 103626 cells/sec (43937 Kbps) | 136054 cells/sec (57687 Kbps) |
| 84033 cells/sec (35630 Kbps) | 104166 cells/sec (44166 Kbps) | 136986 cells/sec (58082 Kbps) |
| 84388 cells/sec (35781 Kbps) | 104712 cells/sec (44398 Kbps) | 137931 cells/sec (58483 Kbps) |
| 84745 cells/sec (35932 Kbps) | 105263 cells/sec (44632 Kbps) | 138888 cells/sec (58889 Kbps) |
| 85106 cells/sec (36085 Kbps) | 105820 cells/sec (44868 Kbps) | 139860 cells/sec (59301 Kbps) |
| 85470 cells/sec (36239 Kbps) | 106382 cells/sec (45106 Kbps) | 140845 cells/sec (59718 Kbps) |
| 85836 cells/sec (36394 Kbps) | 106951 cells/sec (45347 Kbps) | 141843 cells/sec (60141 Kbps) |
| 86206 cells/sec (36551 Kbps) | 107526 cells/sec (45591 Kbps) | 142857 cells/sec (60571 Kbps) |
| 86580 cells/sec (36710 Kbps) | 108108 cells/sec (45838 Kbps) | 143884 cells/sec (61007 Kbps) |
| 86956 cells/sec (36869 Kbps) | 108695 cells/sec (46087 Kbps) | 144927 cells/sec (61449 Kbps) |
| 87336 cells/sec (37030 Kbps) | 109289 cells/sec (46339 Kbps) | 145985 cells/sec (61898 Kbps) |
| 87719 cells/sec (37193 Kbps) | 109890 cells/sec (46593 Kbps) | 147058 cells/sec (62353 Kbps) |
| 88105 cells/sec (37357 Kbps) | 110497 cells/sec (46851 Kbps) | 148148 cells/sec (62815 Kbps) |
| 88495 cells/sec (37522 Kbps) | 111111 cells/sec (47111 Kbps) | 149253 cells/sec (63283 Kbps) |
| 88888 cells/sec (37689 Kbps) | 111731 cells/sec (47374 Kbps) | 150375 cells/sec (63759 Kbps) |
| 89285 cells/sec (37857 Kbps) | 112359 cells/sec (47640 Kbps) | 151515 cells/sec (64242 Kbps) |
| 89686 cells/sec (38027 Kbps) | 112994 cells/sec (47909 Kbps) | 152671 cells/sec (64733 Kbps) |
| 90090 cells/sec (38198 Kbps) | 113636 cells/sec (48182 Kbps) | 153846 cells/sec (65231 Kbps) |
| 90497 cells/sec (38371 Kbps) | 114285 cells/sec (48457 Kbps) | 155038 cells/sec (65736 Kbps) |
| 90909 cells/sec (38545 Kbps) | 114942 cells/sec (48735 Kbps) | 156250 cells/sec (66250 Kbps) |
| 91324 cells/sec (38721 Kbps) | 115606 cells/sec (49017 Kbps) | 157480 cells/sec (66772 Kbps) |
| 91743 cells/sec (38899 Kbps) | 116279 cells/sec (49302 Kbps) | 158730 cells/sec (67302 Kbps) |
| 92165 cells/sec (39078 Kbps) | 116959 cells/sec (49591 Kbps) | 160000 cells/sec (67840 Kbps) |
| 92592 cells/sec (39259 Kbps) | 117647 cells/sec (49882 Kbps) | 161290 cells/sec (68387 Kbps) |
| 93023 cells/sec (39442 Kbps) | 118343 cells/sec (50177 Kbps) | 162601 cells/sec (68943 Kbps) |
| 93457 cells/sec (39626 Kbps) | 119047 cells/sec (50476 Kbps) | 163934 cells/sec (69508 Kbps) |
| 93896 cells/sec (39812 Kbps) | 119760 cells/sec (50778 Kbps) | 165289 cells/sec (70083 Kbps) |
| 94339 cells/sec (40000 Kbps) | 120481 cells/sec (51084 Kbps) | 166666 cells/sec (70666 Kbps) |
| 94786 cells/sec (40189 Kbps) | 121212 cells/sec (51394 Kbps) | 168067 cells/sec (71260 Kbps) |
| 95238 cells/sec (40381 Kbps) | 121951 cells/sec (51707 Kbps) | 169491 cells/sec (71864 Kbps) |

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| 170940 cells/sec (72479 Kbps) | 277777 cells/sec (117777 Kbps) |
| 172413 cells/sec (73103 Kbps) | 281690 cells/sec (119437 Kbps) |
| 173913 cells/sec (73739 Kbps) | 285714 cells/sec (121143 Kbps) |
| 175438 cells/sec (74386 Kbps) | 289855 cells/sec (122899 Kbps) |
| 176991 cells/sec (75044 Kbps) | 294117 cells/sec (124706 Kbps) |
| 178571 cells/sec (75714 Kbps) | 298507 cells/sec (126567 Kbps) |
| 180180 cells/sec (76396 Kbps) | 303030 cells/sec (128485 Kbps) |
| 181818 cells/sec (77091 Kbps) | 307692 cells/sec (130461 Kbps) |
| 183486 cells/sec (77798 Kbps) | 312500 cells/sec (132500 Kbps) |
| 185185 cells/sec (78518 Kbps) | 317460 cells/sec (134603 Kbps) |
| 186915 cells/sec (79252 Kbps) | 322580 cells/sec (136774 Kbps) |
| 188679 cells/sec (80000 Kbps) | 327868 cells/sec (139016 Kbps) |
| 190476 cells/sec (80762 Kbps) | 333333 cells/sec (141333 Kbps) |
| 192307 cells/sec (81538 Kbps) | 338983 cells/sec (143729 Kbps) |
| 194174 cells/sec (82330 Kbps) | 344827 cells/sec (146207 Kbps) |
| 196078 cells/sec (83137 Kbps) | 350877 cells/sec (148772 Kbps) |
| 198019 cells/sec (83960 Kbps) | 357142 cells/sec (151428 Kbps) |
| 200000 cells/sec (84800 Kbps) | 270270 cells/sec (114594 Kbps) |
| 202020 cells/sec (85656 Kbps) | 273972 cells/sec (116164 Kbps) |
| 204081 cells/sec (86530 Kbps) | |
| 206185 cells/sec (87422 Kbps) | |
| 208333 cells/sec (88333 Kbps) | |
| 210526 cells/sec (89263 Kbps) | |
| 212765 cells/sec (90212 Kbps) | |
| 215053 cells/sec (91182 Kbps) | |
| 217391 cells/sec (92174 Kbps) | |
| 219780 cells/sec (93187 Kbps) | |
| 222222 cells/sec (94222 Kbps) | |
| 224719 cells/sec (95281 Kbps) | |
| 227272 cells/sec (96363 Kbps) | |
| 229885 cells/sec (97471 Kbps) | |
| 232558 cells/sec (98605 Kbps) | |
| 235294 cells/sec (99765 Kbps) | |
| 238095 cells/sec (100952 Kbps) | |
| 240963 cells/sec (102168 Kbps) | |
| 243902 cells/sec (103414 Kbps) | |
| 246913 cells/sec (104691 Kbps) | |
| 250000 cells/sec (106000 Kbps) | |
| 253164 cells/sec (107342 Kbps) | |
| 256410 cells/sec (108718 Kbps) | |
| 259740 cells/sec (110130 Kbps) | |
| 263157 cells/sec (111579 Kbps) | |
| 266666 cells/sec (113066 Kbps) | |



Appendix F. Virtually Adapter MAC Addresses

Both LAN Emulation as well as Classical IP and MultiProtocol Encapsulation use locally administered MAC addresses, which are automatically generated by the driver. This appendix documents the algorithms for the automatic generation of these MAC addresses, thereby allowing you to ensure that other locally administered MAC addresses in your network do not conflict with any of the addresses used by the driver software.

F.1 Generation of MAC Address for each Virtual Adapter

Since all virtual adapters are considered separate physical adapters by the operating system (and its protocols), they need a distinct MAC address.

For the first virtual adapter (on a physical adapter) the burn-in address will be identical to the burn-in address of the adapter, but for the remaining virtual adapters a locally administered MAC address needs to be generated and used.

The generated MAC addresses will have the following format:

```
+-----+-----+-----+-----+-----+
| First   | Remaining 5 bytes of burn-in address |
| byte    |                                     |
+-----+-----+-----+-----+-----+
```

The first byte of the MAC address is used to indicate that this is a locally administered address, as well to encode the virtual adapter no. The algorithm for generation of the first byte depends on the LAN type.

If the LAN type is Ethernet the first byte is generated by setting the first nibble (hexadecimal digit) to the virtual adapter number, and the second nibble to 2, indicating a locally administered address.

If the LAN type is Token-Ring then the same algorithm is used, except that each byte is bit-reversed.

Example: If the adapters burn-in address is 0000C1008021 then the MAC address for the second virtual adapter (having virtual adapter index 1) will be:

Ethernet: 1200C1008021

Token-Ring: 480083000184

F.2 Generation of Remote MAC Addresses - Not Applicable to LAN Emulation

For Classical IP and Multiprotocol Encapsulation with Encapsulation=LlcSnapBridged MAC addresses are not included in the frames being received from the ATM network. Since the protocols of the operating system expect to receive frames with MAC addresses (both source and destination) the driver software needs to append these, including generating a MAC address for the remote device.

The generated MAC addresses will have the following format:

| | | | | | | | | | | | | | | | |
|---------------------------------------|-------|--|----------|--|--|-----|--|--|----------|-------|--|--|--|--|--|
| +-----+-----+-----+-----+-----+-----+ | | | | | | | | | | | | | | | |
| | First | | Virtual | | | RFC | | | Internal | Index | | | | | |
| | byte | | Adapter# | | | | | | | | | | | | |
| +-----+-----+-----+-----+-----+-----+ | | | | | | | | | | | | | | | |

First byte

This byte is used to indicate that this is a locally administered MAC address.

Ethernet : 02 (hexadecimal)

Token-Ring : 40 (hexadecimal)

Virtual Adapter# (1 byte)

This byte indicates the number of the virtual adapter on which the frame was received.

RFC (2 bytes)

For Classical IP (RFC1577).

Ethernet: 1577 (hexadecimal)

Token-Ring: A8EE (hexadecimal)

For MultiProtocol Encapsulation (RFC1483):

Ethernet: 1483 (hexadecimal)

Token-Ring: 28C1 (hexadecimal)

Note that the Token-Ring values for this field are the same as for Ethernet, except that each byte has been bit-reversed.

Internal Index

An internal index, which may have any value.



Appendix G. Technical Information

The ATM PCI 155 Adapters can be used in PCs with a PCI Local Bus to provide a dedicated, full-duplex high-bandwidth 155 Mbps connectivity to ATM networks and conforms to all relevant ATM Forum standards including UNI 3.0 and 3.1.

G.1 Hardware

Architecture

On-board line interface, transmission convergence sub layer, ATM layer and adaptation layers with integrated hardware based ATM cell segmentation & reassembly. DMA and on-board 512 KB segmentation and reassembly memory are used. The adapter also uses a memory area of 112 bytes for memory-mapped hardware register.

The host CPU transfers complete LAN frames between the host and the adapter.

ATM Adaptation Layer Support

AAL5 using special-purpose, on-board chipset hardware for HEC and CRC calculations, and ATM cell segmentation and reassembly. Dual leaky bucket traffic shaping in accordance with the Generic Cell Rate Algorithm defined in UNI 3.0 and 3.1 is used.

Physical Layer Interface - OC-6151

| | |
|-------------|--|
| Data rate: | OC-3 155.52 Mbps, SONET or SDH framing, switchable between SONET and SDH |
| Cabling: | UTP Type 5 Media cabling (100 meter) |
| Connectors: | RJ-45 |

Physical Layer Interface - OC-6152

| | |
|---|--|
| Data rate: | OC-3 155.52 Mbps, SONET or SDH framing, switchable between SONET and SDH |
| Cabling: | Duplex 62.5/125 or 50/125 mm multimode fiber (2,000 meter maximum) |
| Connectors: | Duplex SC type |
| Optical power budget for multimode fiber: | |
| Transmitter launch power: | -14 to -18.5 dBm average. |
| Receiver sensitivity: | -30 dBm average. |

Form Factor

Single-slot PCI local bus card - Length: 22.5 cm

Compliance

ATM cell processing per ANSI T1S1.5/92-002R3, CCITT I.361, and ATM Forum v3.0 UNI specification 3.0, 3.1 and 4.0.

ATM cell structure conforms to ITU recommendation I.363.

ATM AAL Layer supported: AAL5.

Configurable HW Setup

Conforms to PCI v.2 configuration. The system BIOS will automatically assign an interrupt level, a memory range and a DMA channel to the adapter.

Certifications

FCC part 15, Subpart B, Class B

EN 55022 Class B

CISPR 22 Class B

EN 50082-1

EN 60825- 1

EN 60950 incl. amendments

G.2 Diagnostics LEDs

The ATM PCI 155 Adapter has two diagnostics LEDs on the adapter's metal bracket:

- Yellow LED, the warning indicator which is illuminated when a loss of signal on the receive path is detected.
- Green LED, the OK indicator which is illuminated when the clock is synchronized on the receive path.

G.3 Software

Virtual Circuits

Supports up to 1024 virtual circuits. $V_{pi} = 0$ to 5 bits and $V_{ci} = 5$ to 10 bits.

$V_{pi} + V_{ci} = 10$ bits.

ATM Signaling

Conforms to ATM Forum UNI 3.0, UNI 3.1, UNI 4.0

Loopback of OAM F4 and F5 cells is supported.

Network Management

Supports ILMI

LAN Emulation

Implements ATM Forum LAN Emulation over ATM v.1.0.

Classical IP

The driver supports Classical IP according to RFC1577 and the recommendations in RFC1755.

MultiProtocol Encapsulation

The driver supports bridged and routed MultiProtocol Encapsulation according to RFC1483 with LLC-based multiplexing. Bridged operation supports Ethernet and Token-Ring encapsulation.

Bridged operation accepts frames with or without LAN FCS and generates frames without LAN FCS.

WinSock 2

The Windows NT 4.0 and Windows 95 drivers support the Windows Sockets 2 application programming interface for native ATM.

G.4 Environmental

Dimensions

12.7 x 23.5 cm (incl. bracket)

Weight

8.3 oz. (250g)

Power Requirements

2.2A max @ +5V

Operating Temperature

32 to 104 degrees F (0 to 40 degrees C)

Operating Humidity

8% to 80%, non-condensing @ 40 degrees C



Index

Numerics

1577 14

A

abbreviations 97
 adding adapters, Windows NT 3.51 32
 adding adapters, Windows NT 4.0 33
 ATM Forum 1

B

BBS 92
 bulletin board service 92

C

cables 28
 classicalIP 14
 command line 90

D

DIAG615X.EXE 85
 diagnostics 85
 diagnostics messages 112
 disks 2
 DOS4GW.EXE 85
 driver installation 29

E

e-mail 92
 error 99

F

FCC compliance ii
 fiber 28
 FTP server 92

H

hotline support 91

I

IBM
 LAN Server 4.0 49, 51
 MPTS 51
 installation
 cables 28
 hardware 27

Internet

e-mail 92
 FTP server 92
 WWW server 93

L

LEDs 140

M

messages 99

N

NDIS 3 35
 Novell server driver 38

P

package contents 2
 parameters
 AgingTime 119
 ArpResponseTime 119
 ArpServer 119
 ArpTimeout 120
 AtmAddress 118, 124
 DescrType 125
 EmptyCells 117
 EnableSvcSupport 117
 Encapsulation 120
 FlushTimeout 120
 ForwardDelayTime 120
 FramingMode 117
 IlmiRegisterAddresses 117
 IpAddress 120, 124
 JoinTimeout 121
 LanName 118
 LanType 118
 LecsAtmAddress 117, 119
 MacAddress 124
 MasterTiming 118
 MaxArpRetryCount 121
 MaxBurstSize 125
 MaxDataFrameSize 119
 MaximumAcceptedConnections 121
 MaximumOpenCircuits 121
 MaxLineRate 117
 MaxPvcs 118
 MaxReceiveRateDifference 122
 MaxTransmitRateDifference 122

index-2

- MaxUnknownFrameCount 121
- MaxUnknownFrameTime 121
- MaxVciBits 117
- MaxVpiBits 117
- MtuSize 123
- PeakRate 125
- PromiscuousMode 123
- PvcType 124
- QosClass 125
- ServerAtmAddress 119
- TraceMask 123
- TrafficProfileSelector 124
- UniVersion 118
- UserInstance 124
- VccTimeoutPeriod 123
- Vci 124
- Vpi 124

problem report form 94

R

RFC 1483 16

S

- source-routing 45
- support web 93
- support, technical 91

T

- technical support
 - e-mail 92
 - fax 91
 - hotline 91
 - WEB 93
- technical support, getting in touch with 91
- technical 91, 139
- test modes 86

U

UNI 1

W

- Windows 95 35
- Windows NT 30
- WinSock 2 error messages 111
- www server 93



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