Installing the TURBOWAYS 155 MC Adapter OS/2 Forum-Compliant LAN Emulation Driver

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1 Installing and Configuring the OS/2 Forum-Compliant LE Driver Automatically Using MPTS or LAPS

The following procedure describes the device driver installation procedure using either the Multi-Protocol Transport Services (MPTS) program or the LAN Adapter and Protocol Support (LAPS) program.

Note: In most cases, the drivers can be fully installed using this procedure. In cases where an automatic installation is not possible, you must follow the procedure contained in "Manually Installing ATM Forum-Compliant LAN Emulation OS/2 Drivers".

1.1 Installing the OS/2 LAN Emulation Driver

1. Determine whether your OS/2 system includes an MPTS or LAPS program. Most OS/2 systems that are used for LAN-based communication have a previously installed version of one of these programs. For example, OS/2 Warp Connect, IBM TCP/IP for OS/2, IBM LAN Server, and PC/3270 for OS/2 all include one of these programs.

   If your system has one of these programs installed, go to step 3.

   Note: The directions that follow use MPTS as the example installation program. The procedure for LAPS is similar. Refer to your MPTS or LAPS documentation for more information.

2. If your system does not have an MPTS or LAPS program installed, you have two choices:

   - Install an MPTS or LAPS program (refer to your MPTS or LAPS documentation for information on installing the program) and continue with step 3.
   - Go to "Manually Installing ATM Forum-Compliant LAN Emulation OS/2 Drivers" and perform the manual driver installation procedure.

3. Start MPTS by double-clicking on the MPTS icon or executing MPTS at the command line. MPTS is usually found in the IBMCOM directory of the OS/2 boot drive. The Multi-Protocol Transport Services panel appears.

4. Select **Install**. The Install Additional Network Drivers panel appears and asks you for the source of the adapter Network Information Files (.NIF files).

5. Insert the OS/2 LAN Emulation diskette in your computer's drive A (or any other 3.5-inch diskette drive) and direct the program to the path containing the OS/2 LAN Emulation driver (usually A:\). Select **OK**.

   When a message appears stating that the driver is installed, select **OK** again. The Multi-Protocol Transport Services panel reappears.

1.2 Configuring the OS/2 LAN Emulation Driver

1. From the Multi-Protocol Transport Services panel, select **Configure** to integrate the adapter's device driver with the protocol drivers. The Configuration panel, as shown in Figure 1, appears.

   [Image Placeholder: Figure 1. MPTS Configuration Panel]

   Figure 1: MPTS Configuration Panel.

2. Make sure that the LAN adapters and protocols radio button is selected and then select **Configure**. The LAPS Configuration panel, as shown in Figure 2, appears.

   [Image Placeholder: Figure 2. LAPS Configuration Panel]

   Figure 2: LAPS Configuration Panel.

3. From the Network Adapters group box, select **TURBOWAYS 155 OS/2 LAN Emulation Adapter**, and then select **Add**. The adapter name should appear in the Current Configuration group box.

4. From the Current Configuration group box, ensure the adapter is highlighted and select **Edit**. The Parameters panel, which displays all the driver parameters that you can edit, appears.

5. If your network requires it, type the 40-character, hexadecimal, LES ATM address in the LAN Emulation Server ATM address field. Some networks can configure the TURBOWAYS 155 Adapter LES ATM address automatically by using the LAN Emulation configuration server (LECS), and some must have the address defined for them.

6. If you want to use a locally administered address instead of the universally administered address, type the 12-character, hexadecimal address that you want to use in the Locally Administered Adapter address field. If you want to use the universally administered address, leave this address blank.

7. Select the LAN type by typing either **802.3+V2** (Ethernet) or **802.5** (token-ring).

8. If you want your computer to join a particular LAN, type the Emulated LAN Name. Contact your network administrator if you are unsure about the Emulated LAN Name.

9. The remaining parameters have default values assigned. If you want to change the default parameters for the adapter, type the appropriate parameter values.

   Note: The defaults are set to maximize performance for most installations; changing them is not required. Change the defaults only if you know that you have a specific need to alter their values.

10. When you have finished editing the driver parameters, select **OK**. The Configure Workstation panel reappears.

11. In the Protocols list box (upper right-hand corner of the panel), select the protocols used by your network application by highlighting each protocol and selecting **Add**. If you are not sure which protocols to use, select IBM IEEE 802.2 and IBM NetBIOS protocol drivers or ask your network administrator.

12. If necessary, edit the default parameters for the protocols by highlighting each protocol and selecting **Edit**. Enter or change any of the parameter values if needed. Select OK and the LAPS Configuration panel reappears.

13. Select **Close** on the Configure panel and then select **Exit**. The CONFIG.SYS Updates panel appears.

14. Make sure that the disk drive shown on the panel is the same as the disk drive that contains the CONFIG.SYS file. Select **Exit**. When the MPTS program has finished updating the CONFIG.SYS file, select **OK**. The Exiting MPTS panel appears.

15. Select **Exit** to exit the MPTS program.

16. Shut down your OS/2 system and restart your computer to complete the driver installation.

17. At system startup, check for the following conditions to determine whether the adapter is working correctly and whether you have successfully installed the adapter device driver:

    - The device driver files are loading successfully. There are no error messages.
    - You are able to log on and communicate with the network.

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2 Manually Installing ATM Forum-Compliant LAN Emulation OS/2 Drivers

This section contains instructions for manually installing TURBOWAYS 155 Adapter ATM Forum-compliant LAN Emulation OS/2 NDIS MAC drivers.

Use the procedure in this section only if you were unable to install the driver using the procedure in "Installing and Configuring the OS/2 Forum-Compliant LE Driver Automatically Using MPTS or LAPS".

Note: You might need to refer to your operating system's instruction manual if you are not familiar with the commands for copying files and creating directories.

To install the OS/2 LE driver, follow the steps listed below:

1. If the TURBOWAYS 155 Adapter is not already installed in the computer, configured, and tested, perform the procedures in *TURBOWAYS 155 ATM Micro Channel Adapter Installation and Testing Instructions* before you continue with this procedure.

2. Create an *x*:\TW155OS2 directory, where *x* is the drive on which you want to install the TURBOWAYS files.

3. Insert the OS/2 LAN Emulation diskette in drive A.

4. Copy the files from the OS/2 LAN Emulation diskette by typing:

   copy a:*.* *x*:\TW155OS2

   where *x* represents the drive on which you want to install the TURBOWAYS files. Press **Enter**.

5. Check the CONFIG.SYS file in the root directory of the drive used to start the computer to see whether or not there is a DEVICE= statement for the Protocol Manager (PROTMAN.OS2) similar to the following example:

   ```
   DEVICE=x:\yyyyy\PROTMAN.OS2 /I:x:\yyyyy
   ```

   If you find the DEVICE= statement, edit it so that it looks like the following statement:

   ```
   DEVICE=x:\TW155OS2\PROTMAN.OS2 /I:x:\TW155OS2
   ```

   where *x* represents the drive on which you installed the TURBOWAYS files.

   If you do not find the DEVICE= statement, add the following DEVICE= statement before any other DEVICE= statements that you find:

   ```
   DEVICE=x:\TW155OS2\PROTMAN.OS2 /I:x:\TW155OS2
   ```

   where *x* represents the drive on which you installed the TURBOWAYS files. The `/I` instructs the Protocol Manager to search for the PROTOCOL.INI file in the \TW155OS2 directory.

6. Add one of the following DEVICE= statements after the PROTMAN.OS2 statement to start the NDIS MAC driver:

   ```
   DEVICE=x:\TW155OS2\AT155LE.OS2
   ```

   where *x* represents the drive on which you installed the TURBOWAYS files.

7. Check to see whether or not there is a statement that invokes NETBIND.EXE.

   If you do not find the NETBIND.EXE statement, add the following statement after the DEVICE= statement that starts the NDIS MAC driver:

   ```
   RUN=x:\TW155OS2\NETBIND.EXE
   ```

   where *x* represents the drive on which you installed the TURBOWAYS files.

8. **If you have an existing PROTOCOL.INI file** on your computer's hard disk, copy that PROTOCOL.INI file to the \TW155OS2 directory.

   Note: The PROTOCOL.INI file is in the path specified after the `/I:` parameter in the Protocol Manager (PROTMAN.OS2) statement in the CONFIG.SYS file.

   If you do not have an existing PROTOCOL.INI file on your computer's hard disk, create one. To create a PROTOCOL.INI file, copy the appropriate sample INI file in the \TW155OS2 directory to a new PROTOCOL.INI file in the \TW155OS2 directory. There are two sample INI files in the \TW155OS2 directory from which to choose:

   - If you are working in an Ethernet network, copy the SAMPLETH.INI file by typing:

     copy *x*:\tw155os2\sampleth.ini *x*:\TW155OS2\protocol.ini

     where *x* represents the drive on which you installed the TURBOWAYS files.
   - If you are working in a token-ring network, copy the SAMPLETR.INI file by typing:

     copy *x*:\tw155os2\sampletr.ini *x*:\TW155OS2\protocol.ini

     where *x* represents the drive on which you installed the TURBOWAYS files.

9. Edit the PROTOCOL.INI file in the TW155OS2 directory. Figures 3 and 4 are examples of PROTOCOL.INI files for Ethernet and token-ring networks. Section A in each figure illustrates a protocol driver section that binds the protocol to the adapter specified in Section B in the same figure.

   - **If you copied a sample INI file** to create a PROTOCOL.INI file, it should look like the one shown in the figures. Perform the following edits in your PROTOCOL.INI file:
     - Remove the semicolons in front of the `[PROTOCOL]`, `Drivername=`, and `Bindings=` statements.
     - Replace the `[PROTOCOL]` statement with the protocol that you are using. For example, if you are using IBM TCP/IP for OS/2, your `[PROTOCOL]` statement would appear as `[TCPIP_nif]`.
     - Replace the value for the `Drivername=` statement with the name of the driver for the protocol that you are using. For example, if you are using IBM TCP/IP for OS/2, your `Drivername=` statement would appear as `TCPIP$`.
   - **If you had an existing PROTOCOL.INI file** on your computer's hard disk, alter or add a section so that it appears similar to that shown in Section A in the figures. (Do not add the semicolons in front of the `[PROTOCOL]`, `Drivername=`, and `Bindings=` statements.)
     - Use the protocol and driver name that you are using to fill in the values for the `[PROTOCOL]` and `Drivername=` statements.
     - Ensure that your `[PROTOCOL]` statement appears similar to the one shown in the figures. For example, if you are using IBM TCP/IP for OS/2, your `[PROTOCOL]` statement would appear as `[TCPIP_nif]`.
     - Complete the `Bindings=` statement. It should appear as:

       `Bindings=AT155LEO_nif`

       Note: If there is already a value for the `Bindings=` statement, place a comma after the existing value before adding the new Bindings value.

10. **If you created a PROTOCOL.INI file by copying the sample INI**, continue with step 11; otherwise, complete this step.

    If you had an existing PROTOCOL.INI file, add the ATM NDIS MAC driver section (Section B in the example PROTOCOL.INI files) to your PROTOCOL.INI file. The easiest way to accomplish this is to use a text editor to copy Section B from the appropriate sample INI file in the \TW155OS2 directory to the PROTOCOL.INI file.

11. Alter the ATM NDIS MAC driver section for the TURBOWAYS 155 Adapter in the PROTOCOL.INI file. Section B in the example PROTOCOL.INI files illustrates an OS/2 NDIS MAC driver section for a TURBOWAYS 155 Adapter.

    Section B lists many of the parameters supported by the TURBOWAYS 155 Adapter. Alter the parameters as needed for your network. The Ethernet and token-ring parameters supported by the NDIS MAC driver are described in Table 1.

    Supply an LES ATM address for the `LES_ATM_ADDR` parameter. The `LES_ATM_ADDR` is a required parameter.

    If you want to use a locally administered address, enter a 12-character, hexadecimal address in the MAC address (`MAC_ADDR`) parameter. If you want to use the universally administered address, omit the `MAC_ADDR` parameter.

    Note:

The default values for the remaining parameters, shown in the tables in "ATM Forum-Compliant LAN Emulation Configuration Parameters for OS/2" are set to maximize performance for most installations and, in most instances, are the values that you should use. Use other values only if you know that you have a specific need to alter the default values.

If you enter no value for a parameter, the adapter uses the default value, but it is recommended that you type the default values in your PROTOCOL.INI file for documentation and maintenance purposes.

12. Shut down the OS/2 system and restart the computer to load the drivers. Look for messages that indicate that the IBM TURBOWAYS 155 Adapter driver and the protocol driver are installed.

    - If the messages indicate that the drivers are installed, the installation is now complete and you have finished with this manual.
    - If error messages are displayed or if you do not see messages that indicate that the drivers are installed, refer to *TURBOWAYS 155 ATM Micro Channel Adapter Installation and Testing Instructions*.

Note: The values shown in the figures that follow are examples.

2.1 Sample PROTOCOL.INI File for an ATM Forum-Compliant Ethernet Network

```
;Protocol Manager Section
[PROT_MAN]
   Drivername = PROTMAN$
                .
                .
                .

;Section A: Example Protocol Driver
;[PROTOCOL]
;   Drivername = OS2NDIS$
;   Bindings = AT155LEO_nif
                .
                .
                .

;Section B: NDIS MAC Driver for Adapter
[AT155LEO_nif]
   Drivername = AT155LE$
   LES_ATM_ADDR = "00000000000000000000000000000000000000000000"
   LEC_AUTO_CFG = "NO"
   LAN_TYPE = "802.3+V2"
   MAX_FRAME_SIZE = 1516
   ENHANCED_MODE = "NO"
   UNI_VERSION = "AUTO"
   MAX_CONNECTIONS = 260
   MAX_MULTIC_ADDR = 8
   BEST_E_PK_RATE = 25600
   CNTRL_P_PK_RATE = 25600
```

```
   AGING_TIMEOUT = 300
   CONN_COMP_TIMER = 4
   CONTROL_TIMEOUT = 120
   LE_ARP_RSP_TIME = 4
   FLUSH_TIMEOUT = 4
   FRWRD_DELAY_TME = 15
   LE_ARP_CACHE_SZ = 260
   MAX_CFG_RETRIES = 1
   MAX_RETRY_CNT = 1
   MAX_UNKN_FR_CNT = 1
   PATH_SWTCH_DELY = 6
   VCC_TIMEOUT = 1200
   ADAPTER_TYPE = 4
```

Figure 3. Sample ATM Forum-Compliant Ethernet Emulation PROTOCOL.INI File for an OS/2 Workstation

Table 1 describes the parameters shown in Figure 3.

2.2 Sample PROTOCOL.INI File for an ATM Forum-Compliant Token-Ring Network

```
;Protocol Manager Section
[PROT_MAN]
   Drivername = PROTMAN$
                .
                .
                .

;Section A: Example Protocol Driver
;[PROTOCOL]
;   Drivername = OS2NDIS$
;   Bindings = AT155LEO_nif
                .
                .
                .

;Section B: NDIS MAC Driver for Adapter
[AT155LEO_nif]
   Drivername = AT155LE$
   LES_ATM_ADDR = "00000000000000000000000000000000000000000000"
   LEC_AUTO_CFG = "NO"
   LAN_TYPE = "802.5"
   MAX_FRAME_SIZE = 4544
   ENHANCED_MODE = "NO"
   UNI_VERSION = "AUTO"
   MAX_CONNECTIONS = 260
   MAX_MULTIC_ADDR = 8
   BEST_E_PK_RATE = 25600
   CNTRL_P_PK_RATE = 25600
   AGING_TIMEOUT = 300
   CONN_COMP_TIMER = 4
   CONTROL_TIMEOUT = 120
```

```
LE_ARP_RSP_TIME = 4
FLUSH_TIMEOUT = 4
FRWRD_DELAY_TME = 15
LE_ARP_CACHE_SZ = 260
MAX_CFG_RETRIES = 1
MAX_RETRY_CNT = 1
MAX_UNKN_FR_CNT = 1
PATH_SWTCH_DELY = 6
VCC_TIMEOUT = 1200
ADAPTER_TYPE = 4
```

Figure 4. Sample ATM Forum-Compliant Token-Ring Emulation PROTOCOL.INI File for an OS/2 Workstation

Table 1 describes the parameters shown in Figure 4.

3 ATM Forum-Compliant LAN Emulation Configuration Parameters for OS/2

This appendix lists the ATM Forum-compliant LAN Emulation configuration parameters that are supported by the TURBOWAYS 155 Adapter, with a brief explanation of each parameter.

3.1 OS/2 NDIS MAC Driver Parameters in PROTOCOL.INI

For ATM Forum-compliant LAN Emulation, the parameters supported by the NDIS MAC driver are described in Table 1.

Table 1. ATM Forum-Compliant OS/2 NDIS MAC Driver Parameters in PROTOCOL.INI

Parameter	Explanation
Drivername	AT155LE$
LES_ATM_ADDR	The ATM address of the LES that serves your computer. You must assign a value. Type: Hexadecimal string Value: A 40-character, hexadecimal address
MAC_ADDR	The MAC address for the adapter. The adapter can be known on the network by its universally administered address (encoded in the adapter memory at the factory) or a locally administered address (a unique, user-assigned address). The universally administered address is the default. The address appears on the TURBOWAYS 155 Adapter bracket. If you use a locally administered address, it should appear with this parameter. Omit this parameter if you use a universally administered address. Type: Hexadecimal string Value: 400000000000 to 7FFFFFFFFFFF

LEC_AUTO_CFG

The configuration mode for the LES ATM address. The configuration mode determines how the adapter obtains the LES ATM address. Automatic (LEC_AUTO_CFG=YES) indicates that the adapter will try to obtain the LES ATM address from the LAN Emulation Configuration Server (LECS). The LECS address will be obtained from the ILMI MIB table in the attached switch, if available, or the adapter will use the ATM Forum defined Well-Known LECS Address.
User-defined (LEC_AUTO_CFG=NO) indicates that the user-specified LES ATM address will be used.
Type: Character string
Value: "YES" or "NO" (Default="NO")

LAN_TYPE

The type of LAN Emulation.
Type: Character string
Value (Ethernet): 802.3+V2
Value (Token-Ring): 802.5

ELAN_NAME

The name of the emulated LAN you would like to join.
Type: Character string
Value: 1 to 32 characters (This parameter is optional.)

MAX_FRAME_SIZE

The maximum AAL-5 service data unit (SDU) size of a data frame that can be transmitted or received.
Type: Decimal number
Value: 1516, 4544, 9234, or 18 190
(Default = 1516 for Ethernet,
4544 for Token-Ring)

ENHANCED_MODE

ATM Forum-compliant LAN Emulation requires that the client drop all connections during certain error conditions, such as in an LES failure or as in the loss of the connection to the LES. IBM's Enhanced Mode will maintain the data connections and will retry the connection to LES. Stations that have Enhanced Mode set can stay up during these failures and continue to communicate with other Enhanced Mode stations.
Type: Character string
Value: "YES" or "NO" (Default = "NO")

UNI_VERSION

This parameter can be AUTO, UNI 3.0, or UNI 3.1. This parameter either specifies which version of the ATM Forum User-Network Interface (UNI) Specification should be used by the driver or specifies that the driver should use Integrated Local Management Interface (ILMI) to query the switch to determine the appropriate version. If this parameter is set to UNI 3.0, then the driver will use ATM Forum UNI 3.0. If this parameter is set to UNI 3.1, then the driver will

use ATM Forum UNI 3.1. If this parameter is set to AUTO, then the driver will query the switch using ILMI to determine the UNI version according to the procedure described in UNI 3.1. If the switch replies with UNI 3.0 or UNI 3.1, then the driver will use the matching version. If the switch does not reply to the query, then the driver will use UNI 3.0.
Type: Character string
Value: "AUTO", "UNI 3.0", or "UNI 3.1" (Default = "AUTO")

MAX_CONNECTIONS — The maximum number of SVC connections that the adapter can support.
Type: Decimal number
Value: 32 to 1024 (Default = 260)

MAX_MULTIC_ADDR — The maximum number of multicast addresses that this station supports.
Note: In a token-ring network, this keyword sets the number of group addresses.
Type: Decimal number
Value: 8 to 64 (Default = 8)

BEST_E_PK_RATE — The peak rate for best-effort (data) connections (Kbps).
Type: Decimal number
Value: 1000 to 155 500, in increments of 100 (Default = 25 600)

CNTRL_P_PK_RATE — The peak rate for all control plane (signalling and ILMI) connections (Kbps).
Type: Decimal number
Value: 1000 to 155 500, in increments of 100 (Default = 25 600)

AGING_TIMEOUT — The time (in seconds) that ARP table entries (MAC addresses or route descriptors) are maintained without verification of their ATM addresses (work on this).
Type: Decimal number
Value: 10 to 300 seconds (Default = 300)

CONN_COMP_TIMER — The time (in seconds) in which data or a READY_IND message is expected from the calling party.
Type: Decimal number
Value: 1 to 10 (Default = 4)

CONTROL_TIMEOUT — The timeout period (in seconds) for most request and response control frame interactions.
Type: Decimal number
Value: 10 to 300 (Default = 120)

LE_ARP_RSP_TIME
The maximum expected time (in seconds) for the LE_ARP_REQUEST/LE_ARP_RESPONSE cycle to complete.
Type: Decimal number
Value: 1 to 30 (Default = 4)

FLUSH_TIMEOUT
The maximum time (in seconds) allowed to receive the LE_FLUSH_RESPONSE after the LE_FLUSH_REQUEST has been sent before recovery action is taken.
Type: Decimal number
Value: 1 to 4 (Default = 4)

FRWRD_DELAY _TME
The maximum time (in seconds) that an ARP entry for a non-local MAC address is maintained without verification.
Type: Decimal number
Value: 4 to 30 (Default = 15)

LE_ARP_CACHE_SZ
The number of entries in the ARP table that maintains the ATM addresses for LAN destinations.
Type: Decimal number
Value: 32 to 1500 (Default = 260)

MAX_CFG_RETRIES
The maximum number of times that a CONFIG_REQUEST is re-sent to the LECS and a JOIN_REQUEST is re-sent to the LES in the absence of a response during the join process.
Type: Decimal number
Value: 0 to 2 (Default = 1)

MAX_RETRY_CNT
The number of times that an LE_ARP request is retried.
Type: Decimal number
Value: 0 to 2 (Default = 1)

MAX_UNKN_FR_CNT
The maximum number of frames for a given unicast MAC address that can be sent to the Broadcast and Unknown Server (BUS).
Type: Decimal number
Value: 1 to 10 (Default = 1)

PATH_SWTCH_DELY
The time (in seconds) allowed from the sending of a frame to the BUS until the LEC assumes that the frame either has been discarded or has been delivered to the recipient.
Type: Decimal number
Value: 1 to 8 (Default = 6)

VCC_TIMEOUT
The time (in seconds) that the adapter maintains inactive data connections.
Type: Decimal number
Value: 30 to 99 999 999 (Default = 1200)

```
ADAPTER_TYPE        The type of adapter.
                    Type: Decimal number
                    Value: 4
```