

EXHIBIT C

User Manual



Optimizer™ USB
CT-L22SU15

USB DSL System Chipset for
Customer Premises Equipment

Installation Guide
Revision 1.2b

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Fremont, CA
USA

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1. Introduction

This guide describes the setup and installation of a USB CPE modem with the Centillium Communications *Optimizer USB* chipset CT-L22DU15, digital chip and CT-L21AT01, analog chip.

The guide will cover the installation of:

- Windows® 98 software drivers for the *RFC 1483* network protocol
- Windows® 98 software drivers for the *PPP over ATM* protocol
- A User interface for monitoring the DSL link (for RFC 1483 protocol only)

2. System Requirements

The Optimizer USB modem requires the following host system:

- PC, Pentium-class, 166 MHz or better recommended
- Windows 98 or Windows 98, 2nd edition
- 16-Mbytes RAM, 32 Mbytes recommended
- Hard disk space of at least 20 Mbytes
- One available USB port

The user may also need access to the Windows 98 or Windows 98, 2nd edition installation CD-ROM.

3. Software Shipped by Centillium

The files needed for the installation of the software are available in the following formats:

- Two or more compressed files (zip-format)
- 3.5" floppy disks
- CD-ROM

If you are using the floppy disks or compressed files, unzip all zipped files into a directory on your computer. The zip files already contain the correct directory structure for the installation. If you are using the CD-ROM, there is no need for copying the files onto the host PC.

The files are organized in three directories:

- *RFC1483* with the driver for the RFC 1483 protocol
- *PPPoA* with the driver for the PPP over ATM protocol
- *UI* with the user interface

In addition, there are documentation files, like this Installation Guide.

4. Software Installation

The user's ISP (internet service provider) will provide information on which of the two protocols, RFC 1483 or PPP over ATM, needs to be installed. The user needs to install only one of them.

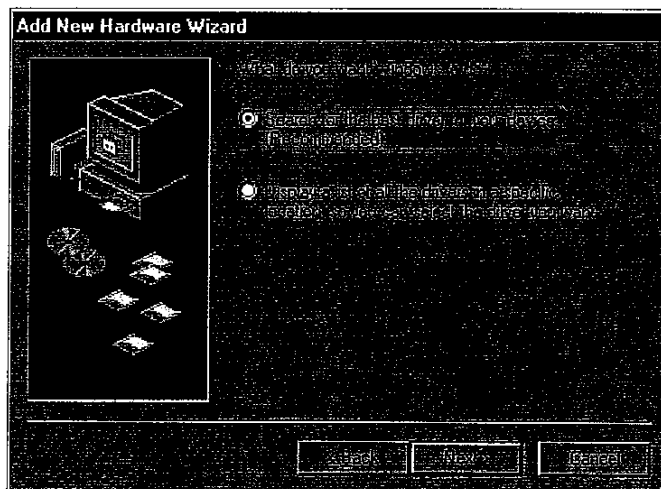
4.1. RFC 1483 – Device Drivers Installation

4.1.1. Plug-and-Play Dialogue

Once the Optimizer USB DSL modem is connected to the PC, the Windows 'plug-and-play' routine will detect the new device and start an installation dialogue.



Click *Next*.



Click *Next*. In the following menu, select 'Specify a location' and fill in the path to the directory (for example, 'A:\rfc1483' for the floppy disk). If you are using the floppy disk, make sure it is inserted in the floppy drive before proceeding.



Click *Next*.



Click *Next*. This will start the installation of the drivers and connection to the ADSL modem over the USB.



Depending on your computer's setup, the operating system may ask for the Windows 98 installation CD-ROM. In that case, insert the CD-ROM in the drive and type in the path to the required installation files (for example, 'D:\Win98').



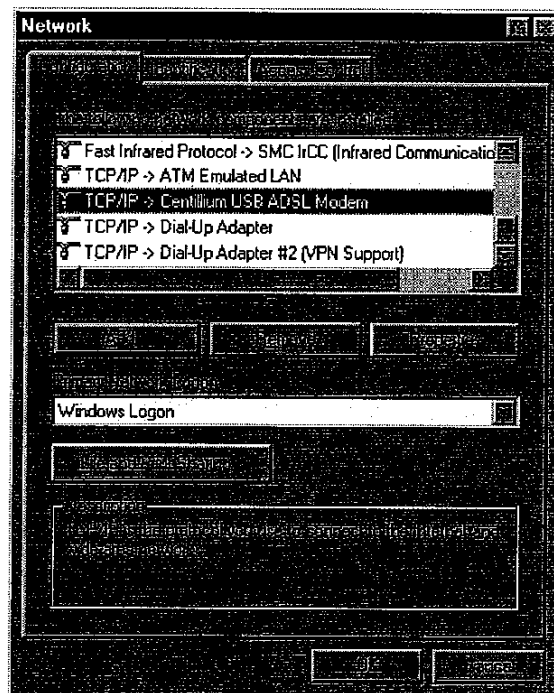
Click *Finish*. If you have used a floppy disk for the installation of the drivers, take it out of the floppy drive and confirm the reboot prompt with a 'Yes'.

4.1.2. Configuring the IP address

In this step, the IP address for the modem is set.

Go to 'Start – Settings – Control panel – Network'.

Scroll down in the window that pops up and you will see an entry 'TCP/IP -> Centillium USB ADSL Modem', as shown in the following screenshot:



(Please note that depending on your computer's setup there can be additional entries that are not needed, but also do not disturb the correct functioning of the Optimizer software; some of the screen shots in this guide contain such entries).

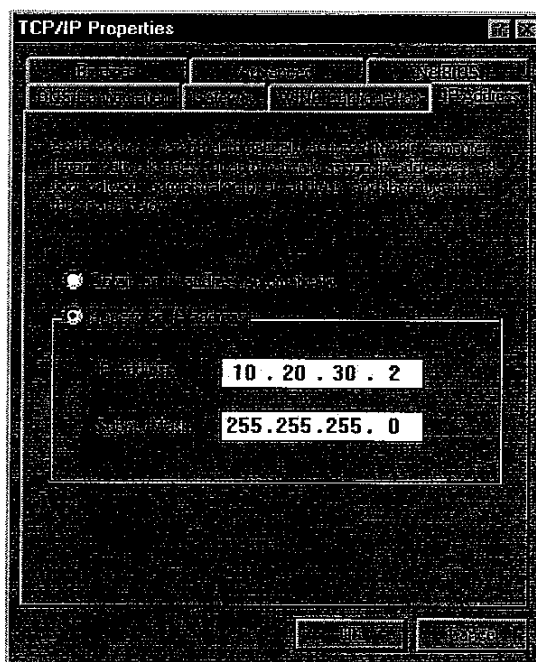
- If this entry is missing, click 'Add' on the window, and select 'Protocol – Add – Microsoft - TCP/IP – OK' in the subsequent windows.
- If there is only one entry mentioning "TCP/IP" (as opposed to three in the screenshot above), the entry will just be "TCP/IP" and not mention the Centillium modem.

Now highlight the entry 'TCP/IP -> Centillium USB ADSL Modem' (or just TCP/IP) and select 'Properties' to configure the IP parameters.



Your Internet Service Provider will provide information on the correct settings for the IP address (in most cases the IP address will be allocated dynamically using the DHCP protocol). The following example applies to a setup with Centillium Communications' CopperLite CO evaluation board as the CO- side modem.

Choose the 'IP address' tab in the window shown below. Select 'Specify an IP address' and type in 10.20.30.2 for the IP address, and 255.255.255.0 for the Subnet mask.

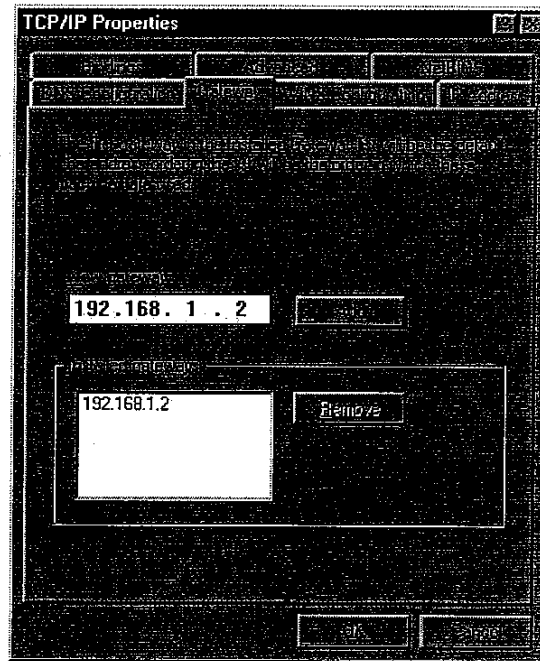


Do not click 'OK' just yet.

→ 4.1.2.1

4.2.1.1 Configuring the Gateway

Click on the 'Gateway' tab, and type 192.168.1.2 in the IP address and click 'Add'.

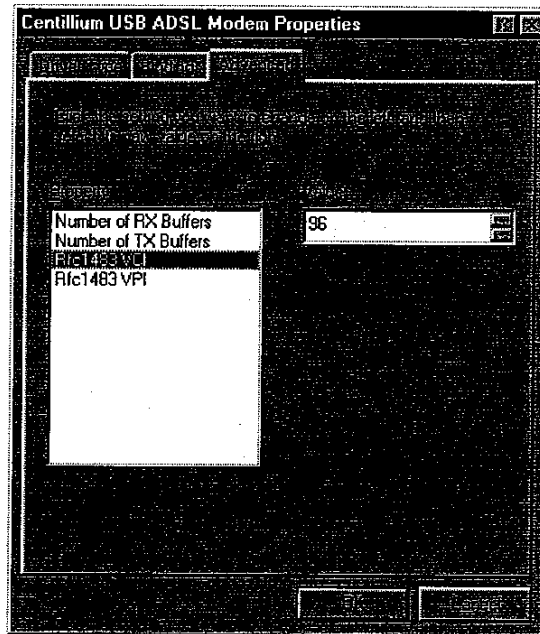


Click the 'OK' button. You may be prompted to reboot the computer. If so, select 'Yes'.



4.1.3. Setting the ATM Virtual Channel/Virtual Path

Go to 'Start – Settings – Control panel – Network'. Highlight 'Centillium USB ADSL Modem' (not 'TCP/IP-> USB ADSL Modem') and select 'Properties'. Choose the 'Advanced' tab.



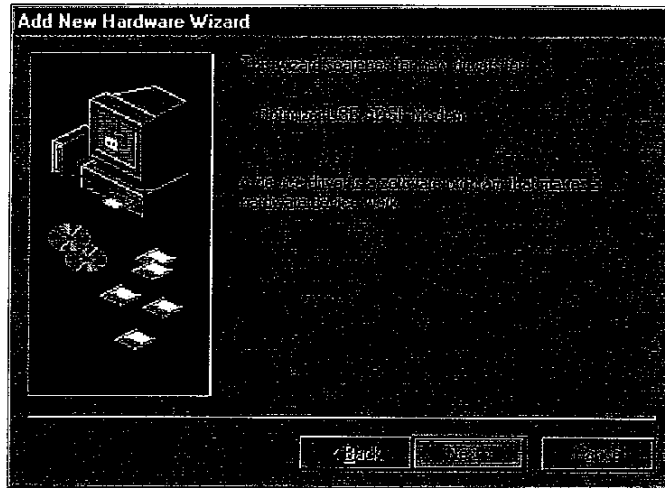
When connecting to a Centillium CopperLite CO board, the 'Rfc1483VCI' must be set to 96 and 'Rfc1483VPI' to 0. In other cases, please check with your ISP or CO-side modem manufacturer.

You may be prompted to reboot the computer. If so, select 'Yes'.

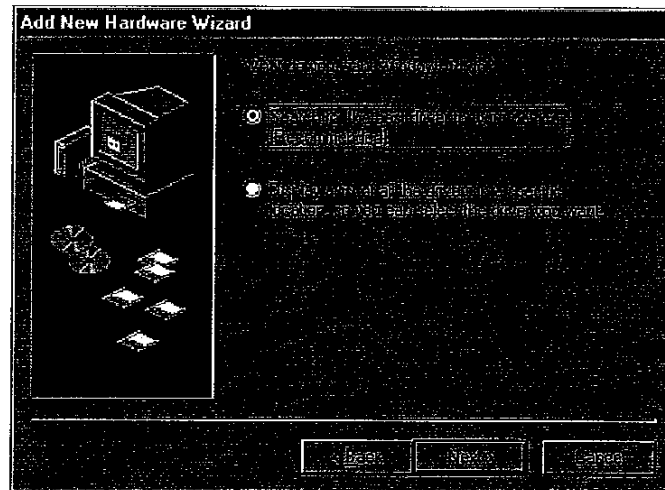
4.2. PPP over ATM – Device Drivers Installation

4.2.1. Plug-and-Play Dialogue

Connect the Optimizer USB DSL modem to the PC, and the Windows 'plug-and-play' routine will detect the modem as a new device and start an installation dialogue.



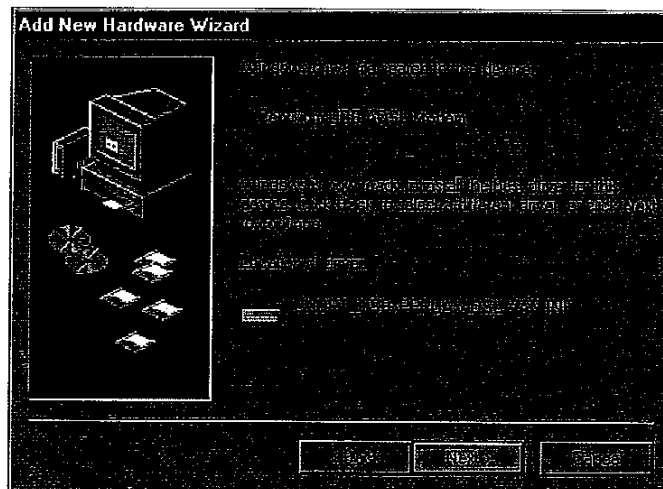
Click *Next*.



Click *Next*. In the following menu, select 'Specify a location', and fill in the path to the 'pppoa' directory (for example, 'D:\pppoa' for the CD-ROM).

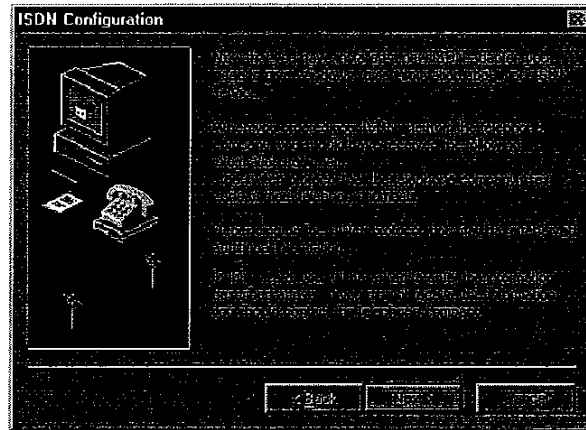


Click *Next* .

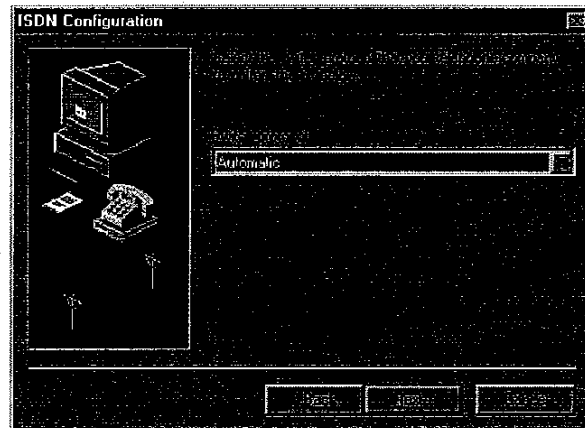


Click *Next*.

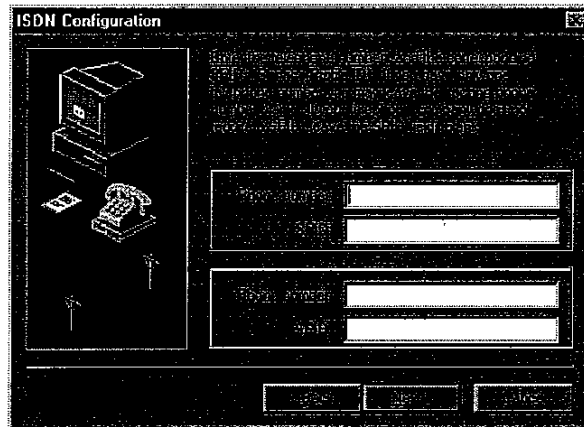
The following dialogue installs an *ISDN* adapter (Integrated Services Digital Network), which is used for the PPP over ATM connection. You only have to step through the dialogue boxes without filling in anything. The screenshots are shown for illustration:



Click *Next*.



Select *Automatic* (the default) and click *Next*.



There is no need to fill in the textboxes.
Click *Next*.

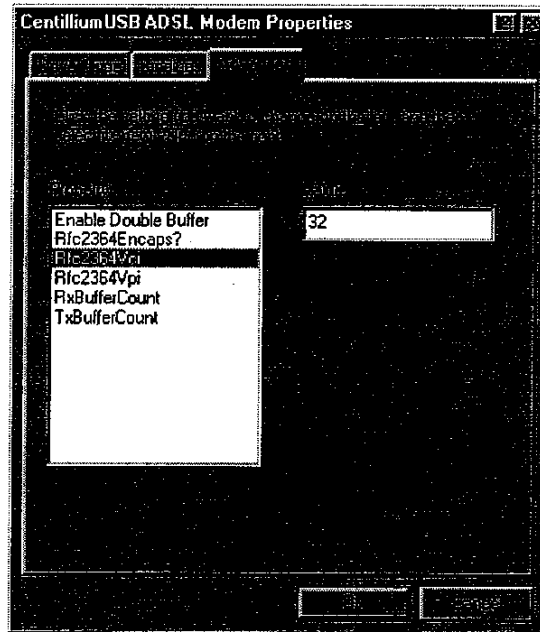


Click *Finish*.

Windows will now install various files. Depending on your computer's setup, the operating system may ask for the Windows 98 installation CD-ROM. In this case, insert the Windows 98 CD-ROM in the drive and type in the path to the appropriate files (for example, 'D:\Win98').

4.2.2. Setting the ATM Virtual Channel/Virtual Path

Go to 'Start – Settings – Control panel – Network'. Highlight 'Centillium USB ADSL Modem' (*not* any of the other entries in the list) and select 'Properties'. Choose the 'Advanced' tab.



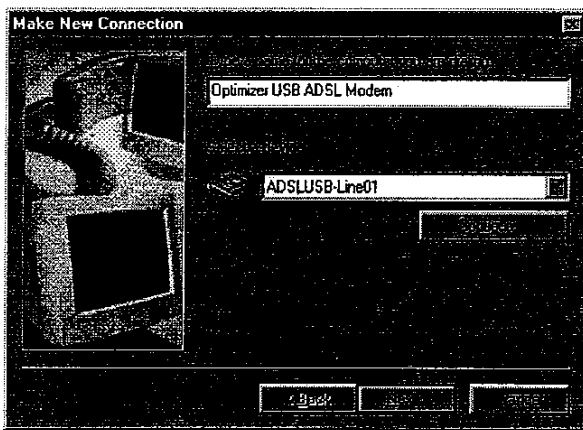
Please check with your ISP or CO-side modem manufacturer on the proper settings for the 'Rfc2364VCI' (e.g. 32) and 'Rfc2364VPI' (e.g. 0). Do not change any of the other parameters.

You may be prompted to reboot the computer. If so, select 'Yes'.

4.2.1.1 Configuring the Dial-Up Connection

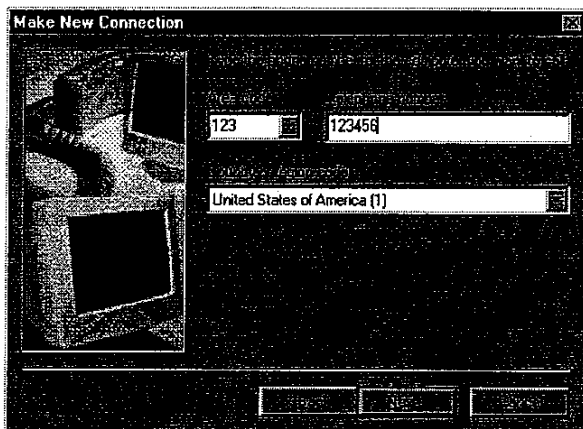
The PPP over ATM protocol uses the familiar dial-up connection that has been in use many years for analogue modems.

Double click 'My Computer – Dial-up Networking – Make New Connection', and select 'Configure'. The following dialogue box will pop up:

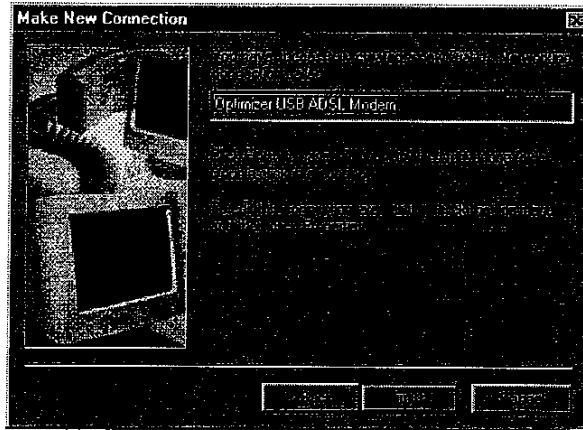


Choose an arbitrary name for the connection (e.g. "Optimizer USB ADSL Modem"). Select 'ADSLUSB Line' from the pull down menu as the *device*.

Click *Next*.



Fill in an arbitrary telephone number and area code and click *Next*.



Click *Finish*.

To establish an ADSL connection, invoke the dial-up connection you have just created. Type in your user name and password, select 'OK', and you will be connected to your ISP.

The ADSL connection with PPP over ATM will work just like the familiar analog modem, only about 30 times faster.

4.3. Uninstalling the Optimizer USB Drivers

First, disconnect the ADSL USB modem.

Go to the 'Taskbar – Start – Settings – Control panel' and select the 'Network' icon. Click on the 'Centillium USB ADSL Modem' entry and choose 'Remove'.

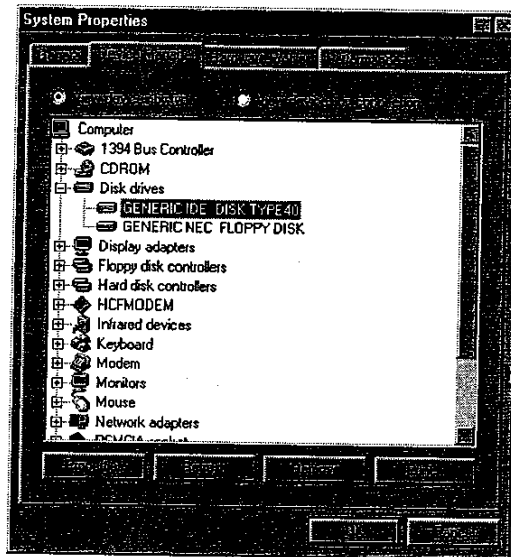
Now go to 'taskbar-start-settings-add/remove programs' and remove the "Optimizer DSL modem software".

Finally reboot.

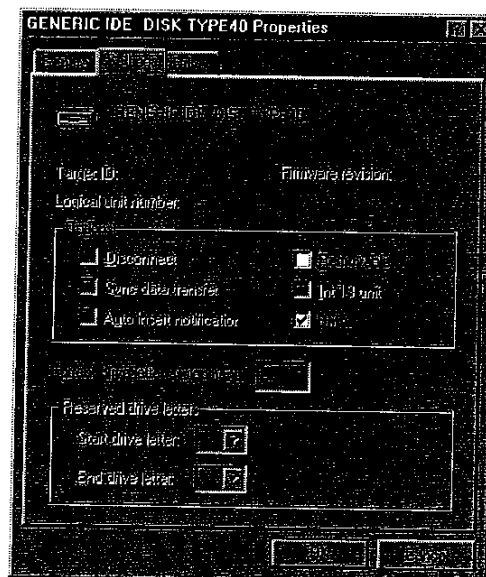
4.4. Improving the performance

There are two simple settings on your computer that can improve the performance of your Optimizer USB ADSL modem, no matter if you are running RFC1483 or PPPoA.

- 1) Enabling the DMA: Go to taskbar-start-settings-system. Choose the Device Manager tab.



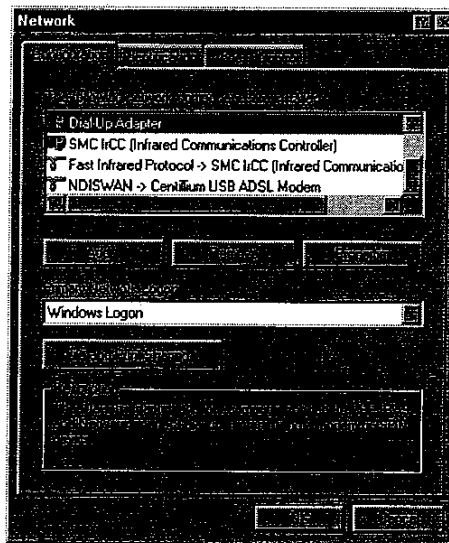
Highlight the main harddisk of your PC and choose properties.



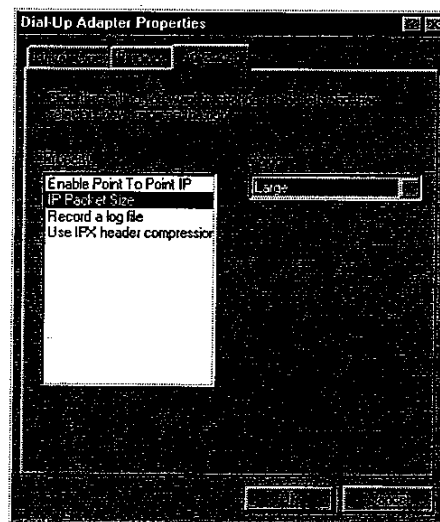


Select the settings tab and make sure that the "DMA" box is selected. Finally click OK.

- 2) Setting the IP packet size: Go to taskbar-start-settings-network. Highlight the dial up adapter (*not* Centillium ADSL USB modem) and click properties.



Choose the *Advanced* tab. Highlight *IP packet size* and select *large* from the pull down menu.



Click OK.

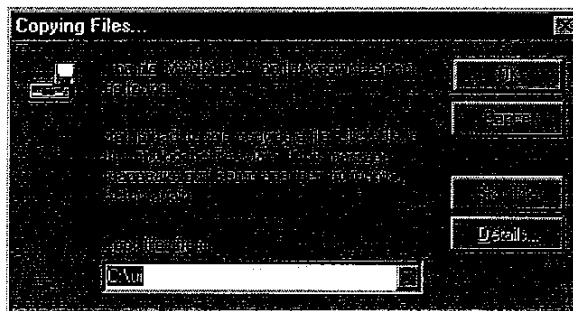
4.5. User Interface (UI) Installation

The user interface shipped with the Optimizer USB modem provides basic monitoring of an ADSL connection. It indicates the upstream and downstream data rates, receive and transmit cell and error count, and an indication of the status of the ADSL link. The user interface can only be used with the RFC 1483 protocol.

4.5.1. Installing the User Interface

The installation of the user interface is semi-automatic consisting of the popular 'Installshield' application and an additional installation program.

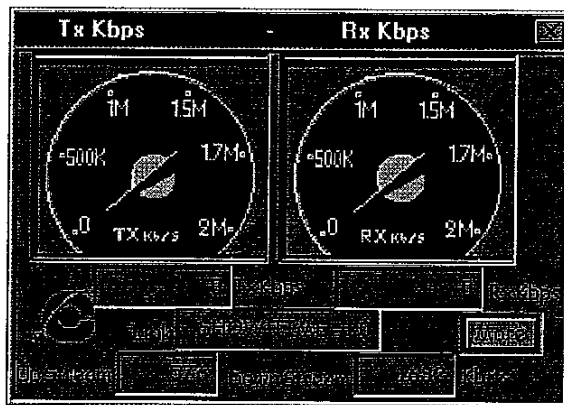
1. Go to the 'ui' directory, unzipped from the zipped file or copied from the floppy disks or CDROM.
2. Double click on 'setup.exe', which will invoke an Installshield.
3. Follow the steps of the Installshield:
 - Read the license agreement and proceed if you agree with its terms and conditions.
 - In the subsequent dialogue box, fill in your name, name of your company, and at this time an arbitrary serial number. Note that you cannot go to the next screen without filling in a serial number.
 - The last step will generate a program group with icons for the user interface, a Readme file and a helpfile. Note that on some screens the program group may hide the final screen of the Installshield.
4. After successfully completing Installshield, double click on the MSDOS program *Install*, which is listed in the program group that opened before the final step of the Installshield. This will perform the necessary TCP/IP settings for the user interface. Please note that if you run the program *install.exe* instead, located in the 'ui' directory, it will terminate with an error and the installation will not be completed.
 - If a dialogue box pops up like the one shown below, specify the path to the directory where you copied or unzipped the 'ui' directory (for example, 'C:\ui'), then click 'OK'.



5. If a dialogue box appears asking for the network protocol, click the 'Have disk' button and specify the path to the 'ui' directory (for example, 'D:\ui' for the CD-ROM).
6. Once the installation is finished, reboot the computer. Note that there is *no* automatic reboot and that the user interface will not work properly without rebooting at the end of the installation.
7. When the computer is rebooted, you can open the user interface by typing 'ui' into the 'Start - Run...' Windows 98 menu option, or access it from the 'Start programs' menu.

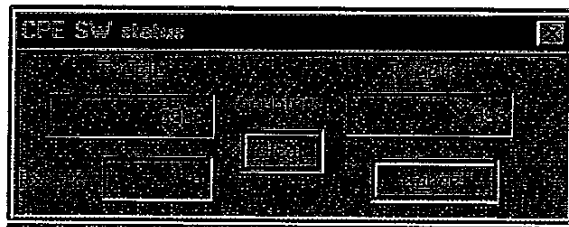
The sample screen of the user interface shows that the modem is in 'Show time' state and connects at a line rate of 576/1632 kbps up/downstream.

Please note that the dials and the *Txkbps* and *Rxkbps* windows indicate the data rate that is being used by the application running, not the maximum available datarate. In this example, the data rate being used by web browsing is 59 kbps upstream and 1031 kbps downstream.



When web browsing, the dials and the *Txkbps* and *Rxkbps* data rates will change frequently, as most browsers transmit and receive relatively short, but many packets of data.

A click on 'More' will show the following screen:



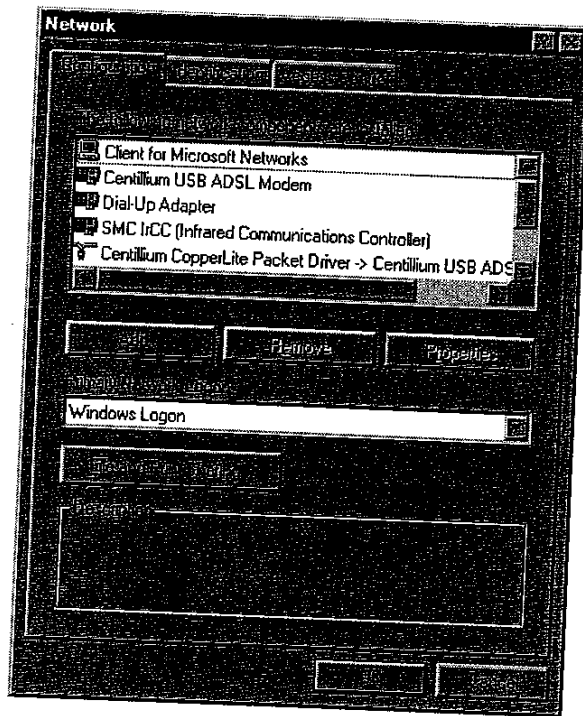


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The *RxCells* and *TxCells* counters show a continuous count of the cells received and transmitted. The count restarts at '0' whenever 'Clear' is clicked in the screen. The *RxCRC* shows the CRC errors in the downstream direction (a '0' here indicates a good connection).

4.5.2. Troubleshooting Tips

1. If the modem does not go to the 'Show Time' state, check the following:
 - Check the USB cable connection to your Optimizer modem.
 - Unplug the USB cable from your Optimizer modem and plug it in again for a new device enumeration.
 - Check that the installation of the driver was correct. Go to 'Start – Settings – Control panel – Network'. The pop-up window should show the 'Centillium CPE Packet Driver ->...' and the 'Centillium USB ADSL Modem' entries.



4.5.3. Uninstalling the User Interface

To uninstall the UI, go to 'Start – Settings – Control panel – Network'. Highlight the line 'Centillium CPE Packet Driver -> Centillium USB ADSL Modem' and click 'Remove'.



5. Related Documents

Optimizer USB Data Sheet — document number CSP-PPUM-2U.

6. Contact Information

For further information please contact:

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