

To: Placer GPS 450 CDPD Resellers and Users
Date: October 11, 1996
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Customer Service

Subject **Setting up an end-to-end system using a CDPD Network**

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Introduction

This document describes:

- What we are providing
- What you need to provide
- Simple end-to-end configurations using CDPD network
- Background information on CDPD systems

The information contained in this document regarding CDPD systems is not exhaustive and should only be used as an introduction to the subject. If you require further details then you should contact the Cellular Carrier that provides CDPD services in your area.

What we are providing

The key components of an end-to-end system are the mobile system and the fixed end host system. The mobile system equipment, installed in the vehicle, comprises a

Placer GPS 450 and a CDPD modem. The fixed end host system, located in your office or the dispatch center, consists of a personal computer, running Trimble's AVL & Fleet Management software FleetVision 2.0 for Windows. The personal computer can use either a CDPD modem, in a peer-to-peer configuration or a normal Hayes AT modem if it is using the internet via an internet service provider to access the CDPD network or special equipment for a direct link to the CDPD carrier (available from the carrier). The equipment and software that we are providing is listed below:

Mobile System

The Placer GPS 450 is shipped with:

- A TCP/IP protocol stack
- SLIP interface driver to communicate with CDPD modems
- Support for the following CDPD modems:
 - ◆ Sierra Wireless MP200 CDPD Modem (MP210 & Pocket Plus will work, BUT you must manually configure them for SLIP mode)
 - ◆ PCSI Ubiquity 2000 CDPD Modem

Host System

The AVL and Fleet Management software, FleetVision 2.0 for Windows, with accompanying ETAK maps.

What you need to provide

The two most common, and probably the simplest, end-to-end system configurations are peer-to-peer configuration or using the internet to exchange messages (there is another configuration that involves a direct link to the CDPD provider, please consult the the provider for further details).

You need to provide the following equipment and software systems to set up these configurations:

Mobile System

At the mobile end, the Placer GPS 450 requires the following:

- A CDPD modem (see appendix A for details)
- An IP address, which your CDPD service provider will give when you register the CDPD modem

Host System

In order to track your mobile systems and exchange messages, you need to provide the following:

- A personal computer with Microsoft Windows 3.1, with one available serial communications COM port

For Peer-to-peer configuration

- A CDPD modem - the following are recommended:
 - ◊ Sierra Wireless MP200
 - ◊ PCSI Ubiquity 2000
- An IP address, which your cellular service provider will give when you register the CDPD modem
- A Winsock incorporating a TCP/IP protocol stack with SLIP driver to communicate with the modem (this will be supplied with the CDPD modem).

For fixed end host system configuration:

- A normal Hayes AT modem
- A telephone line
- A SLIP (or PPP) account with an internet service provider (ISP). Internet TCP/IP software can be used via telephone lines to connect to a SLIP (or a PPP) server (a computer connected to the internet and maintained by the ISP) thus providing you with a direct connection to the internet. The account must have a permanent IP address (also known as a static IP address).
- A Winsock incorporating a TCP/IP protocol stack and a SLIP driver (or a PPP supporting stack, if PPP is chosen) to communicate with the ISP. We recommend you use Trumpet Winsock by Trumpet International.

Simple end-to-end configurations using CDPD

The two most common ways you can configure an end-to-end configuration using CDPD network are: a peer-to-peer configuration or accessing the CDPD network using the internet, see Figures 1 and 2 below.

A. Peer-to-Peer Configuration

This configuration requires a CDPD modem connected to both the Placer GPS 450 and to the host system personal computer running FleetVision for Windows. The CDPD modems use an interface protocol called SLIP (Serial Line Interface Protocol) to communicate with the computing device (the Placer or the PC). Also, the CDPD network operates as an extension of the existing Transmission Control Protocol/Internet Protocol (TCP/IP) we, therefore, need TCP/IP software in both the mobile and the host system.

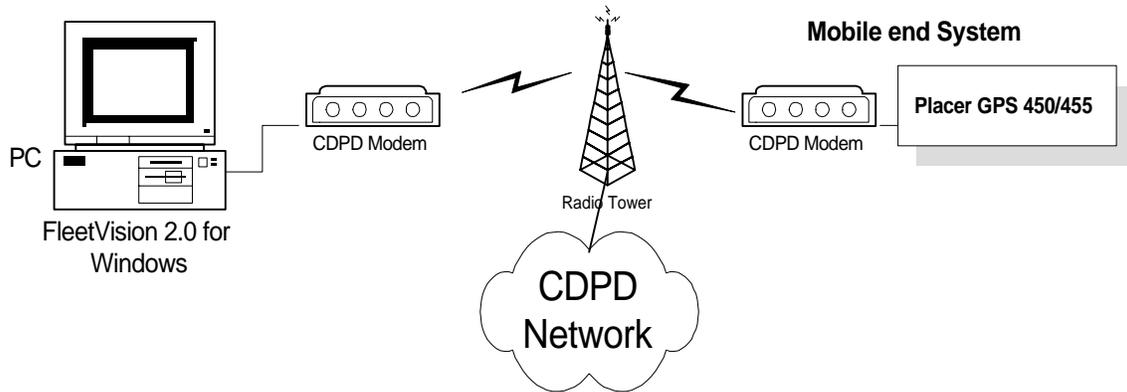


Figure 1. Peer to peer Configuration

The Placer GPS 450 is shipped with a SLIP driver so that it can communicate with the CDPD modem and a TCP/IP stack to enable it to exchange messages over the CDPD network. The Placer has been designed to support two different CDPD modems; Sierra Wireless MP200 and PCSI Ubiquity 2000. You should purchase either one of these. You should then register the CDPD modem with your CDPD provider and configure them with the IP address provided. The modems should come with configuration software to allow you to easily set them up. Please refer to the documentation supplied by the vendor of the modems. Also, please refer to the section on Modem Configuration in this release notebook for more details.

The host system personal computer on which you will run FleetVision 2.0 you should install a Windows Socket or WINSOCK incorporating TCP/IP stack together with a SLIP driver. The Winsock is a set of software programs that allow FleetVision to communicate with the CDPD modem for the transmission and reception of messages through the CDPD network.

The WINSOCK and TCP/IP stack are normally provided by the CDPD modem vendor, check the documentation supplied with the modems. The documentation should also contain instructions on installing the Winsock and TCP/IP stack.

Once power is applied to the CDPD modems they automatically log on to the CDPD network and prepare themselves for operation.

B. Accessing the CDPD network via the Internet

In this configuration a conventional host system such as a personal computer connects to the CDPD network through the internet, please see Figure 2.

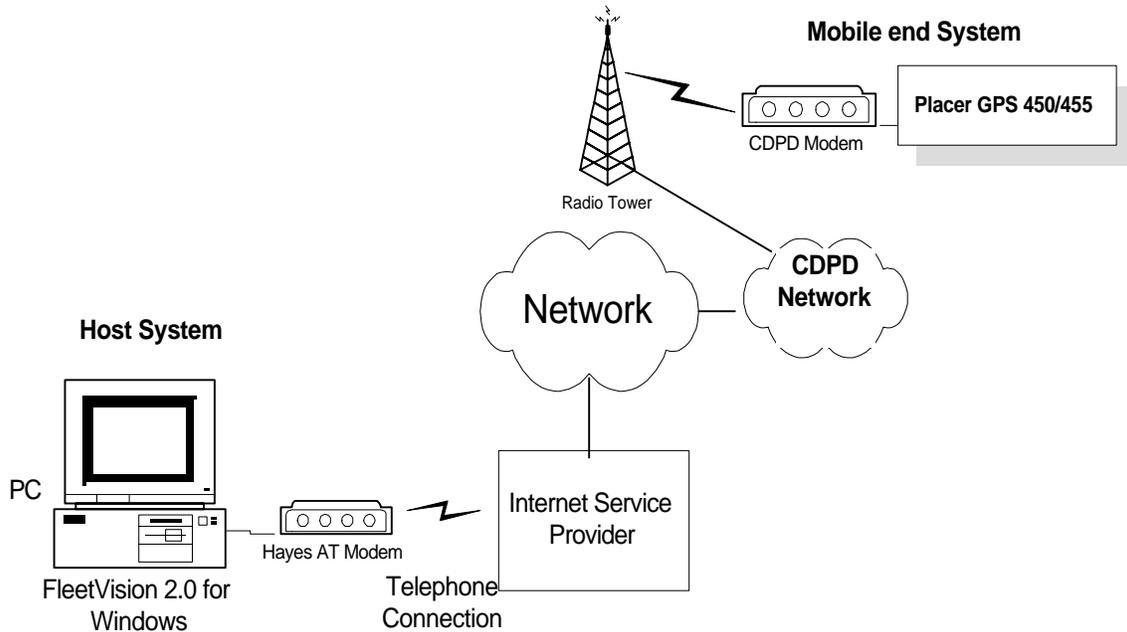


Figure 2. Accessing the CDPD network via the Internet

Messages received by the cellular carrier from units operating in its CDPD network (the Placer in our case) are processed and, optionally, if destined for an IP address that is found to be on the internet, is routed to the appropriate internet server.

Additionally, the cellular carrier providing CDPD services accepts TCP/IP transmissions for IP addresses for units that are registered and operate in its CDPD network and passes those messages on to the units.

In this configuration only one CDPD modem is required, it is connected to the mobile system, the Placer GPS 450.

The host system personal computer running FleetVision 2.0 for Windows can be connected to the CDPD network in a number of different ways (see section on CDPD Basics). We'll consider the simplest configuration in which it uses the internet to communicate to the Placer.

The Placer GPS 450 is shipped with a SLIP interface driver so that it can communicate with the CDPD modem and a TCP/IP stack to enable it to exchange messages over the CDPD network.

You should register the CDPD modem with your CDPD provider and configure it with the IP address provided. The modem should come with configuration software to allow you to easily set it up. Please refer to the documentation supplied by the vendor of the

modems. Also, please refer to the section on Modem Configuration in this release notebook for more details.

As for the host system personal computer running FleetVision for Windows you will need a SLIP account with an internet service provider (ISP) and a Winsock incorporating a TCP/IP protocol stack with a SLIP driver (or PPP if PPP account is chosen) to allow FleetVision 2.0 to with the TCP/IP network layer.

FleetVision 2.0 for Windows, is designed to be compatible with Winsock V1.1 standard compliant winsocks, it will, therefore work with all Winsocks that are V1.1 compliant. FleetVision 2.0 has been tested with the following specific Winsocks:

- ◆ TRUMPET from Trumpet International
- ◆ NEWT from NetManage Inc
- ◆ PCSI Winsock from PCSI
- ◆ Reflections from Walker Richer & Quinn Inc.

The Winsock will provide you with the function to dial up and log on to your ISP. The ISP will either provide these software programs or tell you where to get them.

CDPD Basics

Cellular Digital Packet Data (CDPD) is a connectionless network service that overlays the cellular voice network to wirelessly transmit data to mobile and fixed-location computing devices. The wireless aspect of the communications is provided by sending switched data on existing cellular radio channels (or airlink) during the period of time when these radio channels are not being used for normal cellular voice communications. Some cellular carriers also provide dedicated CDPD services so that they can guarantee the delivery of messages during peak hours of cellular voice traffic.

The CDPD network operates as an extension of the existing Transmission Control Protocol/Internet Protocol (TCP/IP) data communications networks. TCP/IP is the method by which data on the networks is divided into packets of bytes. Each packet is delimited with header information that includes the destination address where the packet is to be routed when it is transmitted over the networks.

Some carriers also offer a private mechanism where no packets go over the internet.

The fixed end system, the host system personal computer, along with the mobile system, are both key components in a network using CDPD technology. Together, these two systems represent the actual physical and logical end nodes that wish to exchange information within the network. A fixed end system is a conventional host system that supports or provides access to data and applications. It can be a PC,

workstation, minicomputer or a mainframe. There are number of options for connecting a host system to the CDPD network:

- Frame relay,
- Internet,
- Leased line connection,
- Gateway.

The preferred method for connecting host systems to the CDPD network is by using TCP/IP; it uses standard IP protocol for routing and the stack resident on the host system need not be identical to the TCP/IP stack resident in the mobile system (this means that different manufacturer's CDPD modems can be used in vehicles, each using different TCP/IP stack). To the host system the mobile appears as another network node.

The two common modes of TCP/IP access are through:

- a direct network connection - you're connected to a LAN that is on the internet
- a serial connection to a SLIP or PPP server via an ISP

A direct network connection involves installing a network interface card in your PC, most likely to be an ethernet card. The ethernet card in turn is connected to your company's LAN, which must in turn be connected to the Internet, and it must be capable of handling TCP/IP data packets.

Network Card Drivers

If the PC has a direct connection to the Internet, there must first be software to control the network interface card. A method commonly used with Windows 3.1 has been to install a piece of software called a *packet driver* that deals directly with the network interface card. The packet driver is loaded under DOS from the AUTOEXEC.BAT file as a TSR (terminate and stay resident) program. A packet driver should be included with the software that comes with the network interface card.

Serial port drivers

When a direct network connection is not available, Internet TCP/IP software can be used via telephone lines to connect to a SLIP (Serial Line Internet Protocol) or PPP (Point to Point Protocol) server that provides a connection to the Internet. SLIP and PPP require a SLIP or PPP driver that communicates through the serial port. The Trumpet Winsock shareware package, for example incorporates the TCP/IP, SLIP and PPP drivers.

Getting an Account

You should first obtain an account, with the Internet service provider, on a SLIP or PPP server. To connect to the Internet you have to use the Winsock recommended/provided by your ISP to dial the ISP's server and establish a SLIP or PPP session. Once the session is established, the Winsock's TCP/IP layer running on the PC can be used just as if the PC was connected directly to the Internet. The ISP will provide you with your IP address, which needs to be static.

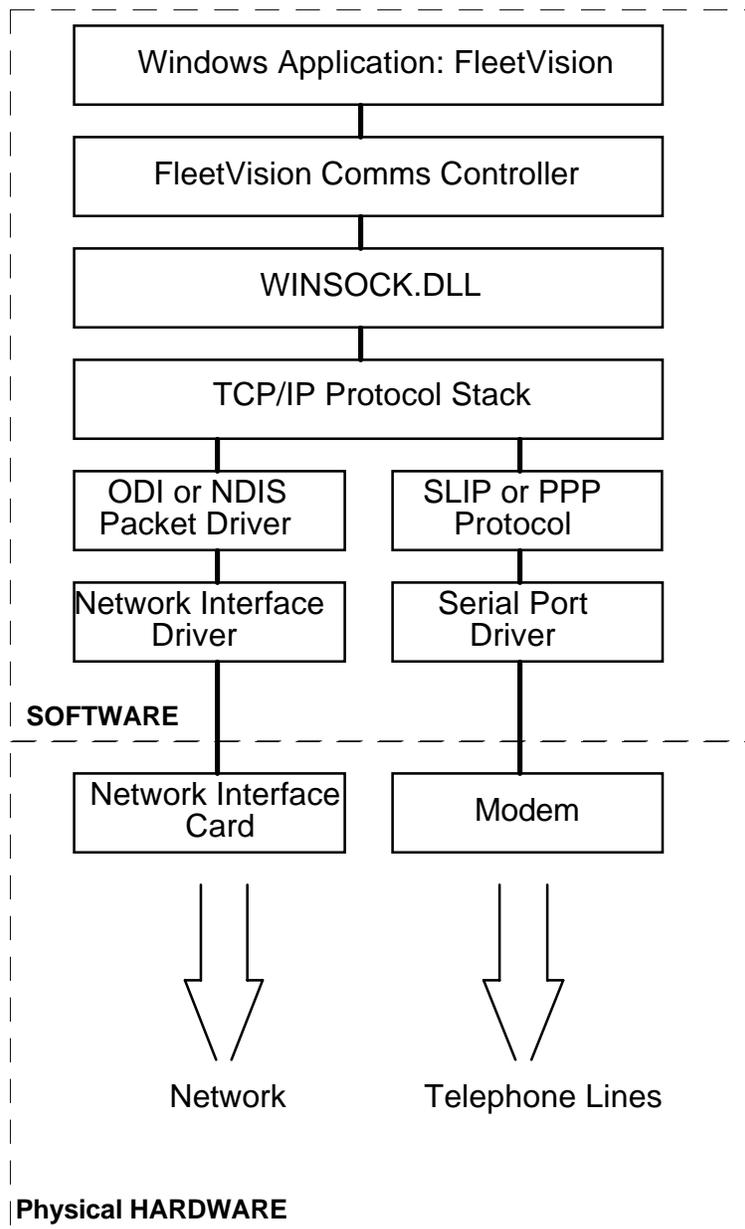


Figure 3. Software Layers

Client Applications: FleetVision 2.0 for Windows

TCP/IP client applications work at the top of the layers of software. Client software runs independently of the type of connection to the Internet. TCP/IP applications frequently are referred to as clients because they access a corresponding server on another machine.

TCP/IP Protocol Stack

The TCP/IP driver, which implements TCP/IP functionality for the system, is referred to as the TCP/IP protocol stack. This driver may be written to interface with a packet driver, as is the case with the Trumpet Winsock package. The advantage of having a TCP/IP stack that interfaces with a packet driver is that the TCP/IP stack can be used with any network card for which an associated packet driver is available. Thus, the packet driver specification eliminates the need for software vendors to provide hardware drivers for every possible network card that might be used with their TCP/IP stack. When using a packet driver with Windows applications, another DOS TSR referred to as a virtual packet driver may be required to interface between the Windows-based TCP/IP protocol stack and the DOS-based packet driver.

If your host system is not on a LAN then Winsock will use its SLIP or PPP services to connect to the ISP.

Windows and TCP/IP for Internet Access

Winsock (Windows sockets) is a technical specification that defines a standard interface between a Windows TCP/IP client application and the underlying TCP/IP protocol stack. When you launch a Winsock compliant client like FleetVision 2.0, it calls procedures from the WINSOCK.DLL dynamic link library. These procedures in turn invoke procedures in the drivers supplied with the TCP/IP protocol stack, see Figure 3 which illustrates where Winsock sits in the software layer. Although Figure 3 separates Winsock and TCP/IP functionality, Winsock incorporates TCP/IP protocol stack.

The WINSOCK.DLL file is *not* generic - each vendor supplies a proprietary WINSOCK.DLL that works only with that vendor's hardware.

The choice of which WINSOCK to use is governed by the following:

- The recommended WINSOCK.DLL from your Internet Service Provider.

- The network environment you work under. If you have commercial networking software you must obtain that companies WINSOCK.DLL from your respective vendor.
- Your personal choice. Even though the WINSOCKs follow the same TCP/IP standard, they each have different features.

NOTE:Which ever WINSOCK.DLL you choose, it must be compliant with version 1.1 of the WINSOCK standard.

Where can you get a 1.1 compliant WINSOCK, you have three possible choices:

- Purchase a commercial product (if you already use network software, this is your only choice),
- Download, evaluate and purchase the Shareware WINSOCK.DLL from Trumpet International Software
- Download and use the freely available Chameleon Sampler from NetManage Inc. (some restrictions on its use apply, you should check these out).

FleetVision 2.0 for Windows has been tested with the following WINSOCKs:

- ◆ TRUMPET from Trumpet International
- ◆ NEWT from NetManage Inc
- ◆ PCSI Winsock from PCSI
- ◆ Reflections from Walker Richer & Quinn Inc.

Installing a WINSOCK

You should refer to the documentation provided by the supplier of the WINSOCK for the installation instructions. Typically, the parameters will be (taken from Trumpet Winsock V2.0):

IP address	Your Internet IP address.
Name server	Your name server IP address for DNS searches.
Domain suffix	Needed when resolving names in the DNS system.
MTU	Maximum Transmission Unit. Related to TCP MSS... usually TCP MSS + 40 (Numeric).
TCP RWIN	TCP Receive Window. It is recommended that this value be roughly 3 to 4 times the value of TCP MSS (Numeric).

TCP MSS	TCP Maximum Segment Size
SLIP port	Your comms port number
baud rate	The speed you wish to run at.
hardware handshake	Recommended if your link supports it.

Logging in to the SLIP/PPP Server

You can use either the manual login or the automatic scripting (as provided by Trumpet Wincosk V2.0) to access your server. You should follow the instructions provided in the documentation for the WINSOCK that you are using.

FleetVision and WINSOCK

FleetVision 2.0 for Windows expects a session to be established prior to its launch. It proceeds to open 'sockets' or connections to the TCP/IP networks. You should, therefore, launch the Windows program that comes with your WINSOCK that allows you to install the TCP/IP stack and make a connection to the internet server. For example, Trumpet Winsock comes with TCPMAN.EXE, a controlling program for WINSOCK, that offers menu options to make connection with the internet server. Please refer to the documentation supplied by the vendor of the WINSOCK.

Appendix A: Brochures - CDPD Modems

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