Ferret – COM Port Analyzer v1.0

User Manual

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1 Product Overview

The Ferret COM port analyzer allows a user to monitor and analyze communications between a Data Terminal Equipment (DTE) device and a Data Communications Equipment (DCE) device of an RS-232 COM port bus. Ferret, itself, is a PC software application that collaborates with standard PC hardware to provide the monitoring capabilities described. There are five (5) modes of operation supported by Ferret:

- DTE Emulation
- DCE Emulation
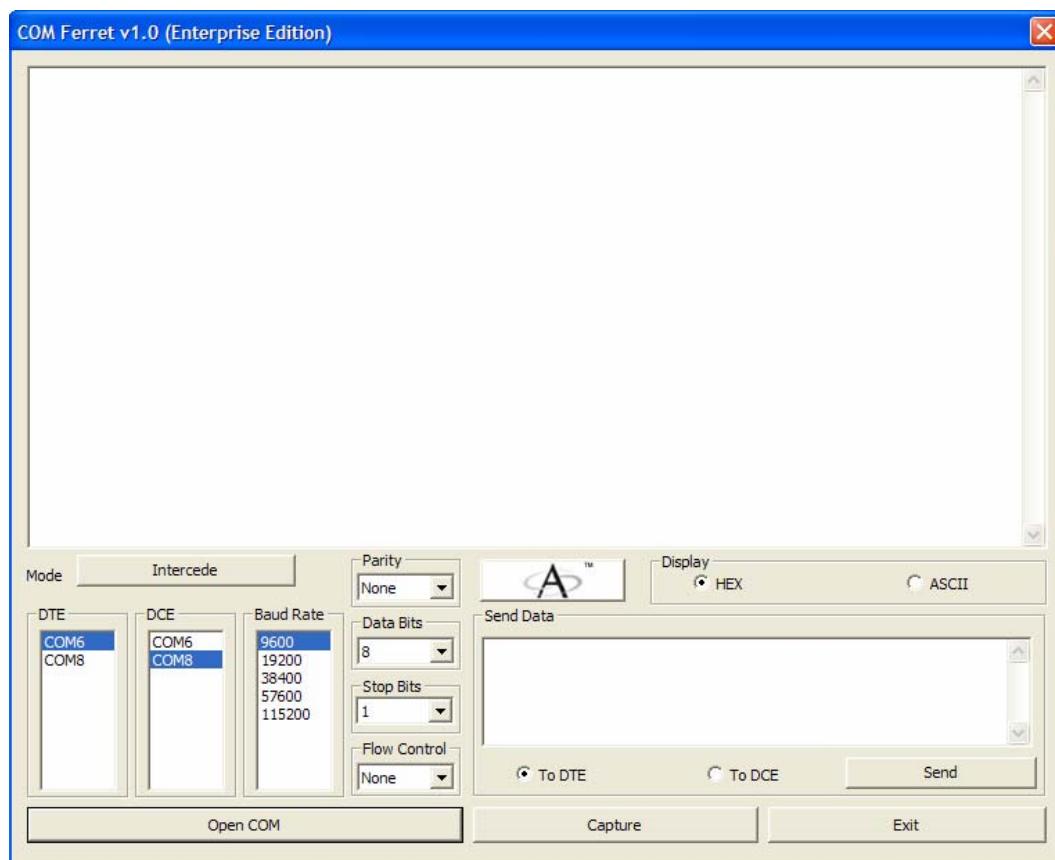- Intercede Monitor
- Half-Duplex Monitor
- Full-Duplex Monitor

Figure 1 : Ferret user interface

Detailed information on how to utilize the various controls in this interface is provided in section 3 of this manual. To activate the default settings, the "Open COM" button can be pressed immediately after launching the Ferret application (as shown in Figure 2). This will cause the COM ports highlighted in the "DTE" and "DCE" listbox to be opened at 9600baud, no parity, 8 data bits, 1 stop bit, and no flow control. The default mode of operation is "Intercede" mode. This mode will take any data received from the DTE COM port and simultaneously display it in the display console and forward the data on the DCE COM port. Likewise, any data received on the DCE COM port will be simultaneously displayed in the display console and sent to the DTE COM port.
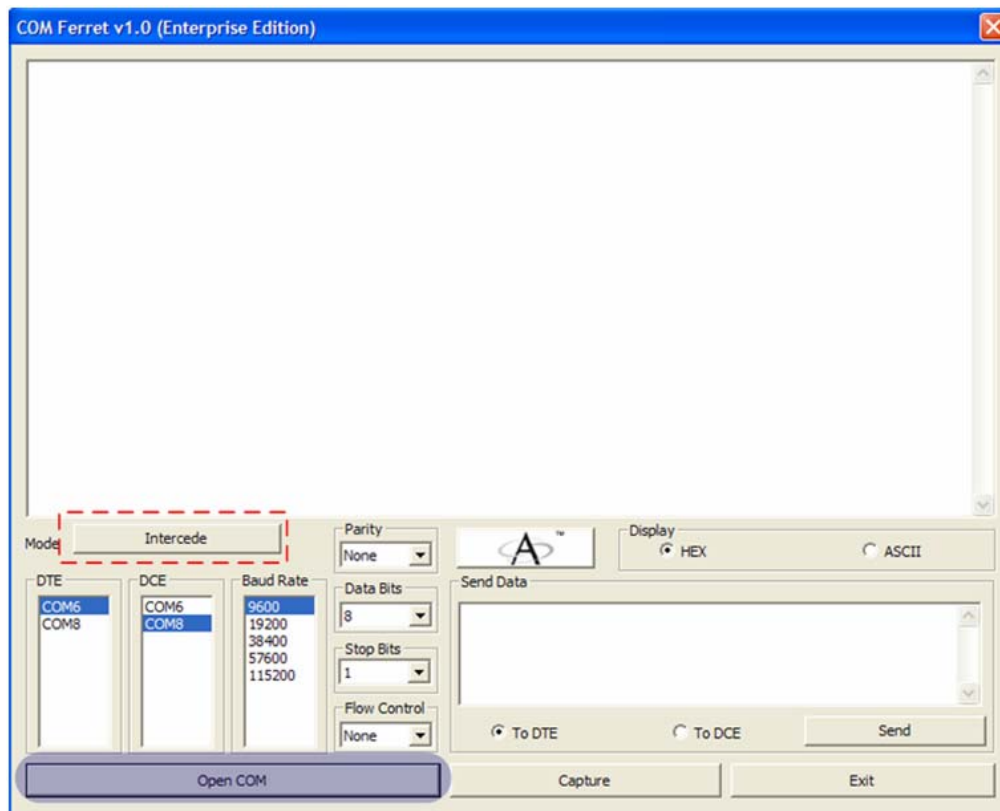

Figure 2 : The "Open COM" button causes the application to activate the COM port in the mode indicated by the "Mode" button

1.1 System Requirements

- Windows 95, 98, 2000, XP, or Vista
- 200MHz Pentium or equivalent processor
- 32MB of RAM
- RS-232 COM port or USB-COM adapter (3 Recommended, 2 Required for full-duplex monitoring, 1 Required for half-duplex monitoring)
- (optional) Full-duplex COM monitor cable

1.2 Licensing

Ferret requires a valid license key to fully operate. Without a license key, Ferret will operate in shareware mode – the application will only operate for 30minutes during the first 30 days of use. After this time period, the application will only operate for 30 seconds without a key. To obtain a license key for Ferret, visit www.apexhyperion.com.

2 Product Installation

1. For internet downloads, the compressed ZIP file must be decompressed to a temporary folder. The contents of the decompressed folder will contain a file called "setup.exe". Execute this file by double-clicking on the setup.exe icon. For CD purchases, inserting the CD into the CD-ROM drive should begin the installation process. If not, the file called "setup.exe" can be executed from the root directory of the installation CD-ROM.
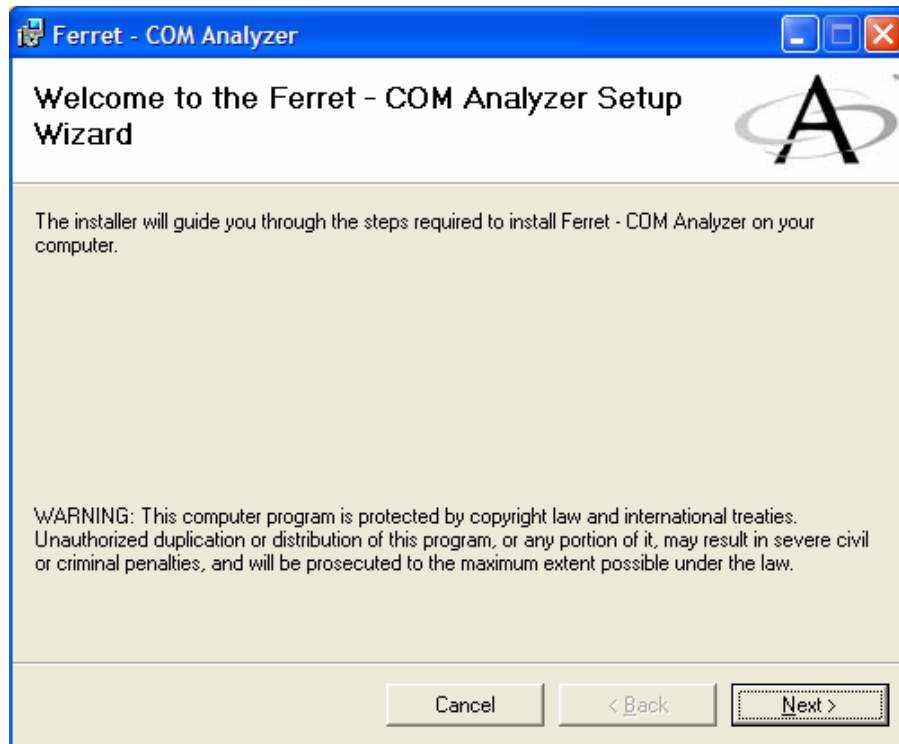2. A self-extracting installation wizard will guide the rest of the installation process.

Figure 3 : A self extracting installer will guide the rest of the installation of the software

3. When the installation completes, the installation wizard will automatically close. The software can be accessed by traversing to the installation destination directory specified in the wizard (the default directory is C:\Program Files\ApexHyperion, Inc\Ferret – COM Analyzer\)
4. The software can also be accessed from the Start menu under "Programs\ApexHyperion"
5. The software can be completely removed by using the "Add or Remove Programs" manager in the Control Panel.

3 Product Interface

3.1 Getting Started

The Ferret application permits the user to monitor and manipulate information on an RS-232 COM port communication bus. The specific function Ferret performs depends upon the mode selected. There are five (5) modes available on the Ferret – these are described in greater detail in sections 3.2.1 - 3.2.5. The modes are:

- DTE Emulation
- DCE Emulation
- Intercede Monitor
- Half-Duplex Monitor
- Full-Duplex Monitor

The purpose of an RS-232 Analyzer, such as Ferret, is to provide a means of tapping into an existing RS-232 communication bus and monitor the data that is being relayed between two devices. Figure 4 shows a terminal and a handheld device communicating with each other
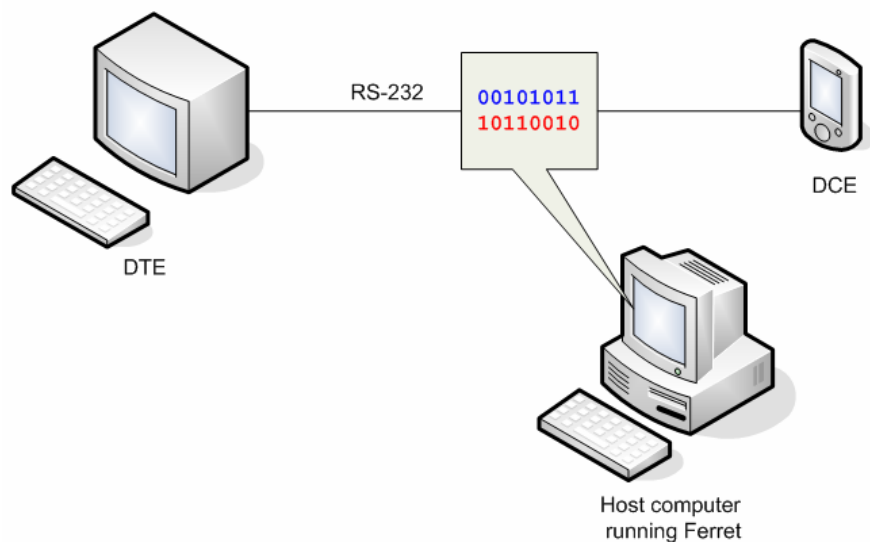

Figure 4 : Ferret can be used to monitor and diagnose an RS-232 connection

Ferret can monitor a connection as described above, but it also has some additional features which provide a significant amount of flexibility and control to the user. By making use of the various modes available on Ferret, the user can additionally emulate a DTE, emulate a DCE, or inject data on the bus to simulate conditions that are difficult to do directly from the DTE or DCE device.
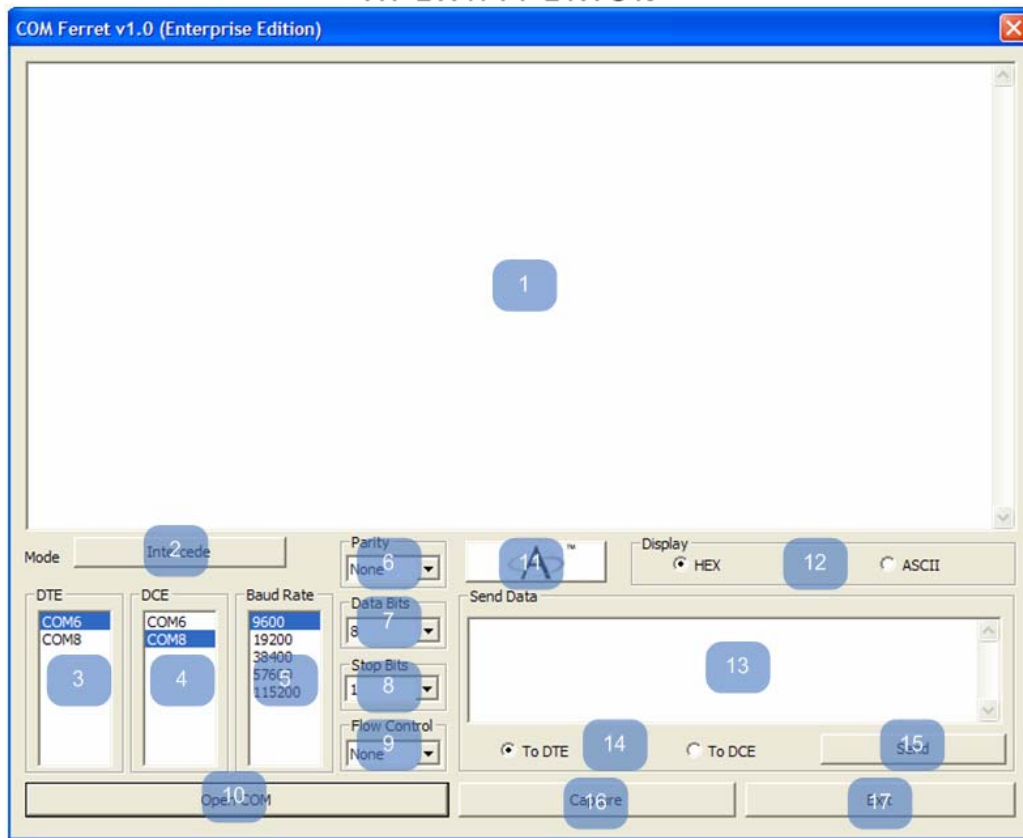
Figure 5 : Pandora Interface Controls

The interface controls of the application are shown in Figure 5. The mapping of these controls is listed below and the usage is described in greater detail in subsequent sections.

1. Display Window – Displays all data that passes through the analyzer. Also displays error and status messages generated by Ferret for the user (The error and status messages are not injected into the RS-232 bus).
2. Mode – Allows the user to select between five (5) different modes of operation for Ferret: DTE Emulation, DCE Emulation, Intercede Monitor, Half-Duplex Monitor, and Full-Duplex Monitor.
3. DTE Port Setting – Selection of available COM ports to connect to the DTE device.
4. DCE Port Setting – Selection of available COM ports to connect to the DCE device.
5. Baud Rate – Selection of baud rate of COM port(s).
6. Parity – Selection of standard parity settings for COM port(s).
7. Data Bits – Selection of standard data bit settings for COM port(s).
8. Stop Bits – Selection of standard stop bit settings for COM port(s).
9. Flow Control – Selection of standard flow control settings for COM port(s).
10. Open COM – Establishes connection to COM port highlighted in (3 and 4) with settings highlighted in (5-9).
11. About Info – Provides additional information about Ferret.

12. Display Format – Allows display in either Hex or ASCII. This settings applies for the display (1) and the data parsed in (13).
13. Send Data Window - Allows user to inject data to either the DTE or DCE device. Due to hardware limitations as described in section 4, data can only be injected when using modes: DTE Emulation, DCE Emulation, and Intercede Monitor.
14. Destination Selection – Allows user to select whether data is to be sent to the DTE or DCE device when button (15) is pressed.
15. Send Button – Causes data typed in Send Data Window to be output to a COM port as described in (14).
16. Capture – Saves communication on bridge connection to file
17. Exit – Exit the application.

3.2 Selecting A Mode

Ferret provides five (5) modes of operation to enable flexibility in analyzing an RS-232 communication link. By default, Ferret operates in "Intercede" mode when the application is initially launched. To change the mode, the user must press the "Mode" button as shown in Figure 6.
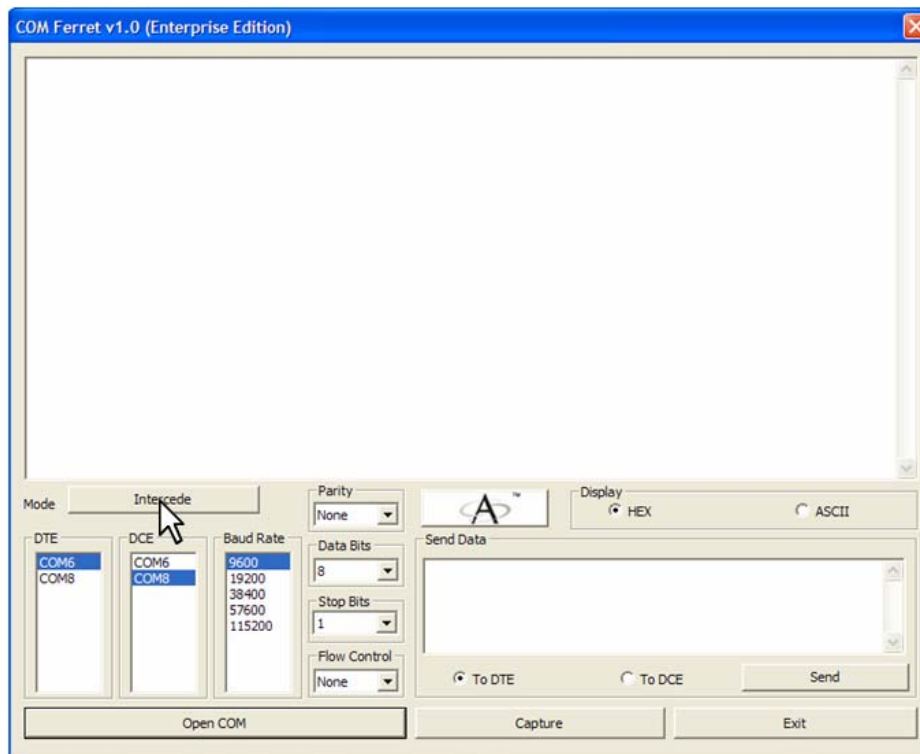

Figure 6 : The Mode button allows the user to change the current mode of operation

When the "Mode" button is pressed, a new dialog window will appear and allow the user to select from five (5) different modes. These modes are described in text with an accompanying diagram to help illustrate the exact usage of the mode (Figure 7).
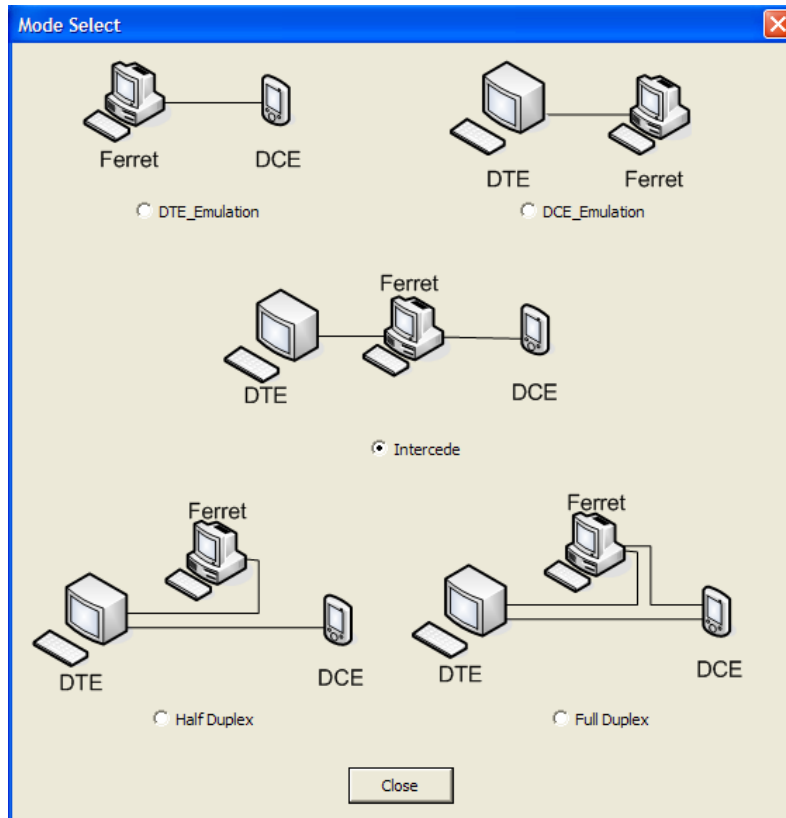

Figure 7 : Mode selection window allows user to select from five (5) modes

To change the mode, the appropriate radio button needs to be selected with the mouse. When the "Close" button is pressed on the "Mode Select" window, specific options on the main window will be enabled/disabled based on the operation selected. Each of the modes is described in greater detail in the following sub-sections.
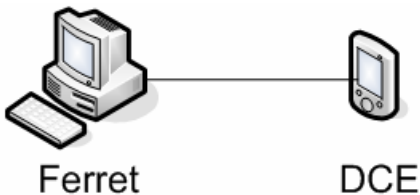
3.2.1 DTE Emulation Mode

Figure 8 : DTE Emulation mode

DTE Emulation mode allows the user to operate as a DTE device on the RS-232 bus. To use DTE Emulation mode, the user must connect a standard RS-232 cable from the PC

directly to the DCE device. Only one (1) COM port is necessary on the host PC running Ferret.

This mode is typically useful in applications where the response to RS-232 commands of a DCE device needs to be probed. Ferret has the capability of sending information in either hex or ASCII format allowing for a variety of applications.
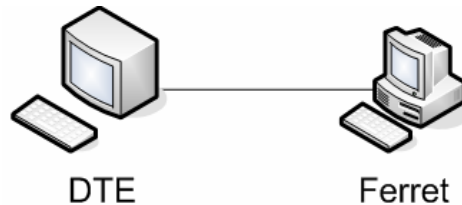
3.2.2 DCE Emulation Mode

Figure 9 : DCE Emulation mode

DCE Emulation mode allows the user to operate as the DCE device on the RS-232 bus. To use DTE Emulation mode, the user must connect an RS-232 cable from the PC directly to the DCE device. Unlike the DTE emulation case, a NULL modem adapter, or a circuit which swaps the transmit/receive pins and the RTS/CTS pins may be necessary (*see section 4 for more details*). Only one (1) COM port is necessary on the host PC running Ferret.
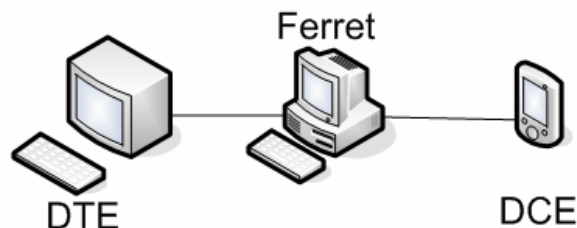
3.2.3 Intercede Mode

Figure 10 : Intercede mode

Intercede mode allows the user to control communications simultaneously to both the DTE device and the DCE device. In this mode, the Ferret accepts data from the DTE on one COM port and forwards it to a DCE attached to a different COM port. The same operation is performed from the DCE device to the DTE device. As the data-forwarding function occurs, the user can monitor the full-duplex flow from the Ferret interface and inject data to either DTE or DCE device at any time. In order to operate in this mode, two (2) COM ports are necessary on the host computer running the Ferret application.

One detail to note is that this mode is invasive to the system in that it is not passively monitoring data on the bus, as a traditional RS-232 monitor does, but relaying data between two physical buses. The advantage to this mode against traditional monitors is that a special cable or circuit is not needed to achieve full-duplex monitoring and analysis capability. Two (2) standard RS-232 cables are the only hardware needed.
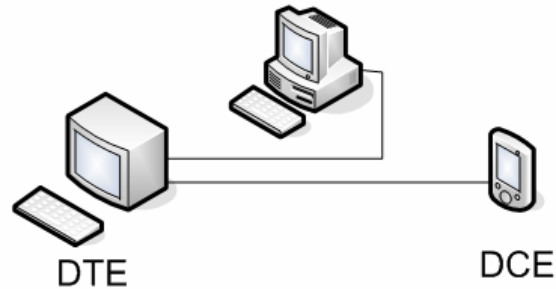
3.2.4 Half-Duplex Monitor Mode

Figure 11 : Half-Duplex Monitor mode

Half-Duplex Monitor mode causes Ferret to operate as a traditional COM port monitor. To use this mode, a third-party half-duplex RS-232 monitor cable or equivalent custom cable is needed. Essentially, such a cable directly connects the RS-232 port of the DTE to the DCE and taps one of the transmit signals to the host (running Ferret) receive pin. Nothing must be connected to the host transmit pin since this will interfere with the communication channel. In this configuration, only one (1) COM port is needed on the host computer running the Ferret application.

In this non-invasive setup, the Ferret can monitor one side of an RS-232 connection. No data can be injected since the hardware limits to monitoring facilities only.
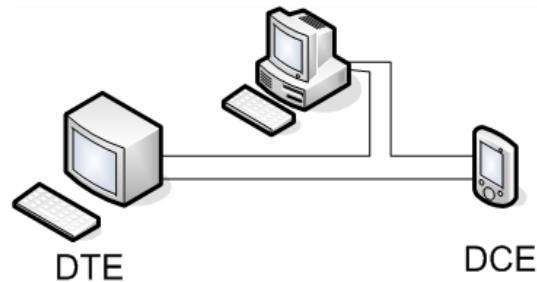
3.2.5 Full-Duplex Monitor Mode

Figure 12 : Full-Duplex Monitor mode

Full-Duplex Monitor mode causes Ferret to operate as a traditional COM port monitor. To use this mode, a third-party full-duplex RS-232 monitor cable or equivalent custom cable is needed. Essentially, such a cable directly connects the RS-232 port of the DTE to the DCE and taps the two transmit signals of the bus (one from the DTE and one from the DCE) and brings these signals separately to the receive pins of two (2) COM ports on the host (running Ferret). Nothing must be connected to the host transmit pins since this will interfere with the communication channel. In this configuration, two (2) COM ports are needed on the host computer running the Ferret application.

In this non-invasive setup, the Ferret can monitor both sides of an RS-232 connection. No data can be injected since the hardware limits to monitoring facilities only.

4 Appendix – RS-232 Pin Diagram

Though an in-depth knowledge of the RS-232 physical protocol is not mandatory to effectively use the Ferret application, this knowledge can be a great tool when analyzing bus conditions and behaviors of the system. The diagram in Figure 13 depicts the pin descriptions of a standard 9-pin RS-232 connector. What is commonly referred to as a "male connector" describes a connector that has a prong on each connection pin. A female connector has a socket at each pin which mates with the prong of the male connector.
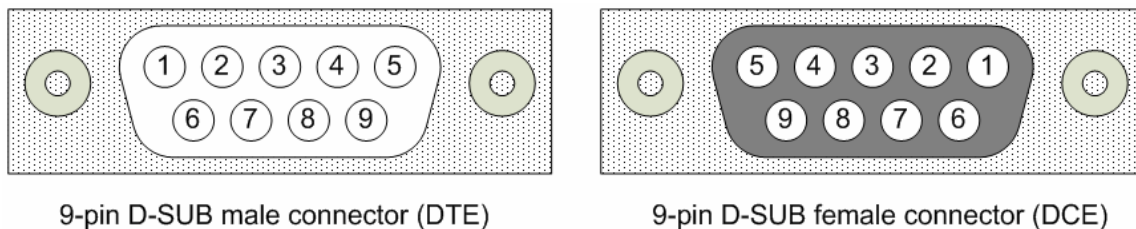

9-pin D-SUB male connector (DTE)   9-pin D-SUB female connector (DCE)

Figure 13 : 9-pin COM port diagram

The corresponding pin descriptions are shown in the table below. Note that the transmit and receive pins are reversed on a DCE with respect to a DTE. This is also the case with the request to send and clear to send pins. The transmit and receive pins are, in most cases, mandatory at the physical layer of any RS-232 connection. The other pins may or may not be used, depending on the application.

	DTE		DCE	
	Direction	Signal Description	Direction	Signal Description
1	in	carrier detect	out	carrier detect
2	in	receive data	out	transmit data
3	out	transmit data	in	receive data
4	out	data terminal ready	in	data terminal ready
5	-	common ground	-	common ground
6	in	data set ready	out	data set ready
7	out	request to send	in	clear to send
8	in	clear to send	out	request to send
9	in	ring indicator	out	ring indicator

A PC will typically provide hardware to allow the user to connect as a DTE and provide one or two make connector ports. Third-party USB-RS-232 bridging adapters can also be purchased for a PC which, again, allow the PC to perform the role of the DTE. As the pin descriptions in the table above indicate, a PC can perform the role of a DCE by using a hardware adapter module which swaps the connection of pin 2 and 3, and swaps the connection of 7 and 8.

5 Support

Q: Why can't I see any COM ports displayed in the COM port listbox?
A: Ferret auto-detects available COM ports when the program is executed. If there are no COM ports on the system, or all available COM ports are being used by other devices, Ferret will not display those particular ports. Exit Ferret, free the desired COM port by exiting other applications which use COM ports. Then, relaunch Ferret.

Q: Why does the Ferret report "Error opening COM port" when I press the "Open COM" button?
A: Ensure that a valid COM port is highlighted in either/both the "DTE" and "DCE" selection list-box. If using the "Intercede" or "Full-Duplex" modes, a COM port is needed for both the "DTE" selection and the "DCE". The same COM port cannot be used for both. That is, if only one (1) COM port is available on the PC, "Intercede" mode and "Full-Duplex" mode cannot be used.

Q: Why does my Ferret software automatically exit after 30 minutes?
A: The free evaluation version provides the user with full access to all the features of the software, but limits the usage to 30 minutes. A purchased license key will eliminate the 30 minute evaluation restriction.

For specific questions that are not covered in this document, contact
support@apexhyperion.com