



December 2016

COMredirect Windows User Guide

Version 6.8

5500200-16

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Normas Oficiales Mexicanas (NOM) Electrical Safety Statement

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua-por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio-El usuario no debe intentar dar servicio al equipo eléctrico más allá de lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico debe ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - a. El cable de poder o el contacto ha sido dañado; u
 - b. Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - c. El aparato ha sido expuesto a la lluvia; o
 - d. El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - e. El aparato ha sido tirado o su cubierta ha sido dañada.

FCC Requirements for Telephone-Line Equipment

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.
2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.
3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.
4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.
5. If the telephone company requests information on what equipment is connected to their lines, inform them of:
 - a. The telephone number that this unit is connected to.
 - b. The ringer equivalence number.
 - c. The USOC jack required: RJ-11C.
 - d. The FCC registration number.

Items (B) and (D) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five. If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

Certification Notice for Equipment Used in Canada

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized maintenance facility—in this case, Black Box. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le Industrie Canada.

Table of Contents

What is COMredirect?	7
COMredirect Full Mode vs Lite Mode	7
Full Mode.....	7
Lite Mode.....	7
Installing COMredirect on the COMredirect Host	8
COMredirect on Windows 8/8.1 and Windows Server 2012/2012 R2/20168	
Accessing COMredirect on previous versions of Windows.....	10
Adding Additional COMredirect Adapters and Updating	11
Windows 8/8.1/10 and Windows Server 2012/2012 R2/2016.....	11
Adding COMredirect Adapters on previous versions of Windows....	13
Uninstalling COMredirect on the COMredirect Host	13
COMredirect on Windows 8/8.1and Windows Server 2012/2012 R2/201613	
Uninstalling COMredirect through Windows Control Panel.....	13
Uninstalling COMredirect on previous versions of Windows	14
Configuring COMredirect on a Terminal Server	15
Server-Initiated Mode	15
Client-Initiated Mode	16
Configuring Ports on the COMredirect Host	16
Configuring the COM Port Connection	18
Connection Profile Settings.....	19
Client-Initiated Connection Settings	20
Configuring Advanced COM Port Settings	21
Application Options	21
Configuring SSL/TLS	22
Configuring Packet Forwarding	22

Working with the COMredirect Adapter	24
Restoring COMredirect Adapter Defaults.....	24
Deleting a COMredirect Adapter on the COMredirect Host	25
Working with the COM Port Parameters	26
Adding COM Ports on the COMredirect Host.....	26
Restoring COM Port Defaults	27
Deleting a COM Port on the COMredirect Host.....	28
Copying COM Port Settings on the COMredirect Host	29
Configuring SSL/TLS	30
SSL/TLS Configuration Information.....	30
SSL/TLS Support Files	32
COMredirect Port Configured as SSL/TLS Server	32
COMredirect Port Configured as SSL/TLS Client.....	32
CLI Conventions	33
Adapter specific commands	33
Com Port specific commands	34

This document provides the procedure for installing and using COMredirect on Windows 2000 Server/Server 2003/Server 2003 R2/XP/Vista/Server 2008 R2/Windows 7/Windows 8/8.1/10, Windows Server 2012/Windows 2012 R2 and Windows Server 2016.

What is COMredirect?

You use COMredirect when you want to connect serial devices to a server using a Terminal Server rather than a multi-port serial card; it is a COM port redirector. COMredirect is especially useful when you want to improve data security, as you can create an SSL/TLS connection between the COMredirect host port and the Terminal Server, which will encrypt the data between the two points.

COMredirect Full Mode vs Lite Mode

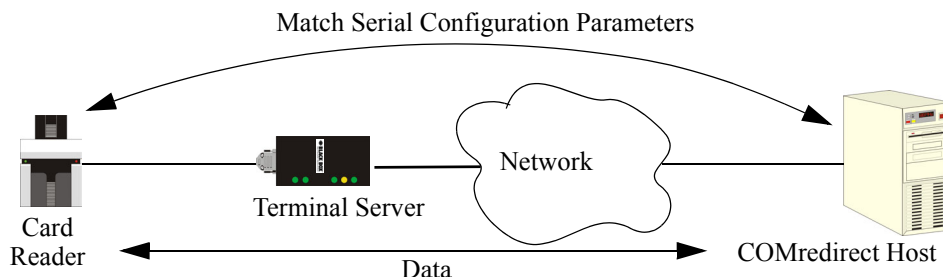
You can configure COMredirect on Windows in either Full Mode or Lite Mode. When you start COMredirect in Full Mode, the serial configuration parameters are set on the COMredirect host. When you start COMredirect in Lite Mode, the serial configuration parameters are set on the terminal server. On Windows, serial configuration parameters consist of bits per second (baud rate speed), data bits, parity, stop bits, and flow control. In either mode, the data is passed in raw format, although you can enable the SSL/TLS connection option to encrypt the data going through a port.

Full Mode

This mode allows complete device control and operates exactly like a directly connected serial COM port. It provides a complete COM port interface between the attached serial device and the network, providing hardware and software flow control.

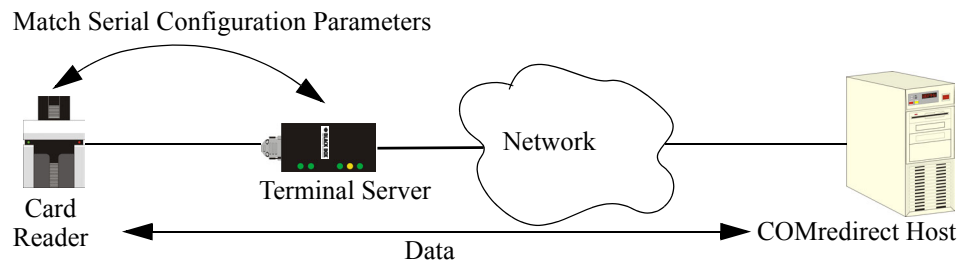
COMredirect 6.1 and lower and Terminal Server firmware 3.4 and lower use the TCP protocol on the configured port and the UDP protocol on port 668 (some firewalls block UDP packets by default and might need to be re configured to support Full Mode communication). COMredirect 6.2 and higher and Terminal Server firmware 3.5 and higher can be configured not to use the UDP protocol.

The port serial configuration parameters set on the COMredirect host must match the serial configuration parameters set on the device (in this example, to the Card Reader), as shown below:



Lite Mode

This mode provides a simple raw data interface between the device and the network. Although the port will still operate as a directly attached COM port, control signals are ignored. Lite Mode uses the TCP protocol on the configured port. In this mode, the serial communications parameters are configured on the terminal server and must match those configured on the device (in this example, a Card Reader), as shown below:



Installing COMredirect on the COMredirect Host

Double-click the COMredirect installation wizard applicable to your Windows environment and follow the installation directions.

- **COMredirect-setup-x86.exe**—32-bit Windows 2000, XP, Windows Server 2003, Vista, Windows Server 2008, Windows 7, Windows 8/8.1 and Windows 10 operating systems.
- **COMredirect-setup-x64.exe**—64-bit Windows XP, Windows Server 2003, Windows Server 2003 R2, Windows Server 2008, Windows Server 2008 R2, Vista, Windows 7, Windows 8/8.1 and Windows Server 2012/ Windows 2012 R2 and Windows Server 2016 operating systems..

To install the COMredirect software on your system, double-click the COMredirect installation wizard and follow the installation instructions.

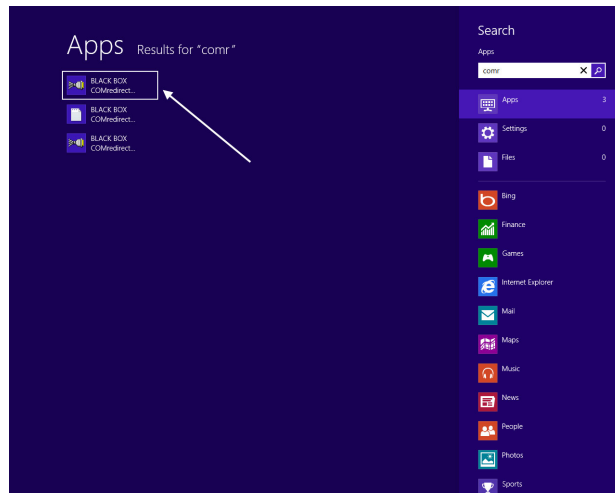
COMredirect on Windows 8/8.1 and Windows Server 2012/2012 R2/2016

Once COMredirect is installed on your system, you can access COMredirect in the following ways:

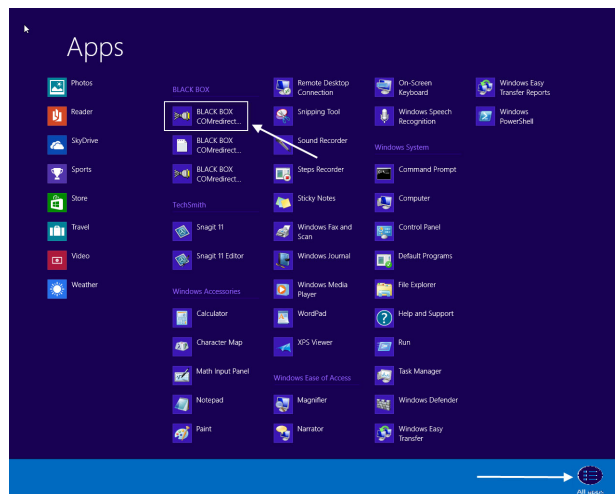
1. Simply, double-click the COMredirect Management Tool desktop icon.



- Alternatively, you can press the Windows function key then right click on the screen. In the search field begin typing COMredirect. All applications starting with COM....will be displayed on the left panel on the screen. From the search results, double-click to open the COMredirect Management Tool.

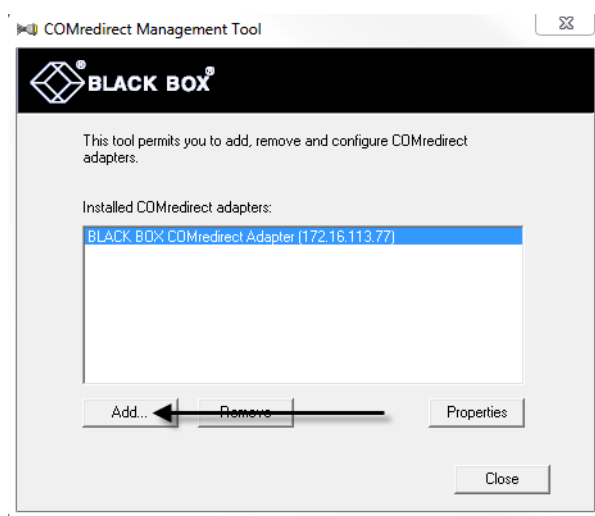
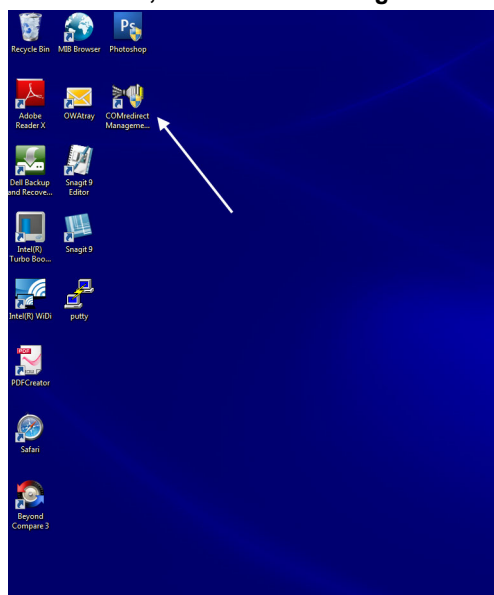


- Lastly, you can right-click on the Windows 8/8.1 or Windows Server 2012/2012 R2/2016 Start screen. Click All Apps at the bottom of the screen. Scroll through the apps installed by group. COMredirect is listed under the BLACK BOX group. Double-click to open the COMredirect Management Tool.

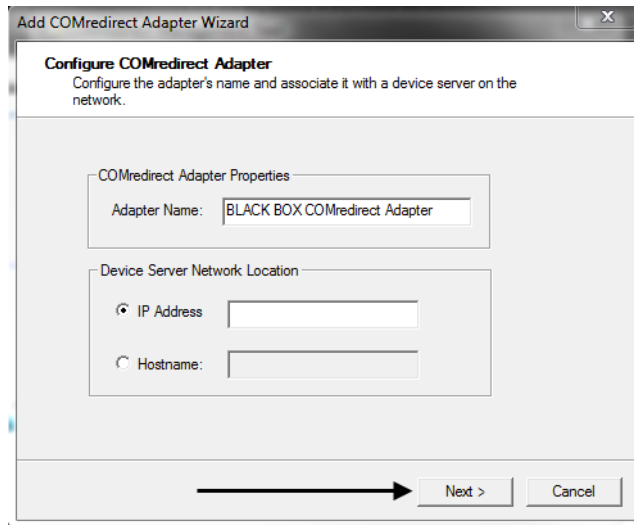


Accessing COMredirect on previous versions of Windows

Double-click the COMredirect Management Tool Desktop icon or select **Start, All programs, BLACK BOX, COMredirect Management**.



If you have existing COMredirect adapters configured, you will see the configured COMredirect adapters, otherwise click the **Add** button to add a new COMredirect adapter.



In this window, you can define a COMredirect adapter name and its network location.

Specify a name for the COMredirect adapter and then the IPv4/IPv6 address or Hostname (the Hostname must be resolvable) of the Terminal Server it will be communicating with. To accept server-initiated TCP connections from any IP address configure an IPV4 address of "0.0.0.0" or a IPV6 address of ":::". Click **Next>** and follow the instructions for the rest of the wizard.

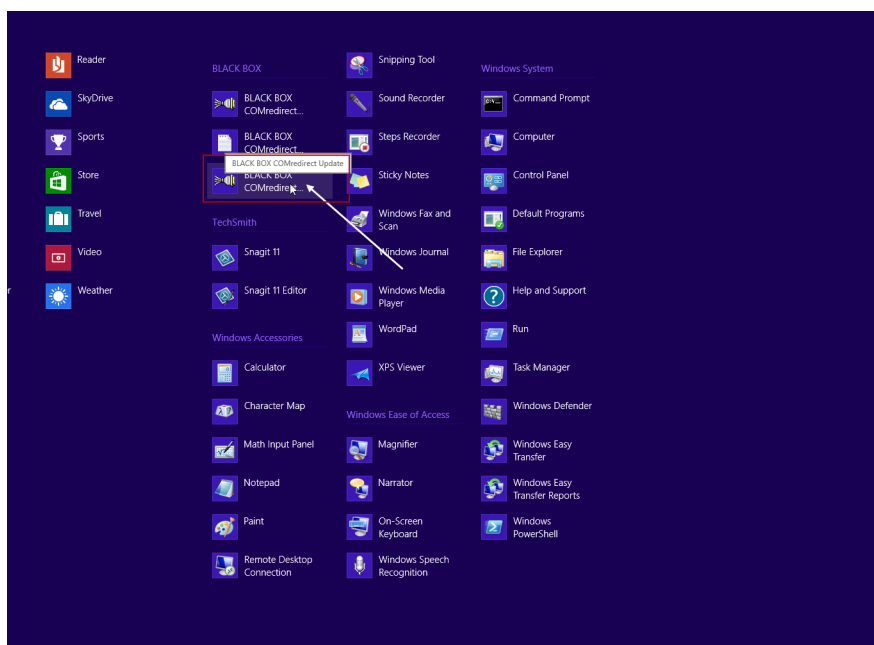
Note: If you have a firewall on your network you may need to add the COMredirect.exe application to the program exception list to run correctly.

Adding Additional COMredirect Adapters and Updating

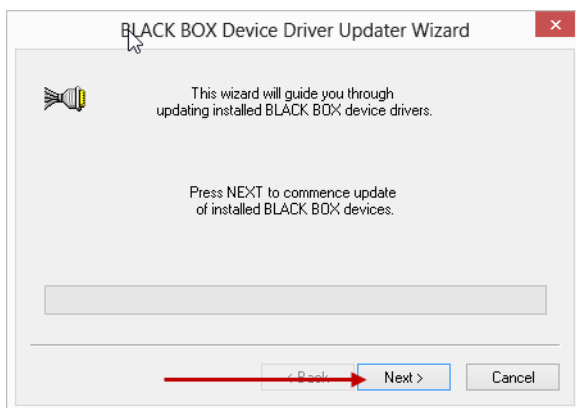
Windows 8/8.1/10 and Windows Server 2012/2012 R2/2016

Whenever you add any additional COMredirect adapters to your system, Windows might install the latest digitally signed driver in its database (depending on your Windows operating system and settings). To ensure you have the latest driver installed after you add the COMredirect adapter, do one of the following:

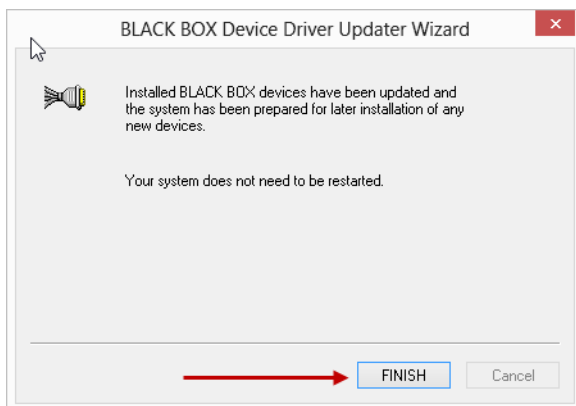
- Right-click on the Windows 8/8.1/10 or Windows Server 2012/2012 R2/2016 Start screen. Click All Apps at the bottom of the screen. Scroll through the apps installed by group. COMredirect is listed under the BLACK BOX group. Double-click to open COMredirect Update.
- Reinstall the drivers as described in Installing [Installing COMredirect on the COMredirect Host](#).



Click the **Next** button to continue.



Click the **Finish** button to complete the Update process.



Adding COMredirect Adapters on previous versions of Windows

Whenever you add any additional COMredirect adapters to your system, Windows might install the latest digitally signed driver in its database (depending on your Windows operating system and settings). To ensure you have the latest driver installed after you add the COMredirect adapter, do one of the following:

- Click **Start, All Programs, BLACK BOX, COMredirect, COMredirect Update** and follow the installation instructions
- Reinstall the drivers as described in [Installing COMredirect on the COMredirect Host](#).

Uninstalling COMredirect on the COMredirect Host

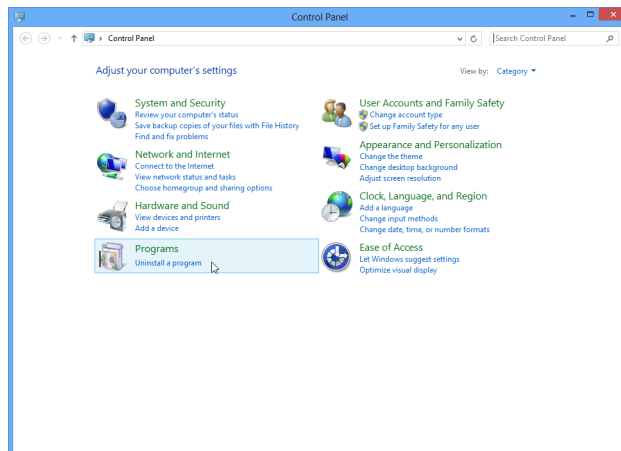
COMredirect on Windows 8/8.1 and Windows Server 2012/2012 R2/2016

On some installations of Windows 8 and Windows Server 2012/2012 R2/2016, you may find the COMredirect uninstall app under All Apps. Right-click on the Windows 8/8.1/10 or Windows Server 2012/2012 R2/2016 Start screen, then click All Apps at the bottom of the screen. Scroll through the apps installed by group. COMredirect may be listed under the BLACK BOX group. If so, double-click to open the COMredirect Uninstall app.

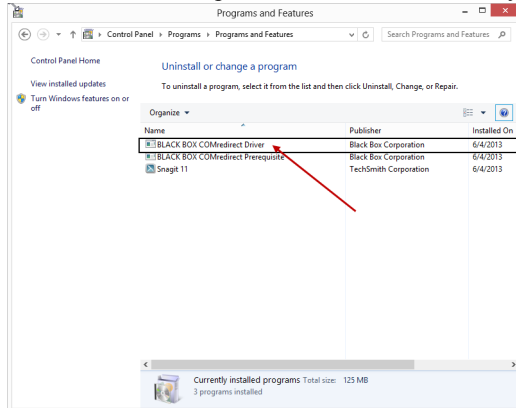
It is recommended that you use the Control Panel to uninstall COMredirect. See [Uninstalling COMredirect through Windows Control Panel](#).

Uninstalling COMredirect through Windows Control Panel

Within control panel, click on Programs -> uninstall a program.



Select the BLACK BOX COMredirect Driver, right click, then select uninstall. BLACK BOX COMredirect Prerequisites will be automatically uninstalled with the COMredirect driver.



Uninstalling COMredirect on previous versions of Windows

1. Select **Start, All Programs, BLACK BOX, COMredirect, Uninstall** from the taskbar.
2. Click **Yes** in the **BLACK BOX COMredirect Uninstall** confirmation window.
3. Click the **Uninstall** button.

The COMredirect application is now uninstalled from your system.

Configuring COMredirect on a Terminal Server

When you add a port, you need to configure the port(s) on the host running COMredirect and you also need to configure the port(s) on the terminal server.

Server-Initiated Mode

When you configure COMredirect for server-initiated mode, the terminal server must initiate communication to the COMredirect host.

To configure a terminal server for server-initiated mode (which is the default mode), you need to set the **Line Service** to **COMredirect** (firmware version 3.3 or higher) or **Silent Raw** and assign the port number to be the same port number configured on the COMredirect host (by default, this number starts at 10000).

The following instructions provide an example of how to set up four ports on the terminal server for COMredirect. You will set the **Line Service** to **COMredirect**. On a 1-port model you would not specify a line number.

1. Connect to the Terminal Server (for example, via Telnet).
2. Log in to the Terminal Server as the **admin** user.
3. Add the host running COMredirect to the host table using the add host command as shown in the following example:

```
add host windows50 192.152.247.61
```

You are now ready to configure the ports that will connect to the COMredirect host.

4. To configure the ports, enter each of the following commands:

```
set line 1 service comredirect windows50 10000
set line 2 service comredirect windows50 10001
set line 3 service comredirect windows50 10002
set line 4 service comredirect windows50 10003
kill line 1-4
```

5. At the command prompt, type **save** and press **Enter**.
6. At the command prompt, type **logout** and press **Enter**.

The configuration of terminal server ports is now complete.

Client-Initiated Mode

Note: Client-Initiated mode is available on Terminal Server, Device Server, and Console Sever models with firmware 3.3 or higher.

When you configure COMredirect for Client-Initiated mode, the COMredirect host must initiate communication with the terminal server.

To configure a terminal server for Client-Initiated mode, you need to set the **Line Service** to **COMredirect**, enable the **Client Initiated** option, and assign the port number to be the same port number configured on the client-initiated configured COMredirect host (by default, this number starts at 10001).

The following instructions provide an example of how to set up 4 ports on a Terminal Server for COMredirect Client-Initiated mode.

1. Connect to the Terminal Server (for example, via Telnet).
2. Log in to the Terminal Server as the **admin** user.
3. To configure the ports, enter each of the following commands:

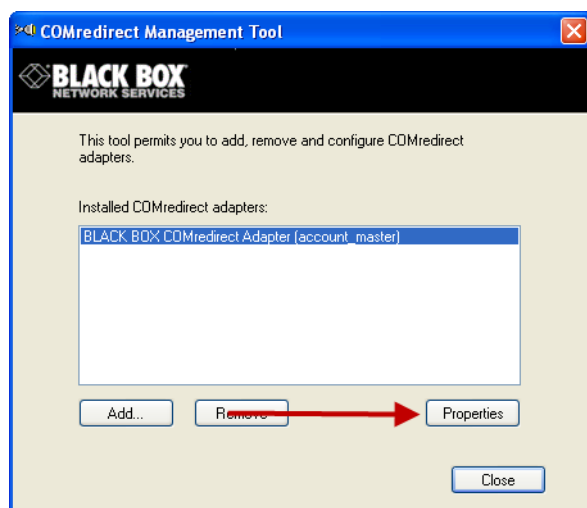

```
set line 1 service comredirect client-initiated on 10001
set line 2 service comredirect client-initiated on 10002
set line 3 service comredirect client-initiated on 10003
set line 4 service comredirect client-initiated on 10004
kill line 1-4
```
4. At the command prompt, type **save** and press **Enter**.
5. At the command prompt, type **logout** and press **Enter**.

The configuration of the terminal server is now complete.

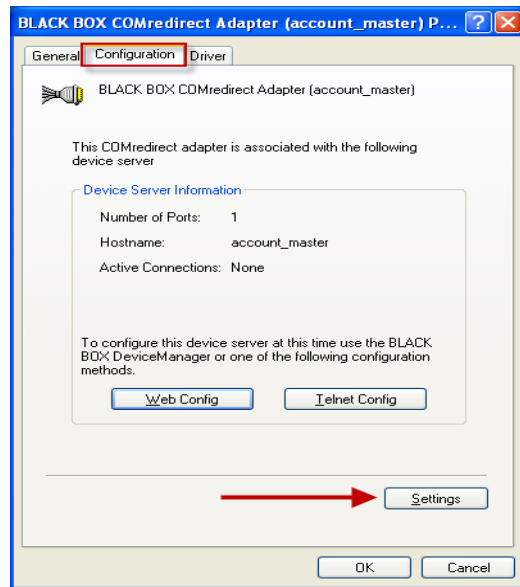
Configuring Ports on the COMredirect Host

After you have configured the ports on the terminal server, you can configure the COMredirect host. Do the following (you can configure a maximum of 4096 COM ports per a host with a maximum of 49 COM ports per a single COMredirect adapter).

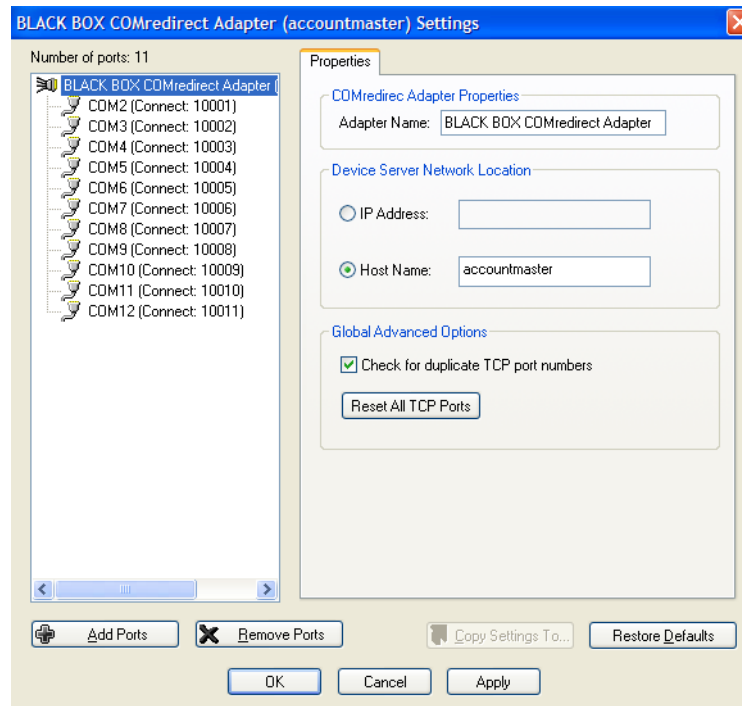
1. When you have finished the Add COMredirect Adapter Wizard (launched from the COMredirect Management Tool), select the COMredirect adapter and click the **Properties** button to configure it.



- Click the **Configuration** tab. On this window, you can connect to a terminal server either by HTTP or Telnet. To configure the COMredirect adapter and its associated COM ports, click the **Settings** button.



- The **Properties** tab displays configuration options for the COMredirect Adapter.



Configure the COMredirect adapter Network Settings:

- **Adapter Name**—Enter a name for the COMredirect adapter to make it easier to recognize.
- **IP Address**—Enter the IP address of the terminal server that will be associated with this COMredirect adapter on the network.
- **Host Name**—Enter the host name of the terminal server that will be associated with this COMredirect adapter on the network. Note: the host name must be resolvable for this option to work (for example, by a DNS lookup).

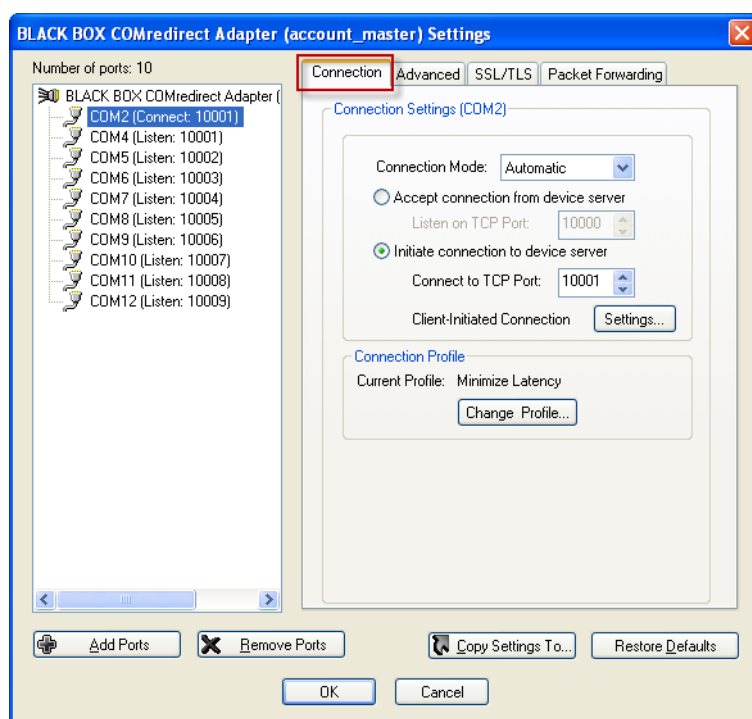
- **Check for duplication TCP ports**—When enabled, displays an error message when there are duplicate TCP port numbers assigned to different COM ports.
- **Reset all TCP Ports**—Click this button to reset the TCP port numbers of all configured ports. Note: this does not reset any parameter values other than the TCP port numbers back to their default values.

Configuring the COM Port Connection

To access the COM port settings:

1. Click the adapter in the COMredirect Management Tool and click the **Properties** button.
2. In the adapter Properties window, click the **Configuration** tab and then click the **Settings** button.
3. Click the COM port you want to configure.

As you configure the COM ports, the COM port label will change to reflect the configuration.



Select the appropriate **Connection Mode**:

- **Full Mode**—All serial configuration and control is driven by the COMredirect host and serial application.
- **Lite Mode**—Serial port parameters are configured on the terminal server. COM port settings on the COMredirect host are ignored. Set this mode if the associated serial port on the Terminal Server is configured for multihost.
- **Automatic**—Automatically selects either Full or Lite Mode.

After you have configured the appropriate **Connection Mode**, you need to determine how the connection is going to be initiated:

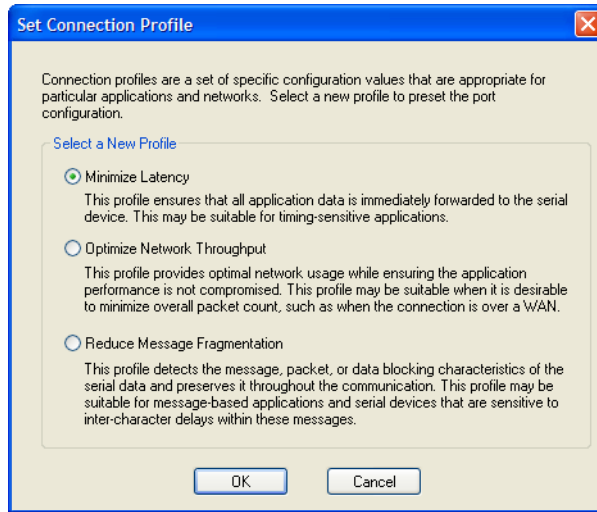
- **Accept Connection from device server**—The Terminal Server initiates the connection to the COMredirect host. You must configure the port that COMredirect will listen on for an incoming TCP connection from the Terminal Server.
- **Initiate Connection to device server**—The COMredirect host initiates the connection to the Terminal Server. You must configure the port that COMredirect will use to initiate the TCP connection to the Terminal Server.

- **Client-Initiated Connection**—Click this button to configure connection options when the COMredirect host is initiating the connection to the Terminal Server. See [Client-Initiated Connection Settings](#) for an explanation of the client-initiated connection options.

Connection Profile Settings

A set of predefined connection profiles have been defined to make it easier to achieve the correct configuration for common TCP connection requirements.

To access the connection profile settings for a COM port, click the **Change Profile** button on the **Configuration** tab.



Specify one of the following optimization modes:

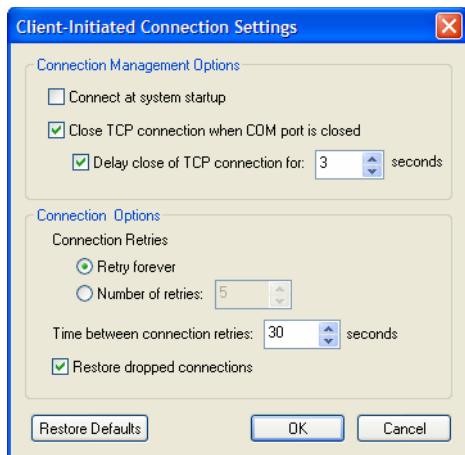
- **Minimize Latency**—This option ensures that all application data is immediately forwarded to the serial device. Select this option for timing-sensitive applications.
- **Optimize Network Throughput**—This option provides optimal network usage while ensuring that the application performance is not compromised. Select this option when you want to minimize overall packet count, such as when the connection is over a WAN.
- **Reduce Message Fragmentation**—This option detects the message, packet, or data blocking characteristics of the serial data and preserves it throughout the communication. Select this option for message-based applications or serial devices that are sensitive to inter-character delays within these messages.

You can also define the packet forwarding rules based on the packet definition or the frame definition (see [Configuring Packet Forwarding](#) for more information).

Client-Initiated Connection Settings

You can configure how client-initiated connections behave.

To access the client-initiated settings for a COM port, enable the **Initiate Connection to device server** option on the **Configuration** tab and click the **Settings** button.



Connection Management Options

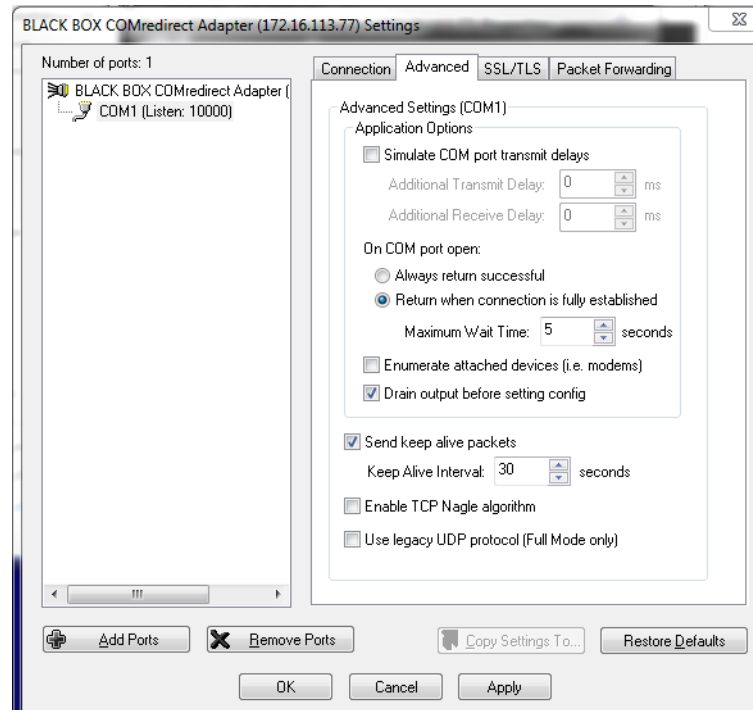
- **Connect at system startup**—When enabled, the COMredirect host will try to connect to the Terminal Server when the COMredirect service starts, as opposed to waiting for the application to open the serial port before initiating the connection to the Terminal Server.
- **Close TCP connection when COM port is closed**—When enabled, closes the TCP connection when the serial application closes the COM port, otherwise, the TCP connection remains open even after the serial application has closed the COM port.
- **Delay close of TCP connection for**—Specifies the amount of time, in seconds, to wait after the application closes the serial port, before the TCP connection is closed to avoid bringing the TCP connection down and up if the application is closing and opening the COM port often. The default is 3 seconds. Valid values are 1-65535.

Connection Options

- **Retry forever**—The COMredirect host will continue to attempt to reconnect to the Terminal Server.
- **Number of retries**—Specifies the number of additional retry attempts for a client-initiated connection, beyond the first attempt. Valid values are 0-255. The default is 5 retries.
- **Time between connection retries**—Specifies the number of seconds between TCP connection retries after a client-initiated connection failure. Valid values are 1-255. The default is 30 seconds.
- **Restore dropped connections**—When enabled, the COMredirect host will attempt to reconnect to the Terminal Server after an existing TCP connection is dropped.

Configuring Advanced COM Port Settings

In the adapter Settings window, click on the COM port you want to configure and then click on the **Advanced** tab.



Application Options

You can select **Simulate COM port transmit delays** to control the read/write delay time. Enabling this option will cause the COMredirect application to delay returns to an application that is doing a write to the COM port. The delay will approximate the time it would have taken to transmit the data if it was being written to a real serial port. If you just enable this option without changing the zero value of the other options, a write delay will be created based on the serial device's baud rate.

- **Additional Transmit Delay**—This delay, in milliseconds (ms), is added to the calculated serial delay, based on the configured baud rate, to compensate for additional delays introduced by the network. Valid values are 0-9999 ms. The default is **0** ms.
- **Additional Receive Delay**—This delay, in milliseconds (ms), is added to the Windows communication delay. Valid values are 0-9999 ms. The default is **0** ms.

Depending on the requirements of your serial application, you can specify the response to the serial application when the COM port is opened.

- **Always return successful**—Opens the serial port without waiting, even if there is no network connection, and does not give an error. Any written data is discarded if the COMredirect connection is not fully established.
- **Return when connection is fully established**—Waits up to the specified time, in seconds, for the COMredirect connection to be fully established. The COMredirect connection is fully established when:
 - The TCP connection between the terminal server and the COMredirect host is up.
 - The SSL/TLS negotiation succeeds (if used).
 - The COMredirect Full mode protocol negotiation succeeds (if used).

If a timeout occurs before a network connection is established, an error is returned. Valid values are 1-65535. The default is 5 seconds.

- **Enumerate attached Device (i.e. modems)**—Enumerate serial devices connected to the Device Server com port.
- **Drain output before setting config**—Drain transmit data before making COM port configuration changes.

Other Advanced Settings that you can configure are:

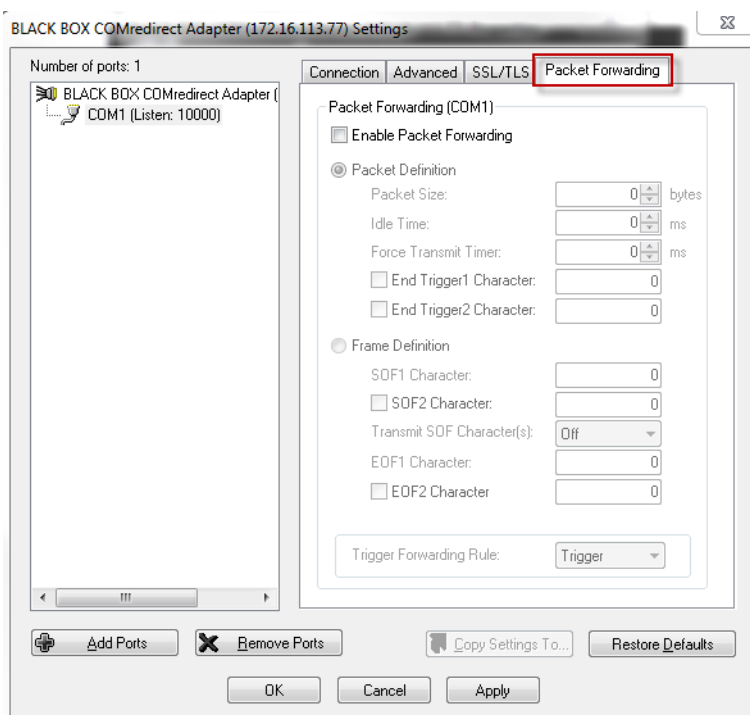
- **Send keep alive packets**—Enable this option if you want to test if the TCP connection is still up when no data has been sent for a while by sending keep-alive messages to the Terminal Server.
- **Keep Alive Interval**—Specifies the number of seconds to wait on an idle connection before sending a keep-alive message. The default is **30** seconds. If no response to the keep alive is received from the device server then the TCP connection is closed.
- **Enable TCP Nagle algorithm**—When you enable the Nagle Algorithm, the number of small packets sent by COMredirect across the network is reduced. The default is enabled.
- **Use legacy UDP protocol (Full Mode only)**—Enabling this option will force the Terminal Server to use the legacy UDP protocol for its connections. The default is to use the TCP protocol for connections.

Configuring SSL/TLS

See [Configuring SSL/TLS](#) for configuration information.

Configuring Packet Forwarding

The Packet Forwarding feature allows you to control how the data coming from a serial device is packetized before forwarding the packet onto the LAN network.



Configure the following parameters:

Enable Packet Forwarding

Check this box if you want to enable Packet Forwarding for this port.

Packet Definition	This section allows you to set a variety of packet definition options. The first criteria that is met causes the packet to be transmitted. For example, if you set a Force Transmit Timer of 1000 ms and a Packet Size of 100 bytes, whichever criteria is met first is what will cause the packet to be transmitted.
Packet Size	The number of bytes that must be written by the application before the packet is transmitted to the network. A value of zero (0) ignores this parameter. Valid values are 0-1024 bytes. The default is 0.
Idle Time	The amount of time, in milliseconds, that must elapse between characters before the packet is transmitted to the network. A value of zero (0) ignores this parameter. Valid values are 0-65535 ms. The default is 0.
Force Transmit Timer	When the specified amount of time, in milliseconds, elapses after the first character is written by the application, the packet is transmitted. A value of zero (0) ignores this parameter. Valid values are 0-65535 ms. The default is 0.
End Trigger1 Character	When enabled, specifies the character that when written by the application will define when the packet is ready for transmission. The content of the packet is based on the Trigger Forwarding Rule. Valid values are in hex 0-FF. The default is 0.
End Trigger2 Character	When enabled, creates a sequence of characters that must be written by the application to specify when the packet is ready for transmission (if the End Trigger1 character is not immediately followed by the End Trigger2 character, COMredirect waits for another End Trigger1 character to start the End Trigger1/End Trigger2 character sequence). The content of the packet is based on the Trigger Forwarding Rule. Valid values are in hex 0-FF. The default is 0.
Frame Definition	This section allows you to control the frame that is transmitted by defining the start and end of frame character(s). If the internal buffer (1024 bytes) is full before the EOF character(s) are received, the packet will be transmitted and the EOF character(s) search will continue. The default frame definition is SOF=00 and EOF=00.
SOF1 Character	When enabled, the Start of Frame character defines the first character of the frame, any character(s) received before the Start of Frame character is ignored. Valid values are in hex 0-FF. The default is 0.
SOF2 Character	When enabled, creates a sequence of characters that must be received to create the start of the frame (if the SOF1 character is not immediately followed by the SOF2 character, COMredirect waits for another SOF1 character to start the SOF1/SOF2 character sequence). Valid values are in hex 0-FF. The default is 0.
Transmit SOF Character(s)	When enabled, the SOF1 or SOF1/SOF2 characters will be transmitted with the frame. If not enabled, the SOF1 or SOF1/SOF2 characters will be stripped from the transmission.
EOF1 Character	Specifies the End of Frame character, which defines when the frame is ready to be transmitted. The content of the frame is based on the Trigger Forwarding Rule. Valid values are in hex 0-FF. The default is 0.

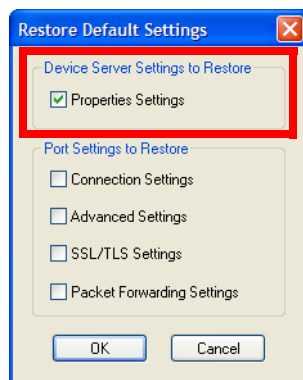
- EOF2 Character** When enabled, creates a sequence of characters that must be received to define the end of the frame (if the EOF1 character is not immediately followed by the EOF2 character, COMredirect waits for another EOF1 character to start the EOF1/EOF2 character sequence), which defines when the frame is ready to be transmitted. The content of the frame is based on the Trigger Forwarding Rule. Valid values are in hex 0-FF. The default is 0.
- Trigger Forwarding Rule** Determines what is included in the Frame (based on the EOF1 or EOF1/EOF2) or Packet (based on Trigger1 or Trigger1/Trigger2). Choose one of the following options:
- **Strip-Trigger**—Strips out the EOF1, EOF1/EOF2, Trigger1, or Trigger1/Trigger2, depending on your settings.
 - **Trigger**—Includes the EOF1, EOF1/EOF2, Trigger1, or Trigger1/Trigger2, depending on your settings.
 - **Trigger+1**—Includes the EOF1, EOF1/EOF2, Trigger1, or Trigger1/Trigger2, depending on your settings, plus the first byte that follows the trigger.
 - **Trigger+2**—Includes the EOF1, EOF1/EOF2, Trigger1, or Trigger1/Trigger2, depending on your settings, plus the next two bytes received after the trigger.

Working with the COMredirect Adapter

Restoring COMredirect Adapter Defaults

You can restore the COMredirect Adapter defaults by either:

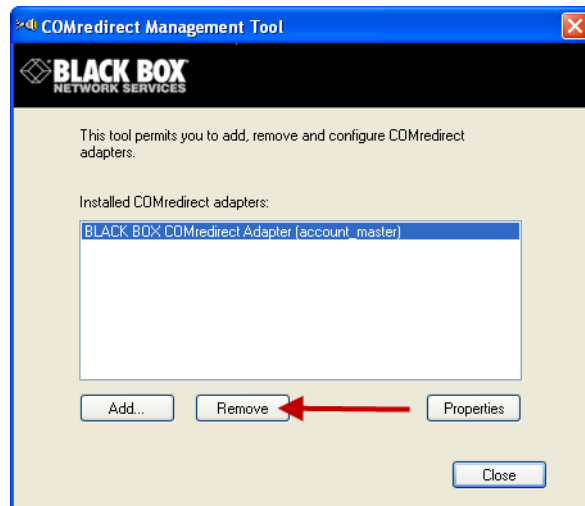
- Select the COMredirect Adapter and then click the **Restore Defaults** button.
- Select any COM port and then click the **Restore Defaults** button. For Device Server settings, click the **Property Settings** checkbox.



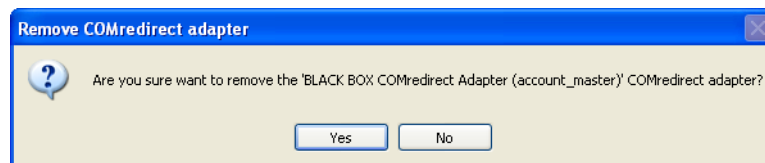
Deleting a COMredirect Adapter on the COMredirect Host

To remove a COMredirect serial adapter(s), do the following:

1. Double-click the COMredirect Management Tool desktop icon or select **Start, All Programs, BLACK BOX, COMredirect, COMredirect Management Tool** from the taskbar to activate the COMredirect Device Management Tool.
2. Highlight the COMredirect adapter you want to remove.



3. Click the **Remove** button.



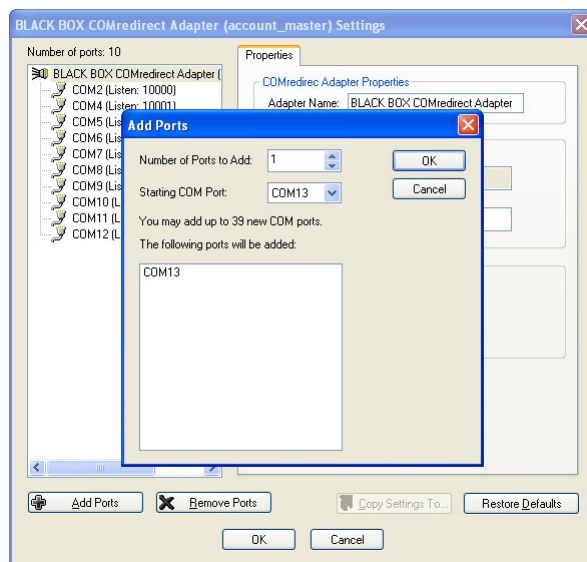
4. Click the **Yes** button to verify that you want to remove the device. The COMredirect serial adapter is now uninstalled from your system.

Working with the COM Port Parameters

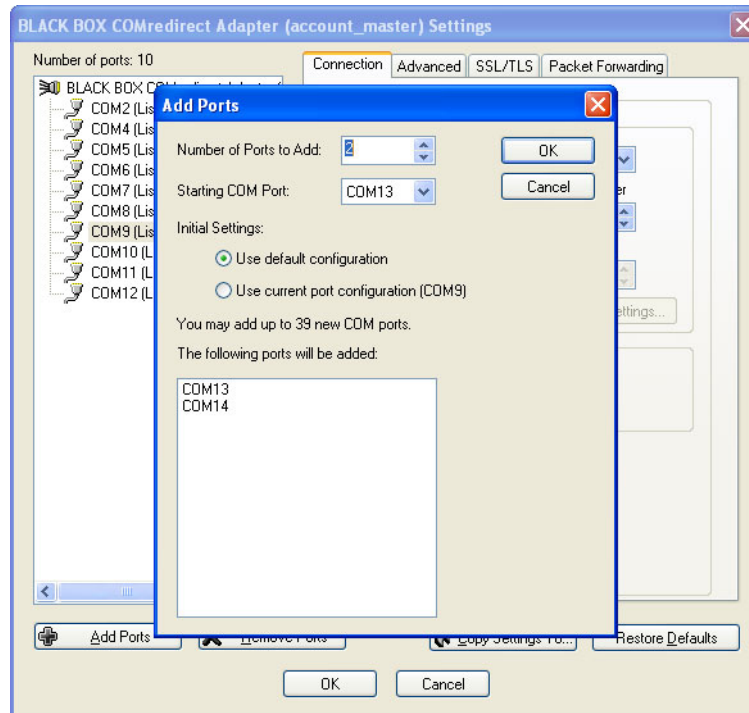
Adding COM Ports on the COMredirect Host

To add COM ports on the COMredirect host, do the following:

1. Double-click the COMredirect Management Tool desktop icon or select **Start, All Programs, BLACK BOX, COMredirect, COMredirect Management Tool** from the taskbar to activate the COMredirect Device Management Tool.
2. Select the COMredirect adapter that has the COM port you want to delete and then click the **Properties** button.
3. Click the **Configuration** tab and then click the **Settings** button.
4. If you click the **Add Ports** button when the COMredirect adapter is selected, you will get the following:



If you click on one of the configured ports and click the **Add Ports** button, you will see the following (notice that **COM9** is selected):



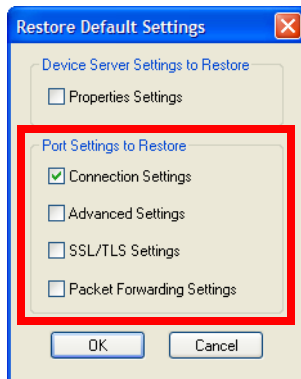
5. Specify the number of ports you want to add. If you selected a COM port before you clicked the **Add Ports** button, you can choose to create the new COM ports with the default COM port settings or with the settings already configured for the selected COM port.
6. Select the starting COM port (COM1 to COM4096). Any COM port(s) being used by other applications will not be shown in the drop-down list of COM ports.
7. Click **OK** to add the specified COM ports.

Note: If the installed COMredirect driver is an unsigned driver, you may have to click through the Hardware Wizard for every COMredirect COM port configured in your system. If you are adding a large number of ports, we recommend clicking **Start, All Programs, BLACK BOX, COMredirect, COMredirect Update** to avoid clicking through the Hardware Wizard for each COMredirect COM port.

This will automatically add and update all added COM ports with the currently installed COMredirect driver (this may take several minutes, depending on how many COM ports you are adding).

Restoring COM Port Defaults

You can restore any or all of the default settings on a COM port by selecting the COM port and clicking the **Restore Defaults** button.



Enable/disable any of the following settings:

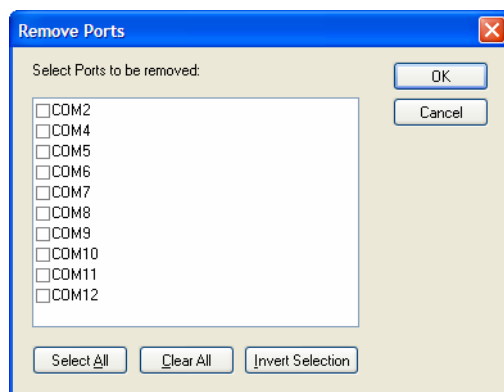
- **Connection Settings**—Resets all the parameters on the **Connection** tab to their default settings.
- **Advanced Settings**—Resets all the parameters on the **Advanced** tab to their default settings.
- **SSL/TLS Settings**—Resets all the parameters on the **SSL/TLS** tab to their default settings.
- **Packet Forwarding Settings**—Resets all the parameters on the **Packet Forwarding** tab to their default settings.

When you have enabled the settings to want to restore to their default settings, click **OK**.

Deleting a COM Port on the COMredirect Host

To delete a COM port on the COMredirect host, do the following:

1. Double-click the COMredirect Management Tool desktop icon or select **Start, All Programs, BLACK BOX, COMredirect, COMredirect Management Tool** from the taskbar to activate the COMredirect Device Management Tool.
2. Select the COMredirect adapter that has the COM port you want to delete and then click the **Properties** button.
3. Click the **Configuration** tab and then click the **Settings** button.
4. Click the **Remove Ports** button to display the Remove Ports window.

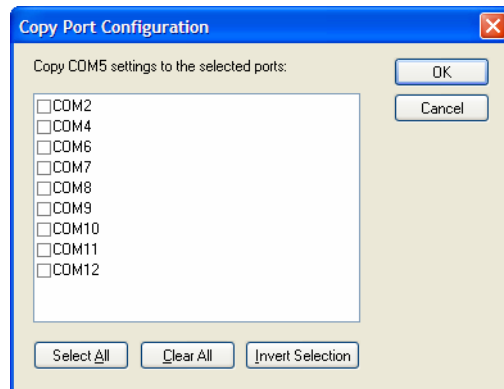


5. Check the COM port(s) you want to delete and click **OK**. You can also delete all the COM ports by clicking the **Select All** button and then **OK**. You must also click **OK** on the main Settings window to actually delete the COM ports.

Copying COM Port Settings on the COMredirect Host

If you have multiple COM ports that will need the same or very similar configuration settings, you can configure one COM and then copy its settings to other COM ports by doing the following:

1. Double-click the COMredirect Management Tool desktop icon or select **Start, All Programs, BLACK BOX, COMredirect, COMredirect Management Tool** from the taskbar to activate the COMredirect Device Management Tool.
2. Select the COMredirect adapter that has the COM port you want to delete and then click the **Properties** button.
3. Click the **Configuration** tab and then click the **Settings** button.
4. Select that COM port with the configured settings and click the **Copy Settings To** button.

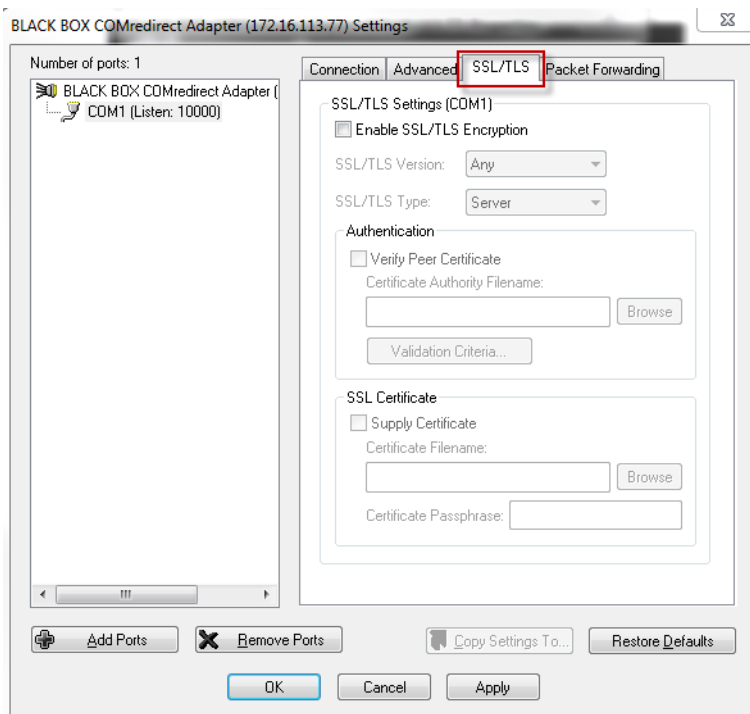


5. Select the COM port(s) you want to copy the settings to and then click **OK**.

Configuring SSL/TLS

The SSL/TLS feature is designed to work with the Secure Terminal Server, Secure Device Server and Secure Console Server models. When COMredirect is used with the Terminal Server, the cipher specified by the Terminal Server will be used for the COMredirect connection. Also, if the Terminal Server is set for **SSL/TLS Type Server**, then you need to set the COMredirect **SSL/TLS Type** to **Client**, and vice versa.

SSL/TLS Configuration Information



The following section provides more information about the SSL/TLS configuration parameters:

- | | |
|---------------------------------------|--|
| Enable SSL/TLS Encryption | Check this box if you want to encrypt the data via SSL/TLS between the COMredirect host and the Terminal Server. |
| SSL/TLS Version | Specify whether you want to use: <ul style="list-style-type: none"> • Any—The COMredirect service will try a TLSv1 connection first. If that fails, it will try an SSLv3 connection. If that fails, it will try an SSLv2 connection. • TLSv1—The connection will use only TLSv1. • SSLv3—The connection will use only SSLv3. |
| SSL/TLS Type | Specify whether the COMredirect service will act as an SSL/TLS client or server. |
| Verify Peer Certificate | The certificate received from the peer will be verified against the CA list, along with any values entered in the validation criteria, for an SSL connection; any fields left blank will not be validated against the peer certificate. |
| Certificate Authority Filename | The full path and file name of the CA (certificate authority) file. |

Supply Certificate Check this box if you need to specify the path and file name of the certificate file.

Certificate Filename The full path and file name of the certificate file.

Certificate Passphrase If you encrypted the private key with a passphrase when it was created, you will need to enter it here to have a successful SSL/TLS connection.

The following section describes the SSL validation criteria.

Note: The values that you enter here are case sensitive, so the peer certificate must match exactly or the connection will fail.

Country A two character country code; for example, US.

State/Province Up to a 128 character entry for the state/province; for example, IL.

Locality Up to a 128 character entry for the location; for example, a city.

Organization Up to a 64 character entry for the organization; for example, Acme Software.

Organization Unit Up to a 64 character entry for the unit in the organization; for example, Payroll.

Common Name Up to a 64 character entry for common name; for example, the host name or fully qualified domain name.

Email Up to a 64 character entry for an email address; for example, acct@anycompany.com.

SSL/TLS Support Files

When you enable the SSL/TLS option for a port, you need to make sure the COMredirect host and Terminal Server have the appropriate support files: certificates/private keys and/or the CA list file. The Installation CD-ROM contains a self-signed RSA certificate named **samplecert.pem**. The **samplecert.pem** file can be used for both the certificate file on the SSL/TLS server and the CA list file on the SSL/TLS client.

COMredirect Port Configured as SSL/TLS Server

When the COMredirect port is configured as an SSL/TLS server, the SSL/TLS private key and certificate is required for all key exchange methods except ADH (Anonymous Diffie-Hellman). The private key needs to be appended to the certificate file, to create one certificate/private key file. This certificate/private key file then becomes the COMredirect certificate. Copy the COMredirect certificate file to the directory you specified in the SSL/TLS configuration.

If the COMredirect SSL/TLS server is configured to verify an SSL client, a CA list file is also required. The CA list file is a certificate, or list of certificates, of the Certificate Authorities (CA) who created and signed the peer certificates.

COMredirect Port Configured as SSL/TLS Client

When the COMredirect port is configured as an SSL/TLS client and peer verification is configured, a CA list file is required. The CA list file is a certificate, or list of certificates, of the Certificate Authorities (CA) who created and signed the peer certificates (the peer certificate(s) must be downloaded to the Terminal Server). This CA list file should be copied to the COMredirect host directory specified in the SSL/TLS configuration.

CLI Conventions

This section explains how to interpret the CLI syntax. BLACK BOX CLI commands are arranged into two categories. CLI commands to be performed on the COMredirect adapter or CLI commands to be performed on the com ports associated with the COMredirect adapter.

To view all valid commands type `crdcon ?`. To get Help on a specific command type `crdcon help <command name>`. Definitions for CLI command parameters can be found in the graphical portion of this manual.

Note: CLI commands need to be "Run as Administrator" within the Command Prompt.

The command will be interrupted as follows:

For example: `add adapter <adapter name> [ipaddr|hostname] <ip addr|host name> <com> <number of ports>`

`add adapter "Blackbox Adapter" ipaddr 172.16.44.55 com3 4`

- Square brackets ([]) show the options that are available for the command.
- Angle brackets (< >) show that the text inside the brackets is a description for a variable value that you must fill in according to your requirements. In the `add adapter` command, you must determine the values for **adapter name**, **ip addr|host name**, **com** and **number of ports**. Any spaces within a value must be enclosed in quotes for example: **"Black Box Adapter"**. The angle brackets can also contain a range that can be used.
- The pipe (|) shows an 'or' condition. For example, valid values for `ipaddr|hostname` are `ip addr` or `host name`.

All BLACK BOX CLI commands must be typed on a DOS command prompt within the Program Files\Black Box Corporation\COMredirect directory. You must run these commands as administrator within the command prompt

```
C:\Program Files\Black Box Corporation\crdcon add adapter
"blackbox adapter" ipaddr 172.16.44.55 com3 4
```

Adapter specific commands

For adapter commands the format is as follows:

`crdcon <command> [<arg>....]`

`<command>` - specifies a command (see command list below).

`<arg>...` - one or more arguments that modify a command

crdcon `add adapter <adapter name> [ipaddr|hostname] <ip address|host name> <com> <number of ports>`

crdcon `remove adapter <adapter name> [ipaddr|hostname] <ip address|host name>`

crdcon `add-ports adapter <adapter name> [ipaddr|hostname] <ip address | host name> <com> <number of com ports>`

crdcon `remove-ports adapter <adapter name> [ipaddr|hostname] <ip address|host name> <com|ALL>`

crdcon `show-adapter *|<adapter name> [ipaddr|hostname] <ip address|host name>`

crdcon `show-port adapter [ipaddr|hostname] <ip address|host name> <com>`

Com Port specific commands

For com port commands the format is as follows:

crdcon <com> <command> [<arg>.....]

<com> - the com port <com1-com49>

<command> - specifies a command (see command list below).

<arg>... - one or more arguments that modify a command

crdcon list

crdcon <com> show

crdcon <com> baud-rate

<50|75|110,134|150|200|300|600|1200|1800|2000|2400|4800|7200|9600|14400|19200|28800|33400|56000|57600|64000|76800|115200|128000|150000|230400|256000>

crdcon <com> data-bits <5|6|7|8>

crdcon <com> parity <None|Even|Odd|Mark|Space>

crdcon <com> stop-bits <1|1.5|2>

crdcon <com> flow-control <None|Xon|Xoff|Hardware>

crdcon <com> port-number <new com number>

crdcon <com> tx-fifo-limit <1-128>

crdcon <com> tx-fifo-trigger <0-127>

crdcon <com> access [Ports|IO-channels]

crdcon <com> connection-mode [Automatic|Lite|Full]

crdcon <com> accept <1-65535>

crdcon <com> initiate <1-65535>

crdcon <com> connect-startup [Disable|Enable]

crdcon <com> tcp-close-com-close [Disable|Enable]

crdcon <com> delay-tcp-close <0-65535 seconds>

crdcon <com> connection-retry <Forever|0-255 seconds>

crdcon <com> retry-interval <1-255 seconds>

crdcon <com> restore-connection [Disable|Enable]

crdcon <com> io-tcp-port <1-65535>

crdcon <com> io-application [Io-access|Modbus-ascii|Modbus-rtu]

crdcon <com> profile

[optimize-throughput|min-latency|reduce-fragmentation]

crdcon <com> simulate-delays [Disable|Enable]

crdcon <com> tx-delay <0-9999 milliseconds>

crdcon <com> rx-delay <0-9999 milliseconds>

crdcon <com> open-response <Always|Established>

crdcon <com> max-wait <0-65535 seconds>

crdcon <com> enum-devices [Disable|Enable]

crdcon <com> drain-before-config [Disable|Enable]

crdcon <com> keep-alive-interval <0-65535 seconds>

crdcon <com> nagle [Disable|Enable]

crdcon <com> udp [Disable|Enable]

crdcon <com> ssl [Disable|Enable]

```
crdcon <com> ssl-version [Any|tslv1|sslv3]
crdcon <com> ssl-type [Server|Client]
crdcon <com> verfiy-peer [Disable|Enable]
crdcon <com> ca-name <1-260 characters>
crdcon <com> ssl-country <2 characters>
crdcon <com> ssl-state <1-128 characters>
crdcon <com> ssl-locality <1-64 characters>
crdcon <com> ssl-organization <1-64 characters>
crdcon <com> ssl-organization-unit <1-64 characters>
crdcon <com> ssl-common-name <1-64 characters>
crdcon <com> ssl-email <1-64 characters>
crdcon <com> supply-certificate [Disable|Enable]
crdcon <com> certificate-file-name <1-260 characters>
crdcon <com> cert-passphrase <1-255 characters>
crdcon <com> packet-forwarding [Disable|Enable]
crdcon <com> packet-definition [Packet|Frame]
crdcon <com> packet-size <0-1024>
crdcon <com> idle-time <0-65535>
crdcon <com> force-transmit <0-65535>
crdcon <com> end-trigger1 [Disable|Enable]
crdcon <com> end-trigger1-char <0-FF hexadecimal>
crdcon <com> end-trigger2 [Disable|Enable]
crdcon <com> end-trigger2-char <0-FF hexadecimal>
crdcon <com> sof1-char <0-FF hexadecimal>
crdcon <com> sof2 <Disable|Enable>
crdcon <com> sof2-char <0-FF hexadecimal>
crdcon <com> tx-sof [Disable|Enable]
crdcon <com> eof1-char <0-FF hexadecimal>
crdcon <com> eof2 [Disable|Enable]
crdcon <com> eof2-char <0-FF hexadecimal>
crdcon <com> trigger-rule [trigger|trigger+1|trigger+2|strip]
```



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