TREK

CCSDS FILE DELIVERY PROTOCOL (CFDP)

USER GUIDE

August 2014

TABLE OF CONTENTS

PARAGRAPH PAGE

FIGURES

FIGURE PAGE

1 Welcome

The Telescience Resource Kit (TReK) is a suite of software applications and libraries that can be used to monitor and control assets in space or on the ground.

The TReK CFDP application provides the capability to transfer files using the Consultative Committee for Space Data Systems (CCSDS) File Delivery Protocol (CFDP).

1.1 Getting Started

Start with the Introduction which provides an application overview. Next, try the Quick Start Guides for "How Tos" for common functions. For help with details, reference the Details section. See the FAQ and Troubleshooting section for helpful hints and solutions to the common "gotchas".

1.2 System Requirements

Windows 7, Red Hat Enterprise Linux 6.x.

2 Technical Support

If you are having trouble installing the TReK software or using any of the TReK software applications, please try the following suggestions:

Read the corresponding material in the manual and/or on-line help.

Ensure that you are correctly following all instructions.

Checkout the TReK Web site at http://trek.msfc.nasa.gov/ for Frequently Asked Questions.

If you are still unable to resolve your difficulty, please contact us for technical assistance:

TReK Help Desk E-Mail, Phone & Fax:

E-Mail:	trek.help@nasa.gov
Telephone:	256-544-3521 (7:00 a.m. - 3:30 p.m. Central Time)
Fax:	256-544-9353

TReK Help Desk hours are 7:00 a.m. – 3:30 p.m. Central Time Monday through Friday. If you call the TReK Help Desk and you get a recording please leave a message and someone will return your call. E-mail is the preferred contact method for help. The e-

mail message is automatically forwarded to the TReK developers and helps cut the response time.

3 Introduction

The TReK CFDP application provides the capability to transfer files using the Consultative Committee for Space Data Systems (CCSDS) File Delivery Protocol (CFDP).

The CCSDS File Delivery Protocol (CFDP) was developed by the Consultative Committee for Space Data Systems (CCSDS). Official specifications are contained in a CCSDS document called the CFDP Blue Book (available at www.ccsds.org). The CFDP protocol provides reliable transfer of files from one computer to another, and has been designed to work well over space links. It can be used to perform space to ground, ground to space, space to space, and ground to ground file transfers. The underlying communications protocol used by the TReK CFDP application is the User Datagram Protocol (UDP).

CFDP requires a sender and a receiver. The sender and receiver must be configured and running at the same time to perform a file transfer. Each party is referred to as an "Entity". The sender is an entity and the receiver is an entity. Each "Entity" must have a unique Entity ID. For example:

Figure 1 CFDP Sender and Receiver

To move a file from one computer to another, you will enter one or more CFDP Commands (primitives) to indicate the action to be taken. The syntax of a primitive is as follows:

[CFDP Directive] [Class of Service] [source-path] [remote-EID] [destination-path]

Example: put class2 D:\file1.txt 2 /home/kirk/file1.txt

The TReK CFDP application currently supports two CFDP Directives: put and get. These are defined as follows:

Put: To copy one file from the local entity to the remote entity.
Get: To copy one file from the remote entity to the local entity.

The file you want to transfer is considered the "Source" and the location it should be transferred to is considered the "Destination".

Don’t worry there is no need to type in CFDP Commands unless you want to. You can use drag and drop to build your CFDP Command list.

Note: The Get directive is not supported in all ISS CFDP implementations. It is supported by TReK when both the sender and receiver are TReK CFDP implementations (TReK CFDP application, TReK CFDP console application, or TReK CFDP Library).

In addition to this application, TReK also includes a CFDP console application and a CFDP library. If you need CFDP functionality onboard a spacecraft consider the TReK CFDP console application. If you need to include CFDP functionality in your own application, consider the TReK CFDP library. The TReK CFDP library can be used to include CFDP functionality in a ground or flight application.

4 Overview of the User Interface

4.1 Main Window

The main window contains several areas as shown in Figure 2. Each area is a dock window that you can float or dock. To float a dock window, use your left mouse button to click and hold the title area while dragging the window to another area of the screen. To dock, use the title bar to drag the dock window over the main window and drop.

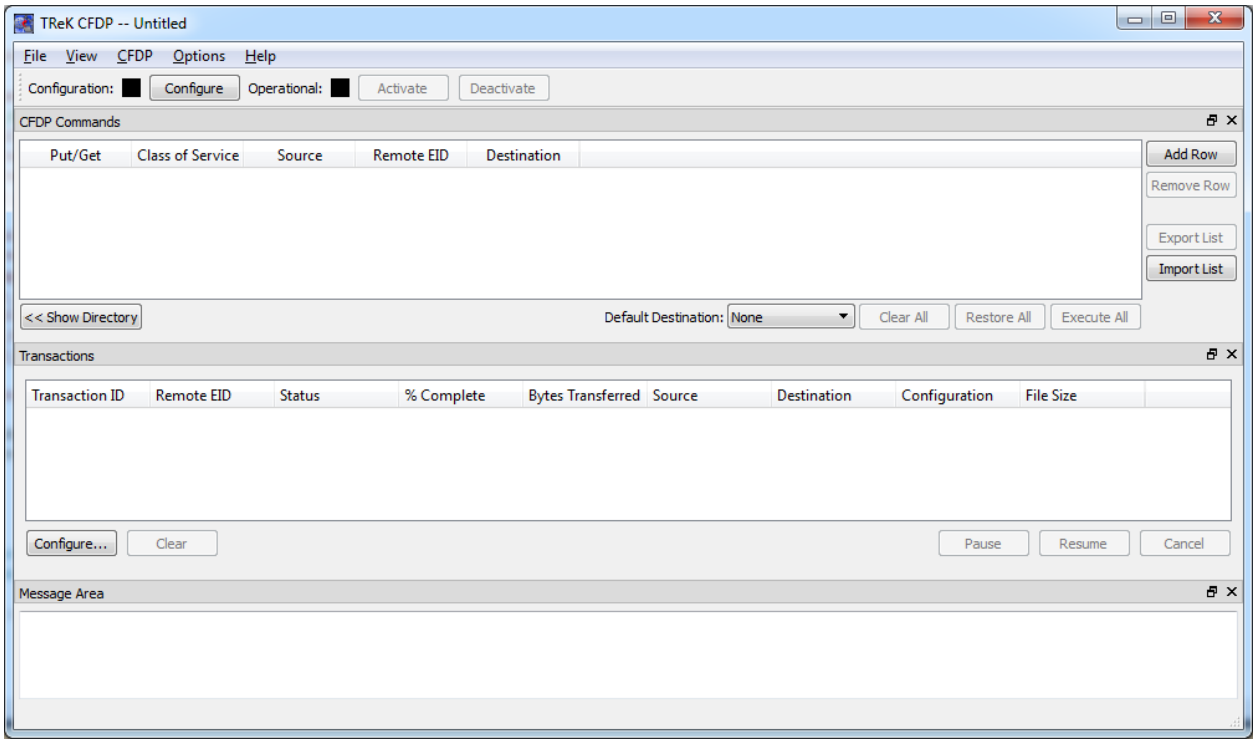

Figure 2 Main Window

Toolbar

The toolbar at the top of the window provides quick access to configure the application and start and stop the CFDP service.

CFDP Commands

The CFDP Commands area provides a way to add and execute one or more CFDP commands (primitives). Add a "put" command to send a file to a remote entity. Add a "get" command to retrieve a file from a remote entity. The "Show Directory" button provides access to the local file system. Files can be dragged from this view of the local file system or from a file explorer window. Files can also be added by pushing the Add Row button and typing in the file transfer information. To delete a file from the list put your cursor in the row you would like to delete and push the Remove Row button. To delete all files in the list push the Clear All button. The Export List button provides a way to save the list of CFDP Commands in a file. The Import List button provides a way to load a list of CFDP Commands from a file. Each CFDP command entered into the list must include a Directive (put or get), the Class of Service (class1 or class2), the absolute path of the source file, the Remote Entity ID (Remote EID), and the absolute path of the destination file. The Class of Service default is class2. To execute all the CFDP commands (puts and gets) in the list, push the Execute All button. After you push the Execute All button, the Restore All button can be used to restore the list of commands. The Restore All button will only restore the list of CFDP commands previously sent by pushing the Execute All button. The Default Destination menu can be used to identify a default destination. This can save typing when dragging and dropping files into the list. If the Default Destination is set, the destination selected will automatically be copied into the Destination field when a file is dropped into the list. The Default Destination menu can be populated using the Configure dialog.

Note: You can enter the absolute path for a directory in the Source and Destination fields. All the files in the first level of the directory will be transferred. Subdirectories will not be transferred. Each file in the directory will result in the execution of an individual CFDP Command (primitive). Therefore, the transactions area will contain transaction information for each file transferred.

Note 2: There are two types of files supported by the CFDP application: the CFDP Application Configuration File and the CFDP Commands List file. File/Save/Save As can be used to save an Application Configuration File. The File/Open command provides a way to open an Application Configuration File. The Export List button provides a way to save a CFDP Commands List file. The Import List button provides a way to load a CFDP Commands List file.

Transactions

The Transactions area displays file transfer activity as it is in progress. The Configure button displays the Configure dialog which provides a way to show and hide columns and rearrange the order of the columns. To Clear, Pause, Resume, or Cancel one or more transactions, select the transactions in the list and push the desired button.

Message Area

The Message Area displays important status and error messages. The message area can be cleared using the View menu.

4.2 Toolbar

The toolbar provides visual information about the state of the application and provides access to common application functions.

Configuration Status

When the Configuration status is black, this indicates the application has not been configured. When the Configuration status is green, this indicates the application has been configured and the CFDP service can be activated.

Use the Configure button to access the Configuration dialog to configure the application.

Operational Status

When the Operational status is black, this indicates the CFDP service is inactive. When the Operational status is green, this indicates the CFDP service is active and file transfer is supported. The application must be properly configured before the Activate button will be available. The CFDP service must be active before the Deactivate button will be available.

Use the Activate button to activate the CFDP service. This will initiate all internal activities needed to prepare the application to send and receive files. When you activate the CFDP service, you will see activation status messages in the main window message area. If you need to reconfigure the CFDP application, deactivate the CFDP service, and then push the Configure button to reconfigure.

4.3 Menus

The CFDP application menus are: File, View, CFDP, Options, and Help. Each of these menus is described in more detail below.

File Menu

The File menu provides the capability to manage configurations and exit the application.

View Menu

The View menu provides the capability to clear the main window message area and show and hide different areas in the main window.

CFDP Menu

The CFDP menu provides the capability to configure the application, activate and deactivate the CFDP service, apply Pause, Resume, Cancel, or Clear to all transactions in progress, and Reset Metrics. Reset Metrics can be used to reset all the metrics to 0 in the

metrics log file that is currently open. The Metrics log file will only be open when Metrics Logging is on and the CFDP service is active.

Options Menu
The Options menu provides access to the Messages dialog, the Configure Message Logging dialog, the Configure Statistics Logging dialog, and Reset Statistics. The Messages dialog displays application messages. The Configure Message Logging dialog provides the capability to configure message logging. The Configure Statistics Logging dialog provides the capability to configure statistics logging. Reset Statistics can be used to reset all the statistics to 0 in the statistics log file that is currently open. The Statistics log file will only be open when Statistics Logging is on.

Help Menu
The Help menu provides access to on-line help and application version information.

5 Quick Start Guides

This section provides "How Tos" for common functions.

5.1 How to Configure the Application

The following steps describe the minimum necessary to configure the application. For additional information and details about the Configure dialog please reference section 6.1.

1. Push the Configure button to display the Configure dialog.
2. Enter your Entity ID in the Local Entity ID field.
3. Push the + button to create a row to enter Remote Entities information. For each remote entity, enter the Remote Entity ID, the Remote IP Address, and Remote Port. You may enter one or more remote entities.
4. Ensure the CFDP Socket Local IP Address contains a valid local IP address.
5. Push the OK button to save the configuration information and exit the dialog.

If the application is configured correctly, the Configuration status will be green.

5.2 How to Configure Application Defaults

This section describes how to configure application defaults using the Configure dialog Options tab.

1. Push the Configure button to display the Configure dialog.
2. Go to the Options tab.

3. Enter a Default Remote EID. When you drag and drop files into the "CFDP Commands" list or the CFDP Command field, the default Remote EID entered here will automatically be used as the Remote EID.
4. Enter one or more Default Destination Paths. These paths will be added to the Default Destination menu shown on the main window. The Default Destination menu will also contain a "None" item and a "Same As Source" item. When dragging and dropping files, the item selected in the Default Destination menu will determine what is placed in the Destination field. This will work as follows:

    - If "None" is selected the Destination field will be blank.
    - If "Same As Source" is selected, the Source information will be copied into the Destination field.
    - If a path is selected, and you are dragging and dropping a file, the path selected on the Default Destination menu will be copied into the Destination field and appended with the Source filename.
    - If a path is selected, and you are dragging and dropping a directory, the path selected on the Default Destination menu will be copied into the Destination field.

5. Push the OK button to save the configuration information and exit the dialog.

5.3 Drag and Drop Features

Drag and Drop is the fastest way to create a list of CFDP commands to transfer one or more files and/or directories. Simply Drag and Drop one or more files from the Directory area in the CFDP main window ("CFDP Commands" area) or from an Explorer window.

You can optimize your Drag and Drop experience by setting application defaults such as Default Remote EID and Default Destination Paths. To set these defaults see section 5.2.

5.4 How to Save a CFDP Command List

A CFDP Command List can be saved by saving the application configuration using the File menu's Save/Save As items or by using the Export List button on the Main Window. If the application configuration is saved, the entire application configuration, including the CFDP Command List, will be saved in the configuration file. If the Export List button on the Main Window is used, only the CFDP Command List will be saved in the file.

The File menu's Open menu item can only open a TReK CFDP Application Configuration file.

The Import List button on the Main Window can only be used to read a CFDP Command List file.

5.5 How to Start and Stop the CFDP Service

This section describes how to start and stop the CFDP service.

1. Before the CFDP service can be started, you must configure the application. To learn more about this see section 5.1. The Configure status must be green before you can start the CFDP service.
2. To start the CFDP service, push the Activate button on the toolbar. If this is successful the Operational status will turn green. When the Operational status is green you can transfer files (send or receive files).
3. To stop the CFDP service, push the Deactivate button.
4. When activating or deactivating important status and/or error messages will be displayed in the Main Window message area.

5.6 How to Put (Send) a File

This section describes how to put (send) a file.

1. The CFDP application must be configured and the CFDP service must be active.
2. Drag and Drop a file into the "CFDP Commands" area.
3. Ensure the Put, Class of Service, Source, Remote EID and Destination information is correct. The Class of Service should be class1 or class2. The Source should identify the absolute path of the file to be sent. The Remote EID should identify the target Entity. The Destination should identify where to store the file at the target location.
4. Push the Execute All button.

Note: If you want to transfer the contents of a directory, you can enter the absolute path for a directory in the Source and Destination fields. All the files in the first level of the directory will be transferred. Subdirectories will not be transferred. Be sure to include a forward slash '/' at the end of the directory path.

If the text is red, this indicates there is problem with the information provided. Until this is corrected it will not be possible to successfully perform the file transfer.

5.7 How to Get (Retrieve) a File

This section describes how to get (retrieve) a file.

Special Note: ISS Change Request (CR) 13351 Ku-Band Forward Access for Payload Operations only required support for the "Put" directive. Therefore, the Get directive is not supported in all ISS CFDP implementations. It is supported by TReK when both the sender and receiver are TReK CFDP implementations (TReK CFDP application, TReK CFDP console application, or TReK CFDP Library).

1. The CFDP application must be configured and the CFDP service must be active.
2. Enter information into the "CFDP Commands" area for the file you wish to get. Ensure the Get, Class of Service, Source, Remote EID, and Destination information is

correct. The Class of Service should be class1 or class2. The Source field should identify the absolute path of the file to be retrieved from the target entity. The Remote EID should identify the target Entity. The Destination field should identify the location where you want the file to be stored when retrieved.

3. Push the Execute All button.

Note: If you want to transfer the contents of a directory, you can enter the absolute path for a directory in the Source and Destination fields. All the files in the first level of the directory will be transferred. Subdirectories will not be transferred. Be sure to include a forward slash '/' at the end of the directory path.

If the text is red, this indicates there is problem with the information provided. Until this is corrected it will not be possible to successfully perform the file transfer.

5.8 How to Monitor File Transfers

File Transfers can be monitored using the Transactions area in the main window. No transactions will appear until a file transfer is in progress. Transactions will appear when a send or receive is in progress. The details about the file transfer will stay in the Transactions area until they are cleared out.

5.9 How to Configure the Transactions Area

This section describes how to configure the Transactions area.

1. In the Transactions area, push the Configure button to display the Configure Transactions dialog.
2. To show or hide columns, select the column(s) you would like to show or hide and push the arrow buttons to move the columns to the Available list or the Columns Showing list as desired.
3. To order the columns use the Move Up and Move Down buttons to order the list. The top item will be the left most column.
4. Push the OK button to save the configuration and exit.

The Transactions list can be safely configured while transactions are in progress. The configuration is not saved as part of the application configuration.

5.10 How to Turn on Message Logging

This section describes how to turn on message logging. Various types of application messages are generated. As you use the application, messages will be displayed in the main window message area and the Messages dialog. Messages can also be logged to a file by turning on Message Logging. Message Logging will only capture messages generated after Message Logging is turned on. Any messages generated before message logging was turned on will not appear in the message log file.

1. Go to the Options menu and select ‘Configure Message Logging’.
2. Check the Log Messages checkbox to turn Message Logging On.
3. Enter a directory for the Log File in the Log File Path field.
4. Enter a name for the Log in the Log File Name field.
5. You can select whether debug messages are written to the Message Log using the Log Debug Messages checkbox.
6. Push OK to save the configuration and exit the Configure Message Logging dialog.

5.11 How to Turn on Statistics Logging

This section describes how to turn on statistics logging. Various types of application statistics are generated. Statistics are generated and captured in memory as you use the application. Statistics can also be logged to a file by turning on Statistics Logging. When Statistics Logging is on, the Statistics Log file provides a snapshot of the application statistics from the time the application started or the last statistics reset.

1. Go to the Options menu and select ‘Configure Statistics Logging’.
2. Check the Log Statistics checkbox to turn Statistics Logging On.
3. Enter a directory for the Log File in the Log File Path field.
4. Enter a name for the Log in the Log File Name field.
5. You can select whether packet statistics are written to the Statistics Log using the Log Packet Statistics checkbox.
6. Push OK to save the configuration and exit the Configure Statistics Logging dialog.

5.12 How to Turn on Metrics Logging

This section describes how to turn on metrics logging. Various types of CFDP metrics are generated. Metrics are generated and captured in memory when the CFDP service is active. Metrics can also be logged to a file by turning on Metrics Logging. The Metrics Log file provides a snapshot of the current CFDP metrics starting from the time the CFDP service was activated or the last metrics reset.

1. Go to the CFDP menu and select ‘Configure’.
2. In the Configure dialog select the Options tab.
3. Check the Log Metrics checkbox to turn Metrics Logging On.
4. Enter a directory for the Log File in the Log File Path field.
5. Enter a name for the Log in the Log File Name field.
6. Push OK to save the configuration and exit the Configure dialog.

5.13 How to Use the CFDP Command Line

This section describes how to access the CFDP Command Line area.

Special Note: ISS Change Request (CR) 13351 Ku-Band Forward Access for Payload Operations only required support for the "Put" directive. Therefore, the Get directive is not supported in all ISS CFDP implementations. It is supported by TReK when both the sender and receiver are TReK CFDP implementations (TReK CFDP application, TReK CFDP console application, or TReK CFDP Library).

1. Go to the View menu and select File Transfer Command Line.
2. Set the Default Destination menu if you would like the application to automatically fill in the default destination when you drop a file.
3. Drag and Drop a file or Type a CFDP Command into the CFDP Command field.

The following syntax must be used:

[CFDP Directive] [Class of Service] [source-path] [remote-EID] [destination-path]

You may use put or get for CFDP directive.
You may use class1 or class2 for Class of Service.
All paths must be absolute paths.

Example:

put class2 D:\file1.txt 2 C:\myfiles\file1.txt

4. Push the Execute button to execute the CFDP command.

The Clear button can be used to clear the CFDP Command field and the Restore button can be used to restore the last command executed.

Note: If you want to transfer the contents of a directory, you can enter the absolute path for a directory in the [source-path] and [destination-path] fields. All the files in the first level of the directory will be transferred. Subdirectories will not be transferred. Be sure to include a forward slash '/' at the end of the directory path.

6 Details

This section covers various application details.

6.1 Configuration

The Configure dialog contains two tabs: Configuration and Options. The Configuration tab is used to configure parameters that are required and the Options tab is used to configure parameters that are optional.

6.1.1 Configuration Tab

The Configuration tab is shown in Figure 3. Each field is described below.

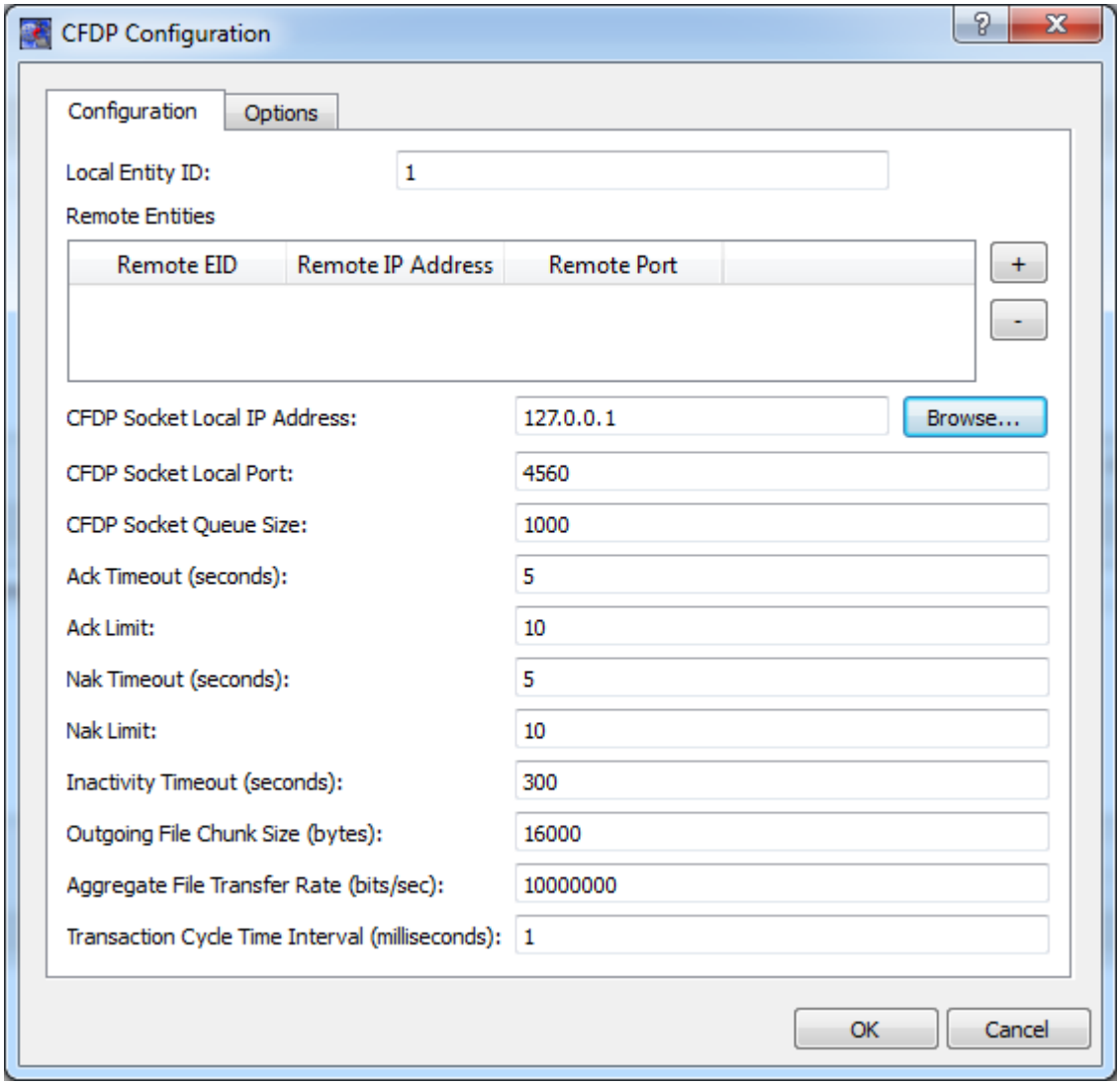

Figure 3 Configure Dialog (Configuration Tab)

Local Entity ID

This field should contain your Entity ID.

Remote Entities List

The CFDP application provides the capability to communicate with one or more entities when transferring files. The Remote Entities List identifies the Remote Entity ID, the Remote IP Address, and the Remote Port for each remote entity.

CFDP Socket Local IP Address

A UDP socket is created to send and receive CFDP packets. This is the local IP address used for the UDP socket.

CFDP Socket Local Port

A UDP socket is created to send and receive CFDP packets. This is the local port used for the UDP socket.

CFDP Socket Queue Size

The UDP socket that is created to receive CFDP packets may store CFDP packets in a queue prior to the packets being processed by the CFDP library. This queue minimizes the chances of a CFDP packet being dropped due to packet transmission bursts or a temporary CPU spike on the receiving platform. In general, a larger queue size is needed for higher transmission rates. If an unacceptable number of CFDP packet retransmissions is occurring, increasing the queue size or decreasing the file transfer rate may help decrease or eliminate the CFDP packet retransmissions.

Ack Timeout

The CFDP library sends positive acknowledgment on reception of the end-of-file packet and finished packet. This timeout defines the length of time the CFDP library will wait for the Ack packet to arrive prior to retransmitting the end-of-file or finished packet.

Ack Limit

The Ack Limit is the number of Ack timeouts that may occur prior to cancelling the CFDP transaction.

Nak Timeout

The CFDP library sends a Nak packet identifying the CFDP packets that were not received by the CFDP library. This timeout defines the length of time the CFDP library will wait for the retransmission of the requested CFDP packets.

Nak Limit

The Nak Limit is the number of Nak timeouts that may occur prior to cancelling the CFDP transaction.

Inactivity Timeout

The Inactivity Timeout is the length of time the CFDP library is required to wait between CFDP packet receptions prior to cancelling the CFDP transaction.

Outgoing File Chunk Size

The Outgoing File Chunk Size is the maximum size, in bytes, of the data zone of the CFDP packets created by the CFDP library.

Aggregate File Transfer Rate

The Aggregate File Transfer Rate represents the maximum transmission rate, in bits per second, of the CFDP packets created by the CFDP library.

Transaction Cycle Time Interval

The transaction cycle time interval, in milliseconds, controls the processing rate of CFDP library transactions. Minimizing the cycle time, increases the transaction speed or processing rate. The default and minimum value is 1 millisecond. This value should only be incremented if CPU usage on the host platform is unexpectedly high while idling or while processing a transaction.

6.1.2 Options Tab

The Configuration tab is shown in Figure 4. Each field is described below.

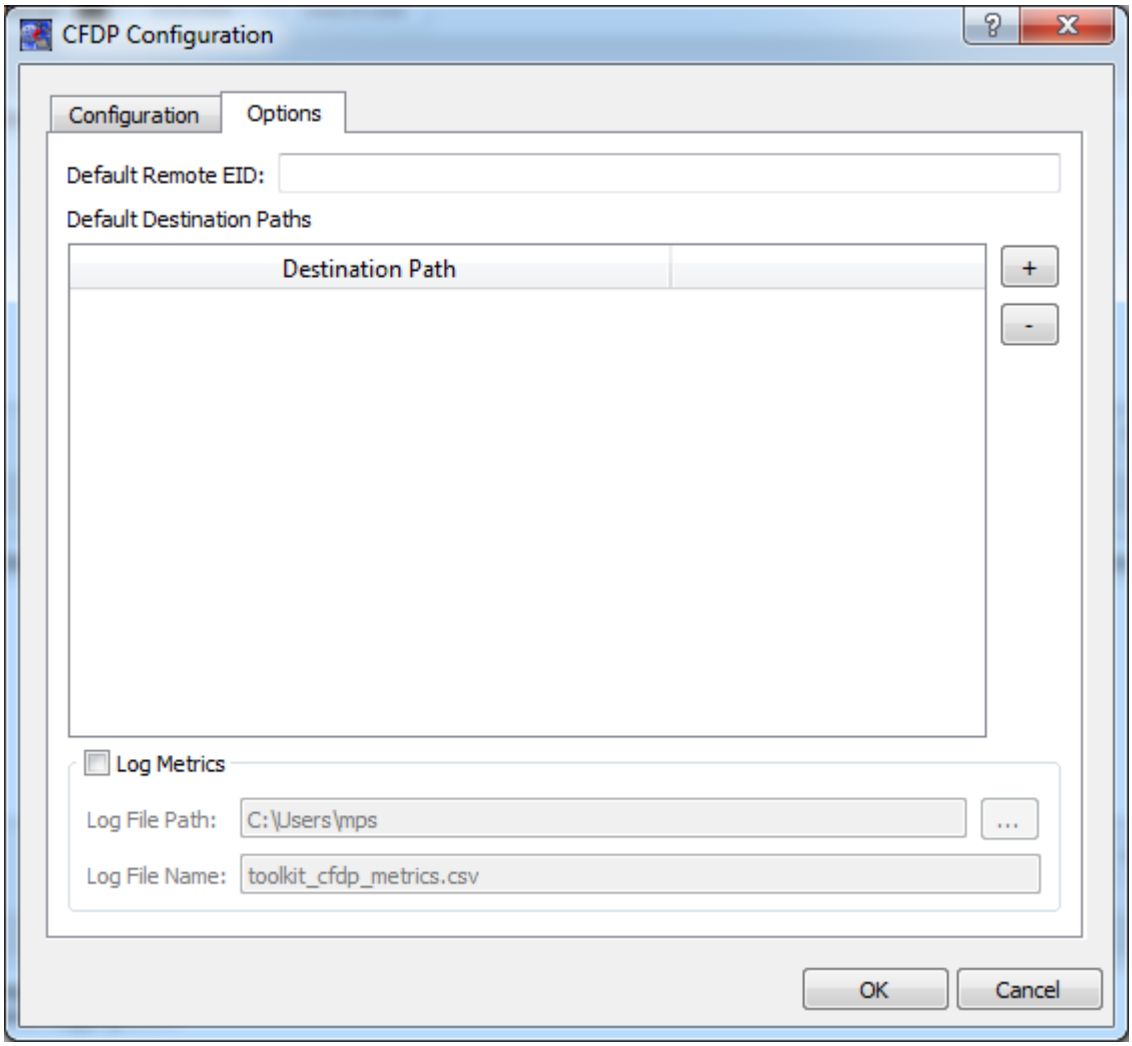

Figure 4 Configure Dialog (Options Tab)

Default Remote EID

The Default Remote EID is used during Drag and Drop. If this field contains a value, this value will be entered as the Remote EID when you drag and drop a file into the "CFDP Commands" list or the "CFDP Command" field.

Default Destination Paths

The Default Destination is used during Drag and Drop. All destinations listed in the Default Destination Paths list will appear in the "Default Destination" menu on the CFDP main window. When you drag and drop a file into the "CFDP Commands" list or the "CFDP Command" field, the destination selected from the Default Destination menu will automatically be entered into the Destination field.

Log Metrics

The CFDP application provides the capability to write metrics to a file. If you check Log Metrics, metrics will be written to the log file specified. Metrics Logging will start when CFDP is activated and stop if you uncheck the box or CFDP is deactivated.

Log File Path
The Log File Path should contain the absolute path to the directory where the log file should be written.

Log File Name
The Log File Name field should contain the name to use for the log file.

6.2 Transactions

This section describes the columns in the main window Transactions area.

Transaction ID
The transaction ID. A unique ID used to identify a transaction.

Remote EID
The Entity ID of the other party involved in the transfer.

Status
The status of the transaction: Sending, Receiving, Complete, etc. The Status field updates as the transaction progresses.

% Complete
The % complete of the file transfer. The % Complete field updates as the transaction progresses.

Bytes Transferred
The number of bytes transferred. The Bytes Transferred field updates as the transaction progresses.

Source
The source identified in the CFDP command.

Destination
The destination identified in the CFDP command.

Configuration
The configuration field indicates the direction of the file transfer: “Sending” or “Receiving”.

File Size
The File Size field displays the size of the file being transferred in bytes.

6.3 Statistics

This section describes the statistics that can be logged by the application to a user specified file. Statistics include device statistics and packet statistics. The snapshot of device and packet statistics is updated once a second with current statistics information at both the device and packet level. Device statistics provides information on all packets that are being received or sent by the device. Packet statistics provides information on the individual packet groups that are being received or sent by the device. The TReK CFDP library that performs this work for the application does not divide packets into groups so packet statistics mirror device statistics.

Device Statistics

Device Key
A character string that uniquely identifies each device.

IP Address
The IP address of the device if it is a socket.

Port (C/L/S)
The port number of the device if it is a socket. If the socket is a client socket then the port number will be followed by two '/'. If the client socket is connected to a listener socket, the listener's port number is also listed. If the socket is a server socket then the client port number that is connected to the server is listed first, followed by two '/' and the server's listener port number. If the socket is a listener socket the listener's port number is listed between two '/'.

Protocol
The IP transportation protocol, either TCP or UDP, if the device is a socket.

Segments Rcvd
The number of segments received by the device if the device is a TCP socket.

Pkts Rcvd
The total number of packets received by the device.

Pkts Sent
The total number of packets sent by the device.

Pkt Rcv Rate
The number of packets received by the device in the last second.

Max Pkt Rcv Rate
The maximum packet receive rate experienced by the device.

Kbit Rcv Rate
The kilobits received by the device in the last second.

Max Kbit Rcv Rate
The maximum kilobit receive rate experienced by the device.

Pkt Send Rate
The number of packets sent by the device in the last second.

Max Pkt Send Rate
The maximum packet send rate experienced by the device.

Kbit Send Rate
The kilobits sent by the device in the last second.

Max Kbit Send Rate
The maximum kilobit send rate experienced by the device.

Pkts Dropped
The total number of packets that were dropped because they could not be temporarily stored in a queue or buffer. The most likely cause of dropped packets is packets arriving at very high packet rates and/or a queue size that is too small.

Packet Statistics

Packet Key
A character string that uniquely identifies each packet type.

Pkts Rcvd
The total number of packets that are received and identified as this packet type.

Pkts Sent
The total number of packets that are sent and identified as this packet type.

Pkt Rcv Rate
The number of packets received and identified as this packet type in the last second.

Max Pkt Rcv Rate
The maximum packet receive rate experienced by this packet type.

Kbit Rcv Rate
The kilobits received and identified as this packet type in the last second.

Max Kbit Rcv Rate

The maximum kilobit receive rate experienced by this packet type.

Pkt Send Rate
The number of packets sent and identified as this packet type in the last second.

Max Pkt Send Rate
The maximum packet send rate experienced by this packet type.

Kbit Send Rate
The kilobits sent and identified as this packet type in the last second.

Max Kbit Send Rate
The maximum kilobit send rate experienced by this packet type.

Pkts Dropped
The total number of packets, of this type, that were dropped because they could not be processed by another device. The most likely cause of dropped packets is packets arriving at very high packet rates.

Pkt Seq Errors
The total number of packet sequence errors identified for this packet type. For example, the primary header of the CCSDS packet contains a 14-bit number that is used as a sequence count. For each packet that arrives, the sequence count is compared to the sequence count of the previous packet. If the count is not the next in the sequence, the packet sequence error value is incremented.

Max Pkt Seq Error
The maximum packet sequence error experienced by this packet type.

6.4 Metrics

This section describes the CFDP metrics that can be logged by the application. The snapshot of CFDP metrics is updated once a second with the completion status of each CFDP transaction. The CFDP metrics are divided into sending and receiving categories and grouped by file size ranging from less than a one megabyte to over a gigabyte. The metrics include calculations on the number and percent of files sent or received, the minimum, maximum, and average file transfer time, and the number and percent of files that required packet retransmission.

The following Metrics are provided for Sending and Receiving.

File Size (MB)
The minimum and maximum file size, in megabytes, for the group.

Success Count

The number of successful file transfers for the group.

Success %
The percentage of successful file transfers for the group.

Cancel Count
The number of canceled file transfers for the group.

Abandon Count
The number of abandoned file transfers for the group.

Fail Count
The number of failed file transfers for the group.

Unknown Count
The number of unknown file transfers for the group.

Min Trans Time (sec)
The minimum successful file transfer time in seconds.

Max Trans Time (sec)
The maximum successful file transfer time in seconds.

Avg Trans Time (sec)
The average successful file transfer time in seconds.

Success W/NAK Cnt
The number of successful file transfers that required one or more NAK packets.

Success W/ NAK %
The percentage of successful file transfers that required one or more NAK packets.

Min NAK Cnt/Trans
The minimum number of NAK packets that had to be transferred for a successful file transfer requiring NAK packets.

Max NAK Cnt/Trans
The maximum number of NAK packets that had to be transferred for a successful file transfer requiring NAK packets.

Avg NAK Cnt/Trans
The average number of NAK packets that had to be transferred for a successful file transfer requiring NAK packets.

6.5 Configure Message Logging

This section describes how to configure message logging. The Configure Message Logging dialog is shown in Figure 5. This dialog can be displayed using the Options menu Configure Message Logging menu item.

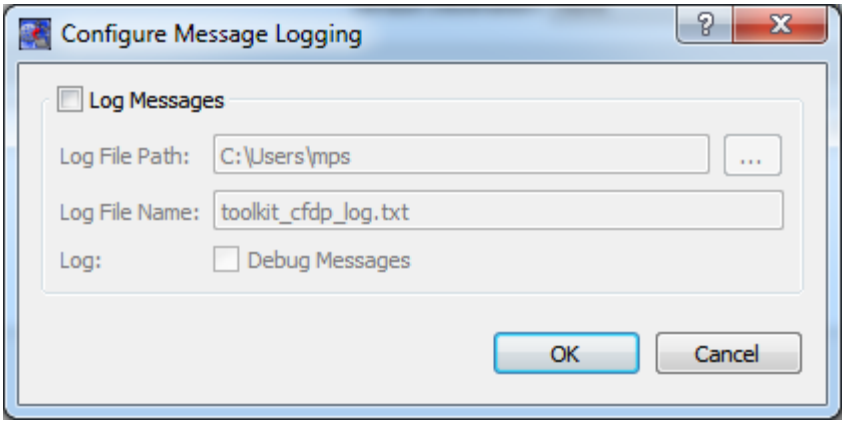

Figure 5 Configure Message Logging Dialog

Each field is described below.

Log Messages
The CFDP application provides the capability to write application messages to a file. If you check Log Messages, application messages will be written to the log file specified. Logging will start once it is turned on, so any messages generated before logging was turned on will not appear in the file.

Log File Path
The Log File Path should contain the absolute path to the directory where the log file should be written.

Log File Name
The Log File Name field should contain the name to use for the log file.

Log Debug Messages
The Log Debug Messages checkbox specifies whether debug messages should be written to the log. For example, if Debug is checked, Debug messages will be written to the log.

6.6 Configure Statistics Logging

This section describes how to configure statistics logging. The Configure Statistics Logging dialog is shown in Figure 6. This dialog can be displayed using the Options menu Configure Statistics Logging menu item. Statistics are generated and captured in memory as you use the application. Statistics can also be logged to a file by turning on Statistics Logging. When Statistics Logging is on, the Statistics Log file provides a

snapshot of the application statistics from the time the application started or the last statistics reset.

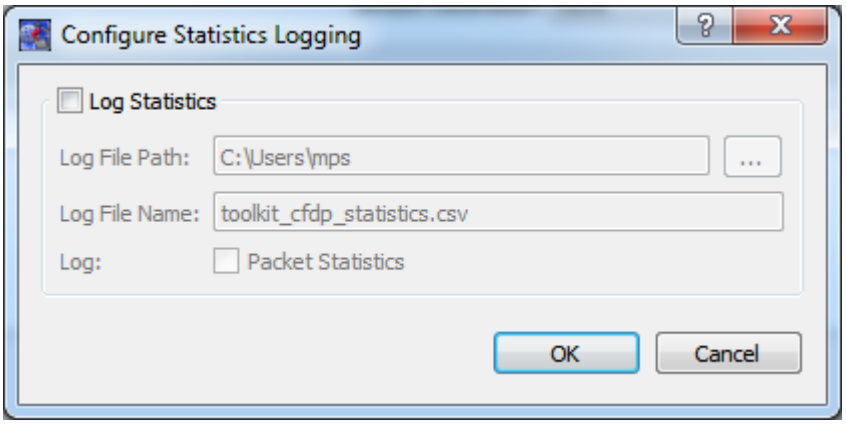

Figure 6 Configure Statistics Logging Dialog

Each field is described below.

Log Statistics
The CFDP application provides the capability to write application statistics to a file. If you check Log Statistics, application statistics will be written to the log file specified.

Log File Path
The Log File Path should contain the absolute path to the directory where the log file should be written.

Log File Name
The Log File Name field should contain the name to use for the log file.

Log Packet Statistics
The Log Packet Statistics checkbox specifies whether packet statistics should be written to the log. For example, if Packet is checked, packet statistics will be written to the log.

6.7 Application Messages

Various types of application messages are generated including information, progress, warning, error, and debug messages. Information, warning, and error messages will be displayed in the main window message area. All application messages are sent to the Messages dialog shown in Figure 7. The Messages dialog can be configured to display specific types of messages. By default, the Messages dialog will display information, progress, warning, and error messages. Columns in the Messages dialog can be sorted by clicking on the column header. The Messages dialog is available from the Options menu.

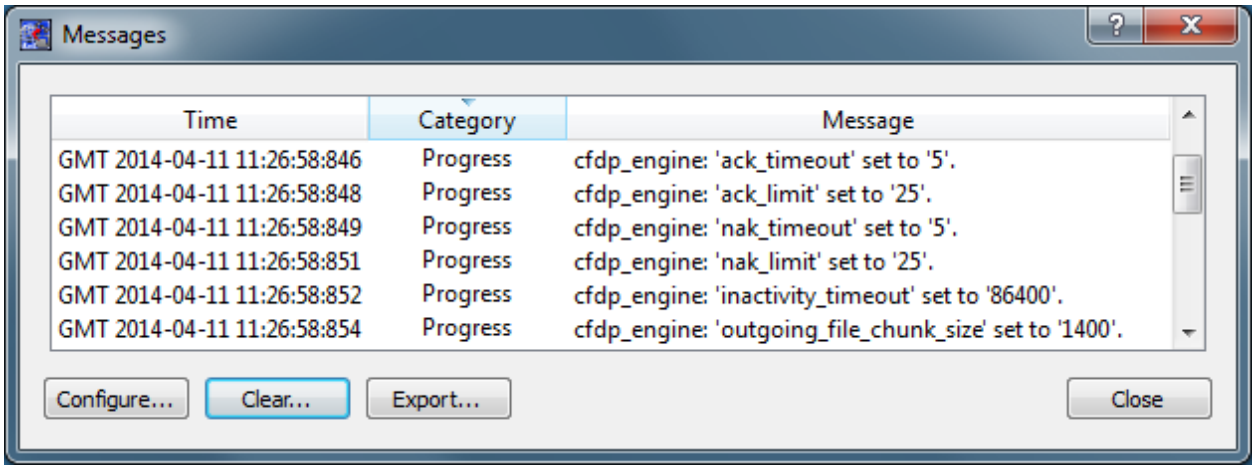

Figure 7 Messages Dialog

Configure

The Configure button provides access to the Configure Messages dialog shown in Figure 8. This dialog is used to filter the types of messages (category) displayed in the Messages dialog.

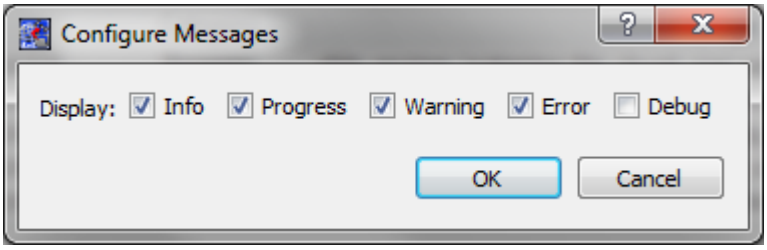

Figure 8 Configure Messages Dialog

Clear

The Clear button provides access to the Clear Messages dialog shown in Figure 9. This dialog provides two ways to clear messages in the Messages dialog. You can clear all the messages or clear selected messages. Once you clear messages, the messages are permanently deleted.

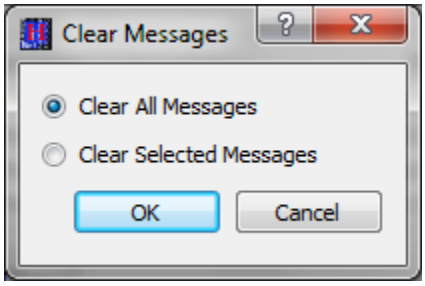

Figure 9 Clear Messages Dialog

Export
The Export button provides the capability to save all the application messages to a file. When you push the Export button you will be prompted for a directory and filename. Export will save all messages, not just the messages currently displayed in the Messages dialog (i.e. the 'Configure' filter is not applied). The name you provide for the file will be modified with a time tag prefixed to the filename. The time tag indicates the time the file was closed. For example:

Filename Input: messages.txt
Filename Output: GMT_2014-04-10_16~57~27~182_messages.txt.

6.8 Application Configuration File

The CFDP application saves the following information when you save a configuration:

- Configuration information in the Configuration Dialog.
- CFDP Commands list displayed in the Main Window CFDP Commands area.
- CFDP Command displayed in the Main Window File Transfer Command Line.
- Default Destination menu selection in the CFDP Commands area.
- Default Destination menu selection in the File Transfer Command Line area.
- Log Messages Configuration
- Log Statistics Configuration
- Configure Messages Checkbox Selections

The configuration of the Transactions area (columns showing/column order) is not saved.

6.9 Application Settings

The CFDP application saves some settings as application settings each time you exit the application. The next time you run the application, the application will initialize with the previous application settings. The following application settings are saved:

- Application Window Size
- Application Window Position

7 FAQ and Troubleshooting

This section addresses Frequently Asked Questions and provides tips for troubleshooting common gotchas.

7.1 Is There an Easy Way to Transfer the Contents of a Directory?

Yes. To transfer the contents of a directory, enter the absolute path to the directory. The CFDP application will transfer all the files in the first level of the directory.

Subdirectories will not be transferred. Be sure to include a forward slash '/' at the end of the directory path when entering the absolute path into the Source and Destination fields.

7.2 What is class1 and class2?

Note: Special thanks to NASA/GSFC/Tim Ray for the following user friendly definitions:

"CFDP provides three **Service Classes**. Service **Class 1** simply sends each file; there are no replies from the receiver, nor is there any guarantee of reliable delivery. Service **Class 2** ensures reliable file delivery; any required retransmissions are requested and performed by CFDP. Service **Class 3** provides **Proxy Operations** (e.g. Entity 'A' tells Entity 'B' to make a request of Entity 'C')."

The TReK CFDP application supports Class 1 and Class 2. When typing in one of these choices please use **class1** and **class2**.

7.3 Source and Destination Constraints

Source and Destinations must be identified using an absolute path. The absolute path name consists of the full path and the file name. The absolute path must meet the following criteria:

- The absolute path must not contain spaces.
- The absolute path cannot exceed 256 characters (null terminated).
- The size of the file to be transferred must be greater than 0 Bytes.
- The size of the file to be transferred cannot exceed 2.1 Giga Bytes.

7.4 I Dropped My File into the List and it Turned Red

Red indicates the file or directory contains an illegal character. File and directory names must meet the File and Directory Name Constraints described in section 7.1.

7.5 My File Starts to Transfer and Then Stops

Chances are the remote entity is unavailable or is not configured as you expected. Check both the Local and Remote entity configurations and ensure the EIDs are correct, the IP address and port information is correct, and both entities are up and running.

7.6 Transfer Results When Item Exists At Destination

If you attempt to transfer an item to a destination on a Windows computer, and the item already exists at the destination, you will see a "cancelled (Filestore rejection)" error message and the item will not be overwritten. If you attempt to transfer an item to a destination on a Linux computer, and the item already exists at the destination, the item will be overwritten.

7.7 Important Things To Know When Using The Get Primitive

The TReK CFDP software provides the capability to "get" or retrieve one or more files from a remote destination. It is important to note that the CFDP Blue Book describes implementation of a "get" as a proxy "put". TReK does not implement a CFDP Blue Book defined proxy "put" function. Therefore, the "get" request will only succeed if both sides of the file delivery transaction are using TReK software. The TReK get function initiates the file transfer process by delivering an equivalent "put" primitive character string to the remote platform's CFDP software. There are some error scenarios in which the initiator of the "get" receives no feedback. Some examples are:

- The get request never reaches the remote platform.
- The requested file(s) do not exist on the remote platform in the location specified in the get request.

If the "get" request reaches the remote platform, the remote platform log file may contain status information regarding the request.

7.8 How Does Pause Transactions Work?

CFDP pauses transactions by pausing both data transmission and timeout clocks associated with the local platform's file transfer transactions. The remote platform is not notified of the pause of file transfer transactions on the local platform and may exceed its timeout limits if the local platform does not resume its file transfer transactions for an extended period of time. If the local file transfer pause is for an extended period of time, the remote platforms should receive a separate pause transaction command to avoid exceeding its timeout limits. Both platforms may resume file transfer transactions when they receive separate resume file transfer transaction commands.