

NETWORKS AND MISSION SERVICES PROJECT

**WSC Transmission Control
Protocol (TCP)/Internet Protocol
(IP) Data Interface Service
Capability (WDISC) User's Guide**

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National Aeronautics and
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Greenbelt, Maryland

WSC Transmission Control Protocol (TCP)/Internet Protocol (IP) Data Interface Service Capability (WDISC) User's Guide

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Preface

The White Sands Complex (WSC) Transmission Control Protocol (TCP)/Internet Protocol (IP) Data Interface Service Capability (WDISC) supports customers who require TCP/IP access to the WSC for telemetry and command processing. Support provided by the initial version of the WDISC is limited to three customers, New Millennium Program Earth Orbiter-1 (NMP/EO-1), Gravity Probe B (GP-B), and Far Ultraviolet Spectroscopy Explorer (FUSE).

The WDISC is capable of being remotely operated by NCC personnel. Operation by WSC personnel is also possible if necessary. Limited operator actions are needed for nominal operation. This document deals primarily with actions required by the remote NCC Operator, and specific instructions in the use of the Graphical User Interface (GUI) that the Operator uses in carrying out required actions.

This document does not provide detailed instructions for the NCC Operator in the performance of real-time activities, i.e., Programmable Telemetry Processor (PTP) status monitoring and troubleshooting. These activities are described in other documents identified herein.

Contents

Preface

Section 1. Introduction

1.1	Purpose and Scope	1-1
1.2	Objectives	1-1
1.3	Functional Capabilities	1-1
1.4	Reference Architecture	1-1

Section 2. PTP Scheduling GUI

2.1	Getting Started	2-1
2.1.1	HP Workstation Toolbar	2-1
2.1.2	Common Window Items	2-1
2.1.3	Advisory Messages	2-2
2.2	Functional Operation	2-3
2.2.1	Starting and Stopping the PTP Scheduling GUI.....	2-3
2.2.2	PTP Scheduling Window	2-3
2.2.3	The PTP Event(s) Window	2-5
2.3	Procedures for Using PTP GUI.....	2-7
2.3.1	Obtaining the Daily Scheduling Data	2-7
2.3.2	Submit a PTP Event for Scheduling	2-7
2.3.3	Open the PTP Event(s) Window	2-8
2.3.4	Clear the PTP Event(s) Window Entries	2-8
2.3.5	Exiting the PTP Scheduling GUI.....	2-8
2.3.6	Sort the PTP Event List.....	2-8

2.3.7	Submit PTP Event(s) for Deletion	2-9
2.3.8	Clear all the Selected PTP Event List Entries.....	2-9
2.3.9	Print a Hardcopy Listing of the PTP Event(s)	2-9
2.3.10	Close the PTP Event(s) Window	2-10
2.4	Error Messages.....	2-10
2.5	Configuration Files	2-12
2.5.1	PtpSic.cfg	2-12
2.5.2	"sic file".cfg	2-13
2.5.3	PtpWsc.cfg	2-13
2.5.4	PtpSgt.cfg.....	2-14

Section 3. WDISC Real-Time Support

3.1	General.....	3-1
3.2	Using The Avtec Programmable Telemetry Processor.....	3-1
3.3	Using PCAnywhere	3-1

Figures

1-1	WDISC Reference Architecture	1-2
2-1	Sample Advisory Box.....	2-3
2-2	The PTP Scheduling Window	2-4
2-3	The PTP Event(s) Window	2-6

Tables

2-1	PTP Scheduling GUI Error and Advisory Messages.....	2-11
2-2	File Characteristics for WDISC System Customer Spacecraft	2-13
2-3	Characteristics of the File for the Desktop of a Particular Customer SIC.....	2-13
2-4	Network Characteristics for PTP Boxes at WSC	2-14
2-5	Network Characteristics for PTP Boxes at STGT	2-14

Abbreviations and Acronyms

Section 1. Introduction

1.1 Purpose and Scope

The White Sands Complex (WSC) Transmission Control Protocol (TCP)/Internet Protocol (IP) Data Interface Service Capability (WDISC) supports customers who require TCP/IP access to the WSC for telemetry and command processing. Support is provided from the NASA Integrated Services Network (NISN) Closed IP Operational Network (IONET), using a defined set of authorized addresses. Support provided by the initial version of the WDISC is limited to three customers, New Millennium Program Earth Orbiter-1 (NMP/EO-1), Gravity Probe B (GP-B), and Far Ultraviolet Spectroscopy Explorer (FUSE).

1.2 Objectives

The WDISC is intended to provide a common solution to the needs of TCP/IP customers. No mission unique equipment at WSC should be needed to provide these data services. The design should allow for enhancements in capabilities and capacity. In particular, the WDISC should be able to evolve as new standards, such as the Consultative Committee for Space Data Systems (CCSDS) Space Link Extension (SLE) services, are adopted.

1.3 Functional Capabilities

The WDISC supports the following functional capabilities

- a. Receive encapsulated forward service data from a customer Mission Operations Center (MOC) via the Closed IONET, convert data to serial form, and present it a WSC local interface (LI) port.
- b. Receive serial return service data from a WSC LI port, encapsulate it, and transmit it to a customer MOC via the Closed IONET.
- c. Data monitoring including computing CCSDS statistics for forward and return data processed.
- d. Data recording.
- e. Data playback.
- f. Provide real-time status on forward and return service data processed for use at the NCC and/or WSC.

1.4 Reference Architecture

The reference architecture is shown in Figure 1-1. It consists of the Closed IONET, PTPs, and the MOC. The WDISC comprises four PTP units, two (primary and backup) located in each of the WSC ground terminals—WSGT and STGT. Each PTP has three processing “boards.” Each board can handle a single forward and a single return data stream for the same customer, and any board can be used to fully support any of the

initial customers. This provides additional redundancy. Appropriate switching and controls permit failover to occur between matching boards on the prime and backup PTP units.

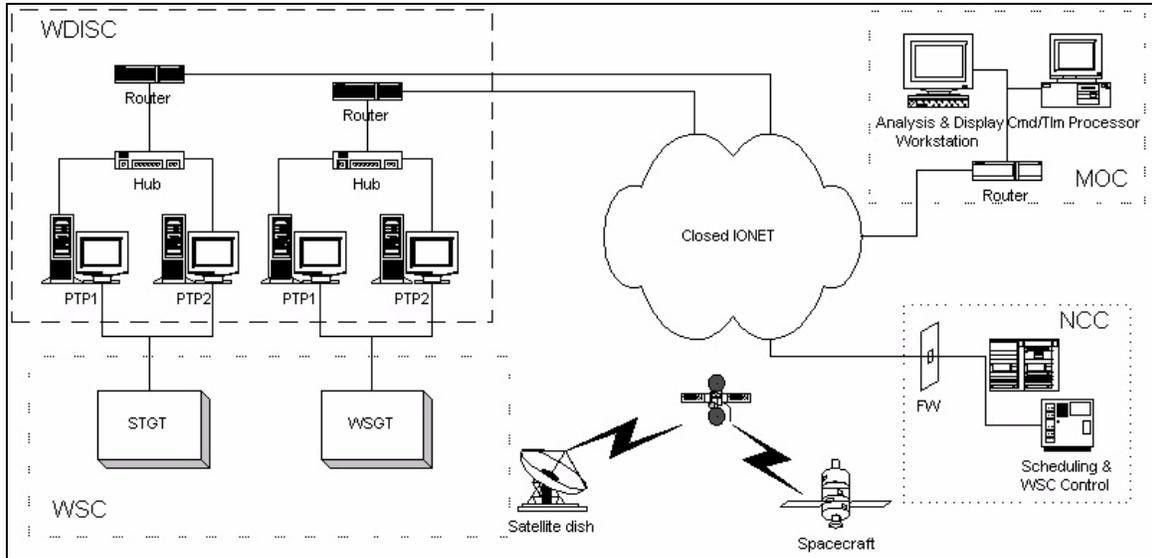


Figure 1-1 WDISC Reference Architecture

Section 2. PTP Scheduling GUI

2.1 Getting Started

The following sections provide overview information for the operator interface. In general this interface follows a "windows point & click" model. The point action refers to using the mouse to position the cursor over a desired point on the display. The click action refers to pressing a mouse button once the cursor is "pointed" at the desired location.

2.1.1 HP Workstation Toolbar

The Toolbar is a specialized window typically located at the bottom of the display that provides operator access to the common system capabilities. It is displayed in every workspace. It can be iconified but it cannot be closed. The buttons, icons, and associated lists on the Toolbar provide operator access to common system capabilities.

The PTP icon provides access to the PTP applications graphical user interface (GUI) window. Clicking on the PTP icon from the toolbar will start the PTP GUI application.

2.1.2 Common Window Items

The following sections describe some of the common control items (widgets) that the operators will encounter in the PTP interface.

2.1.2.1 Pushbutton

A Pushbutton is a control that starts an operation. It will contain a text or graphic label to indicate the associated operation. To press a pushbutton, point to it (position the cursor over it), and click the selected button.

2.1.2.2 Togglebutton

A Togglebutton is used to select options in an application. It will contain a text or graphic label and may contain a graphic indicating the state of the button as either "set" or "un-set". To press a togglebutton, point to it (position the cursor over it), and click the select button (left mouse button).

2.1.2.3 Combination Box

A Combination Box is a combination of a list and text entry. The user can select items from the associated list by clicking on the arrow, or the user can enter text into the text field from the keyboard. The combination box implementation may disable text input and limit the operator's selections to items in the list. Depending on the associated application the combination box may limit the selection to a single item in the list or support multiple selections. If the number of items in the list exceeds the available display space for the list, the list will include a scroll bar to permit viewing and selections of items that are not initially visible (see paragraph 2.1.2.5.1).

2.1.2.4 Text

A Text component is used to enter and display text. The "I-bar" cursor indicates that text may be entered. Moving the cursor out of the text box will commit the text to the operation.

2.1.2.5 List

A List presents the operator with a list of elements, the list provides the operator with the option to select one item from the list as input for the associated function.

2.1.2.5.1 Scroll Bar

Whenever the list of elements is larger than the list box the system displays scroll bars along the right and bottom edges of the box. The scroll bar allows the user to view items that are not visible in the box. Scroll bars have an arrow at each end and a rectangular slider. Selecting the arrows scrolls the list. Dragging the slider also scrolls the list.

2.1.2.5.2 Single List Selection

Click on a single element in list to select it. Any previously selected item is deselected. In many cases double clicking the element in the list provides a shortcut to the action or most common action associated with the selection of an element from the list.

2.1.2.6 Closing a window

Clicking on the top left box in a window's border causes a window menu to pop up. This menu contains several window options and includes a close option. Clicking on the close option terminates the function and closes the window. There is also an option to close the window from a Close pushbutton on the window.

2.1.3 Advisory Messages

The system conveys selected process related information to the operators via advisory messages. These messages are typically used to notify the operator of system problems related to the processing of an operator's request for some system action. In selected cases advisory messages are also used to confirm the successful completion of a requested function. Advisory messages are presented in windows that the underlying function automatically opens. Depending on the implementation the operator may need to acknowledge the message by clicking on OK in the advisory window before the system will recognize any other actions. Figure 2-1 shows a sample Advisory Box.

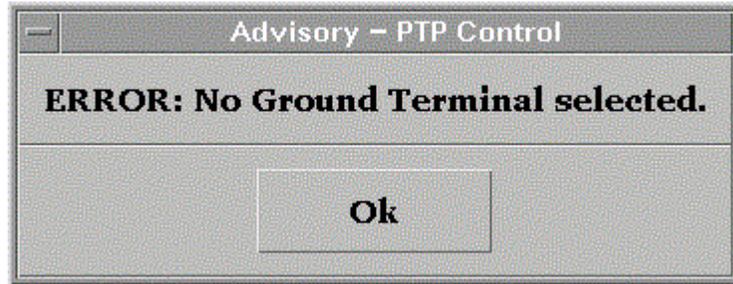


Figure 2-1 Sample Advisory Box

2.2 Functional Operation

The Programmable Telemetry Processor (PTP) operator interface is via two graphical user interface (GUI) windows which run on the Hewlett Packard workstations. The two GUI windows are PTP Scheduling and PTP Events. The following describes each of these GUI windows in detail.

2.2.1 Starting and Stopping the PTP Scheduling GUI

2.2.1.1 The "PTP Schedule" Icon

When a user logs on to the HP workstation, the front panel appears. The "PTP Schedule" icon, located on the front panel is used to start the PTP Scheduling GUI. To start the GUI, click on this icon.

2.2.1.2 Stopping the PTP Scheduling GUI

The Quit Pushbutton, located in the PTP Scheduling Window, terminates the PTP GUI application and closes the window. An alternative method to close the window is to use the standard Motif pulldown menu, located in the top left hand corner of the window's border, and select the close option.

2.2.2 PTP Scheduling Window

The PTP Scheduling window, shown in Figure 2-2, allows the operator with the capability to schedule PTP events. For each event, the operator enters the support identification code (SIC), the ground terminal, the start and stop times, and a configuration identifier that specifies the PTP "desktop" needed for that event.

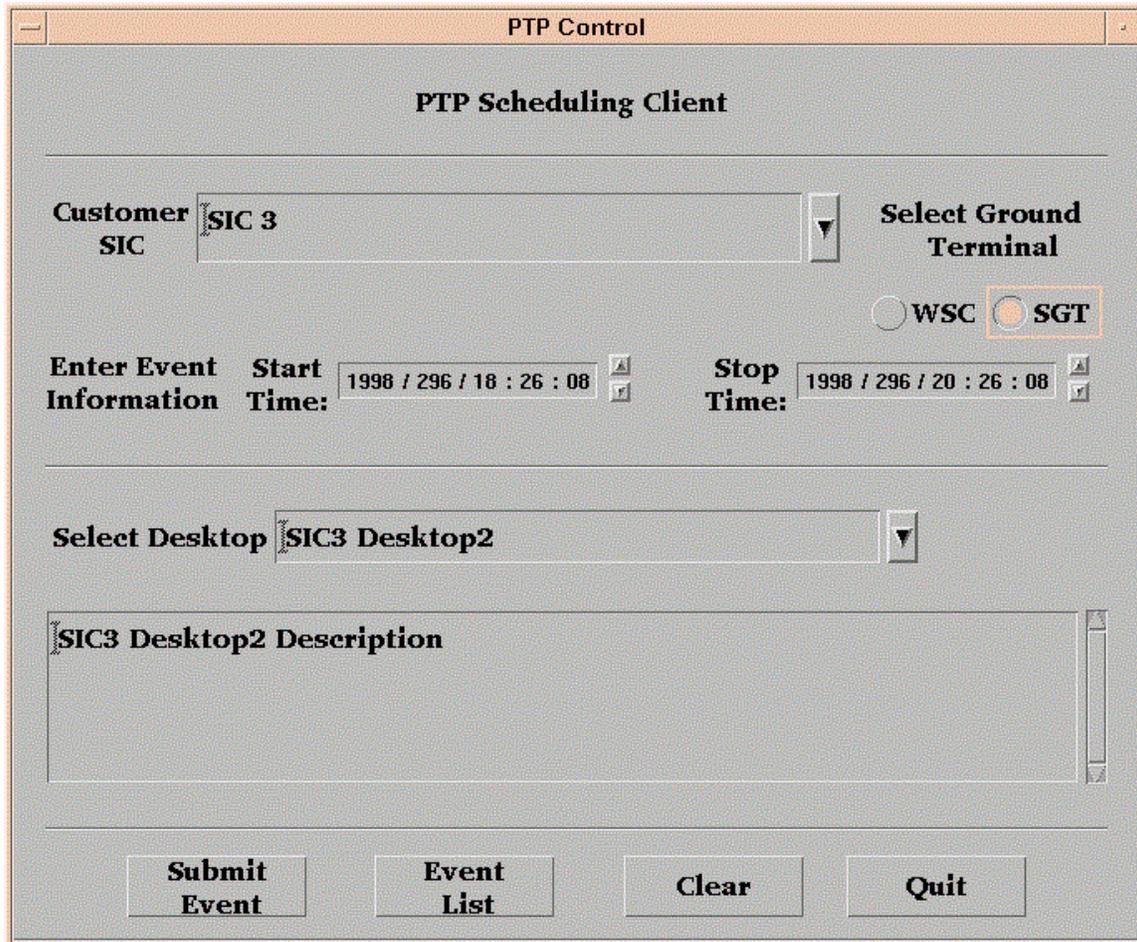


Figure 2-2 The PTP Scheduling Window

2.2.2.1 Window Diagram/Description

The following describes the major characteristics of the PTP Scheduling window. Widgets that are common to all windows are described in the Section, Common Window Items.

2.2.2.1.1 Customer SIC

The Customer SIC (support identification code) is a combination box widget that provides the user an interface to specify a particular SIC. A particular SIC is entered into the data entry field by selecting a SIC from the pulldown SIC selection list. To display the pulldown SIC selection list click on the down arrow to the right of the SIC text field. Prior to submitting an event for scheduling, a SIC must be selected. The pulldown SIC selection list is read from a mass storage data file. Therefore, if the SIC does not appear in the selection list then contact the system administrator so that the SIC data file can be updated.

2.2.2.1.2 Ground Terminal

The ground terminal togglebuttons are radio buttons so that only one of the togglebuttons may be set at any one time. Prior to submitting an event for scheduling, one of the ground terminal togglebuttons must be set.

2.2.2.1.3 Start and Stop Time

The start and stop time data entry fields are for entering the events start and stop times. The data entry fields represent (from left to right) the year, day of the year, hours, minutes and seconds.

2.2.2.1.4 PTP Desktop

The PTP Desktop is a combination box widget that provides the user an interface to specify a particular PTP "desktop" configuration. A particular desktop is entered into the data entry field by selecting a desktop from the pulldown desktop selection list. To display the pulldown desktop selection list click on the down arrow to the right of the desktop text field. Prior to submitting an event for scheduling, a desktop configuration must be selected. The pulldown desktop selection list is read from a mass storage data file. Therefore, if the desktop does not appear in the selection list then contact the system administrator so that the desktop data file can be updated.

2.2.2.1.5 PTP Desktop Description

The PTP Desktop Description text field provides a description of the desktop configuration that was selected in the PTP Desktop combination box widget.

2.2.2.1.6 Submit Event Pushbutton

The Submit Event Pushbutton retrieves the supplied information for an event verifying that all the necessary data has been supplied. Following the verification, the event is transmitted to the appropriate PTP server for scheduling.

2.2.2.1.7 Event List Pushbutton

The Event List Pushbutton brings up the PTP Event(s) window (if there are any events).

2.2.2.1.8 Clear Pushbutton

The Clear Pushbutton clears all the data entry fields, clears (un-sets) the ground terminal togglebuttons and sets the start and stop times to the current system time.

2.2.2.1.9 Quit Pushbutton

The Quit Pushbutton terminates the PTP GUI application and closes the window. An alternative method to close the window is to use the standard Motif pulldown menu, located in the top left hand corner of the window's border, and select the close option.

2.2.3 The PTP Event(s) Window

The PTP Event(s) window, shown in Figure 2-3, allows the operator to view a PTP event list. The PTP Event(s) window also allows the operator the ability to delete selected events, sort events by columns and print a hardcopy list of the events. While the PTP Event(s) window is open the PTP Scheduling window is disabled.

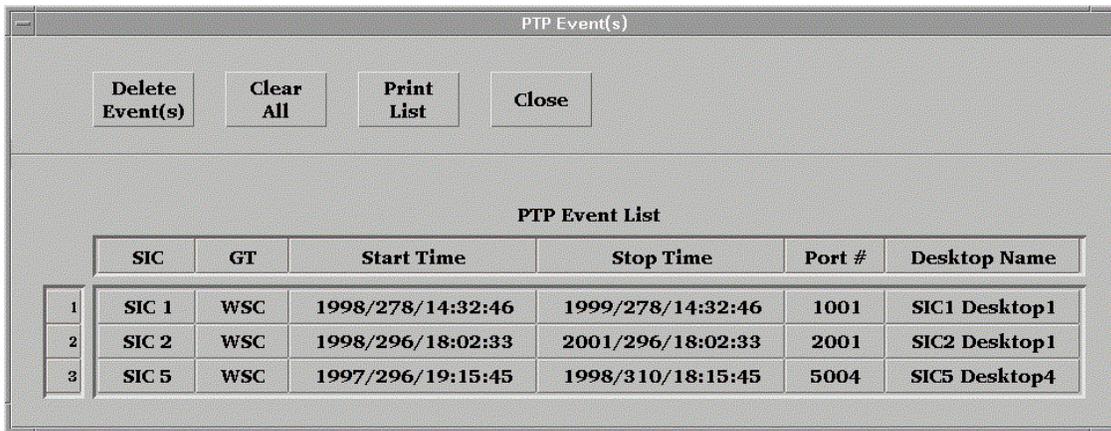


Figure 2-3 The PTP Event(s) Window

2.2.3.1 Window Diagram/Description

The following describes the major characteristics of the PTP Event(s) window. Widgets that are common to all windows are described in the section, Common Window Items.

2.2.3.1.1 PTP Event List

The PTP Event List is a table with a list of events. The Event List table displays the following columns: SIC (support identification code); GT (ground terminal); Start Time; Stop Time; Port Number; and Desktop Name. The operator can select events in the table for deletion and can sort the list by a selected column.

2.2.3.1.2 Delete Event(s) Pushbutton

The Delete Event(s) pushbutton will submit, to the PTP server, the selected events for deletion.

2.2.3.1.3 Clear All Pushbutton

The Clear All pushbutton will clear all selected entries in the PTP Event List table.

2.2.3.1.4 Print List Pushbutton

The Print List pushbutton will cause a hardcopy printout of the PTP event list to be submitted to the default printer.

2.2.3.1.5 Close Pushbutton

The Close Pushbutton terminates closes the PTP Event(s) window. An alternative method to close the window is to use the standard Motif pulldown menu, located in the top left hand corner of the window's border, and select the close option.

2.3 Procedures for Using PTP GUI

2.3.1 Obtaining the Daily Scheduling Data

- a. The NCC Scheduler requests a display of the active schedule, specifying the 24 hour period of interest and the one or more SICs that correspond to WDISC customers. NCC 98 lists these events.
- b. The NCC Scheduler selects the first applicable event and clicks the “Service Display” button. NCC 98 lists all services in the selected event.
- c. The NCC Scheduler notes the SIC, the event start and stop time, the ground station (“SGT” or “WSC”).
- d. The NCC Scheduler selects the forward service (if applicable) and clicks the “Parameters” button. NCC 98 displays the schedulable parameters for the forward service.
- e. The NCC Scheduler notes the User Interface Channel ID (UIFC) allocated to the forward service.
- f. The NCC Scheduler selects the return service and clicks the “Parameters” button. NCC 98 displays the schedulable parameters for the return service.
- g. The NCC Scheduler clicks the “Return Channels” button. NCC 98 displays the return channel schedulable parameters.
- h. The NCC Scheduler notes the UIFC allocated to the return service.
- i. If both a forward and return service are scheduled, the NCC Scheduler confirms that the two UIFCs are a matching pair. A failure to match will prevent the PTP from supporting the event properly. To achieve a match, the incorrect event must then be replaced using standard operating procedures.
- j. The NCC Scheduler repeats steps b through i for each applicable event displayed in step a.

2.3.2 Submit a PTP Event for Scheduling

The operator can submit a PTP event for scheduling by completing the appropriate entries and clicking the Submit Event pushbutton. The following entries must be supplied prior to submission. If any of the entries are missing or invalid an advisory message is displayed.

2.3.2.1 Select a SIC

Click on the down arrow of the Customer SIC combination box in order to display the pulldown list of SICs. From the pulldown SIC selection list select the desired SIC. The selected SIC will be automatically copied into the data entry field.

2.3.2.2 Select a Ground Terminal

Click on the desired ground terminal togglebutton. Since these are radio buttons only one togglebutton can be set at any one time.

2.3.2.3 Enter a Start and Stop Time

Change the default times (i.e. the current system time) by clicking on a digit and entering the desired value. Or after placing the cursor in the desired time field, for example, the minute field, click on the arrow keys until the desired value is displayed. The window checks the input, and does not allow out of range values or characters to be entered. To be valid, the start time must always be before the stop time.

2.3.2.4 Select a desktop configuration

Click on the down arrow of the desktop combination box in order to display the pulldown list of desktop configurations. From the pulldown desktop selection list select the desired desktop. The selected desktop will be automatically copied into the data entry field and a description of the desktop configuration will be displayed in the desktop description text field. Prior to selecting a desktop configuration a SIC must have been selected.

2.3.3 Open the PTP Event(s) Window

Click on the Event List pushbutton. If there are any events, a PTP Event(s) window is displayed. The PTP Event(s) window displays a PTP Event List and also allows the operator the ability to delete selected events, sort events by columns and print a hardcopy list of the events. While the PTP Event(s) window is open the PTP Scheduling window is disabled.

2.3.4 Clear the PTP Event(s) Window Entries

Click on the Clear pushbutton. This clears all the data entry fields, clears (un-sets) the ground terminal togglebuttons and sets the start and stop times to the current system time at the time the clear pushbutton was pushed.

2.3.5 Exiting the PTP Scheduling GUI

Click on the Quit pushbutton to exit the PTP Scheduling GUI application. An alternative method to close the window is to use the standard Motif pulldown menu, located in the top left hand corner of the window's border, and select the close option.

2.3.6 Sort the PTP Event List

Click (with mouse button 1) on a particular column heading and the PTP Event List will be sorted based on the selected column values. The PTP Event List can only be sorted by a single column. The default PTP Event List sort order is by the following order: SIC; Start Time; GT; Stop Time; Port Number; and Desktop Name.

2.3.6.1 Select a Sort Column

Click on the column heading to sort on. The mouse buttons have the following meanings for sorting:

- <Mouse Button 1> - Select the column and sort event list.
- Shift <Mouse Button 2> - Clear (deselect) the column.
- Shift <Mouse Button 3> - Clear (deselect) all the event list table selections. The same effect as the Clear All pushbutton.

2.3.7 Submit PTP Event(s) for Deletion

The operator can submit PTP event(s) for deletion by the PTP server by selecting the appropriate events and clicking the Delete Event(s) pushbutton.

2.3.7.1 Select a PTP Event

Click on the event or event(s) for deletion. Events may be selected either as a single selection, as a multiple selection, as a range of selections or any combination of the above. Multiple selections are multiple single selections. Range selections are a set of contiguous events. The mouse buttons have the following meanings for selection:

- Click <Mouse Button 1> - Select a event.
- Click, hold and drag <Mouse Button 1> - Select a contiguous range of events.
- Click <Mouse Button 2> - Clear (deselect) an event selection.
- Shift <Mouse Button 3> - Clear (deselect) all the event list table selections. The same effect as the Clear All pushbutton.

2.3.7.2 Click the Delete Event(s) pushbutton

When you click on the Delete Event(s) button the following Dialog Box appears:



Push "Yes" to delete or "No" to cancel.

2.3.8 Clear all the Selected PTP Event List Entries

Click on the Clear All pushbutton. This will clear (deselect) all the selected entries in the PTP Event List table.

2.3.9 Print a Hardcopy Listing of the PTP Event(s)

Click on the Print List pushbutton. This will print a hardcopy listing of the PTP event table on the default printer.

2.3.10 Close the PTP Event(s) Window

Click on the close pushbutton to close the window. An alternative method to close the window is to use the standard Motif pulldown menu, located in the top left hand corner of the window's border, and select the close option.

2.4 Error Messages

Table 2-1 contains a list of Error and Advisory messages produced by the PTP Scheduling GUI.

Table 2-1 PTP Scheduling GUI Error and Advisory Messages (1 of 2)

ADVISORY MESSAGE	RECOMMENDED ACTION
ERROR: Duplicate Event Requested.	Check data entries. User may have hit the submit event twice.
ERROR: No Customer SIC selected.	Select a SIC and resubmit.
ERROR: No Desktop selected.	Select a desktop configuration and resubmit.
ERROR: No desktops found. Check configuration file (filename).	There were no desktops found for the SIC. Verify the configuration file. Check the environment variable PTPDATADIR
ERROR: No Ground Terminal selected.	Select a ground terminal and resubmit.
ERROR: Start Time must be less than Stop Time.	Modify time entries.
The PTP Event submission was successful.	Nominal response from a successful transmission.
There are no current events to display.	None. The PTP Event(s) window is not displayed.
WARNING! PTP Event file (filename) is not accessible.	Contact the System Administrator. Check the environment variable PTPDATADIR. Verify the existence of the file.
WARNING! PTP GT file (filename) is not accessible.	Contact the System Administrator. Check the environment variable PTPDATADIR. Verify the existence of the file.
WARNING! PTP SIC file (filename) is not accessible.	Contact the System Administrator. Check the environment variable PTPDATADIR. Verify the existence of the file.
SOCKET ERRORS:	With socket errors contact the System Administrator.
Server Name: *** Socket Error *** Socket Status = SOCKET_FAILURE	
Server Name: *** Socket Error *** Socket Status = GETHOSTBYNAME_FAILURE	
Server Name: *** Socket Error *** Socket Status = GETHOSTNAME_FAILURE	
Server Name: *** Socket Error *** Socket Status = CONNECT_FAILURE	
Server Name: *** Socket Error *** Socket Status = GETSOCKNAME_FAILURE	

Table 2-1 PTP Scheduling GUI Error and Advisory Messages (2 of 2)

SOCKET ERRORS (continued):	With socket errors contact the System Administrator.
Server Name: *** Socket Error *** Socket Status = BIND_FAILURE	
Server Name: *** Socket Error *** Socket Status = LISTEN_FAILURE	
Server Name: *** Socket Error *** Socket Status = ACCEPT_FAILURE	
Server Name: *** Socket Error *** Socket Status = SEND_FAILURE	
Server Name: *** Socket Error *** Socket Status = RECV_FAILURE	
Server Name: *** Socket Error *** Socket Status = SHUTDOWN_FAILURE	
Server Name: *** Socket Error *** Socket Status = MAX_FAILURE	
SERVER Response ERRORS:	With server response errors contact the System Administrator.
Server Name: *** Data NOT Recognized ***	
Server Name: *** Desktop file NOT found ***	
Server Name: *** Bad Times in Data ***	
Server Name: *** Command NOT Recognized ***	

2.5 Configuration Files

The PTP Scheduling GUI is configured using several data files. This approach allows for changes in network configuration and users without modifying delivered software. The configuration files define network characteristics for the PTPs at the Ground Terminals, as well as the data for the individual user spacecraft.

2.5.1 PtpSic.cfg

The PtpSic.cfg file shown in Table 2-2 defines the file for customer spacecraft that may use the WDISC system. There are entries for each SIC. This file provides the data that is displayed in the Customer SIC pulldown list.

Table 2-2. File Characteristics for WDISC System Customer Spacecraft

Data Item	Format	Description
Number of SICs	Numeric String	Number of spacecraft being defined in this file.
SicName	String	Text that will appear in the Customer SIC pulldown list
SicFileName	String	Name of configuration file that contains the specific information for this Sic. See "sic file".cfg for the details of these configuration files.
Repeat Previous two items for each spacecraft		

2.5.2 "sic file".cfg

The "sic file".cfg file shown in Table 2-3 defines the file for the desktops that are available for a particular customer SIC. There is one of these files for every SIC listed in the PtpSic.cfg file.

Table 2-3. Desktop File Characteristics for a Particular Customer SIC

Data Item	Format	Description
accessType	Char (O/C)	Indicates that the customer will use Open or Closed IONET. This will determine which PTP(s) to send the information to.
Number of Desktops	Numeric string	Number of desktop file names to follow in this data file
DesktopName[1]	String	Desktop names used to populate the pulldown list for this SIC.
DesktopDesc[1]	String	Description of Desktop - used to populate the text box below the selected desktop name
PTP Port[1]	Numeric string	Port number associated with the PTP board to be used by this desktop.
Repeat Previous two items for each desktop.		

2.5.3 PtpWsc.cfg

The PtpWsc.cfg file shown in Table 2-4 defines the network characteristics for PTP boxes located at WSC.

Table 2-4. Network Characteristics for PTP Boxes at WSC

Data Item	Format	Description
Closed Timer Server IP Address #1	String	IP Address (nnn.nnn.nnn.nnn) of first PTP Timer Server used for Closed IONET.
Closed Timer Server Port #1	Numeric string	Port number of PTP Timer Server socket for the above IP Address.
Closed Timer Server IP Address #2		IP Address (nnn.nnn.nnn.nnn) of second PTP Timer Server used for Closed IONET.
Closed Timer Server Port #2	Numeric string	Port number of PTP Timer Server socket for the above IP Address.
Open Timer Server IP Address		IP Address (nnn.nnn.nnn.nnn) of PTP Timer Server used for Open IONET.
Open Timer Server Port	Numeric string	Port number of PTP Timer Server socket for the above IP Address.

2.5.4 PtpSgt.cfg

The PtpSgt.cfg file shown in Table 2-5 defines the network characteristics for PTP boxes located at STGT.

Table 2-5. Network Characteristics for PTP Boxes at STGT

Data Item	Format	Description
Closed Timer Server IP Address #1	String	IP Address (nnn.nnn.nnn.nnn) of first PTP Timer Server used for Closed IONET.
Closed Timer Server Port #1	Numeric string	Port number of PTP Timer Server socket for the above IP Address.
Closed Timer Server IP Address #2		IP Address (nnn.nnn.nnn.nnn) of second PTP Timer Server used for Closed IONET.
Closed Timer Server Port #2	Numeric string	Port number of PTP Timer Server socket for the above IP Address.
Open Timer Server IP Address		IP Address (nnn.nnn.nnn.nnn) of PTP Timer Server used for Open IONET.
Open Timer Server Port	Numeric string	Port number of PTP Timer Server socket for the above IP Address.

Section 3. WDISC Real-Time Support

3.1 General

The primary real-time activities for NCC operators are PTP status monitoring and troubleshooting. These activities are described in other documents. Monitoring and troubleshooting are accomplished using PCAnywhere and the Avtec PTP Client COTS products.

3.2 Using The Avtec Programmable Telemetry Processor

Detailed information for monitoring the PTPs can be found in the document, *Programmable Telemetry Processor for Windows NT User's Manual, Version 1.3.5*. Actions include monitoring the status of any component of an active desktop, confirming the desktop configuration in real time, and troubleshooting activities.

3.3 Using PCAnywhere

Detailed information on PCAnywhere can be found in the document, *PCAnywhere User's Guide*. Actions include obtaining the status of the Windows NT system and applications running on it, restarting applications, manipulating files, and performing other troubleshooting activities.

Abbreviations and Acronyms

CCSDS	Consultative Committee for Space Data Systems
COTS	commercial off-the-shelf
EO-1	Earth Orbiter-1
FTP	File Transfer Protocol
FUSE	Far Ultraviolet Spectroscopy Explorer
GP-B	Gravity Probe B
GT	ground terminal
GUI	graphical user interface
ID	identifier
IONET	IP Operational Network
IP	Internet Protocol
LI	local interface
MAP	Microwave Anisotropy Probe
MOC	Mission Operations Center
NASA	National Aeronautics and Space Administration
NCC	Network Control Center
NISN	NASA Integrated Services Network
NMP	New Millennium Program
PTP	Programmable Telemetry Processor
SIC	support identification code
SLE	space link extension
SN	Space Network
STGT	Second TDRSS Ground Terminal
TCP	Transmission Control Protocol
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
UIFC	user interface channel ID
WDISC	WSC TCP/IP Data Interface Service Capability
WSC	White Sands Complex
WSGT	White Sands Ground Terminal