Yamcs Client Tools Guide

YAMCSCT-SA-MA-001

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www.yamcs.org

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Chapter 1. Yamcs Monitor

Yamcs Monitor allows to control a Yamcs Server. It shows the list of data links, channels and clients connected to the Yamcs Server. Only one Yamcs instance is shown at a time, and the currently selected instance can be changed using the Instance menu.

Installing

Dependencies

OS	Linux or Windows, 32bit or 64bit
Java runtime (JRE)	Version >= 1.8

Installation

The Yamcs Monitor is delivered as part of an archived client tools package. The package does not need to be installed, just extracted to a suitable location. The tools can be run from the extracted location using starting scripts found in the `bin` folder.

Configuration

No further configuration is needed, unless the Yamcs server has been configured to require authentication. In this case, edit the `etc/yamcs-ui.yaml` file in the extracted location and change `authenticationEnabled` entry to `true`.

Updating

Updated applications are made available as an archived client tools package. This should be extracted into its own folder, separate to any previous installation. The configuration files in `etc/` can be copied from a previous installation into the new installation.

Removing

To remove an installation, delete the extracted folder.

Starting Yamcs Monitor

On Windows and OS X, start Yamcs Monitor with the command

```
$ yamcs-monitor.sh
```

On Windows use the bat-script instead:

```
$ yamcs-monitor.bat
```

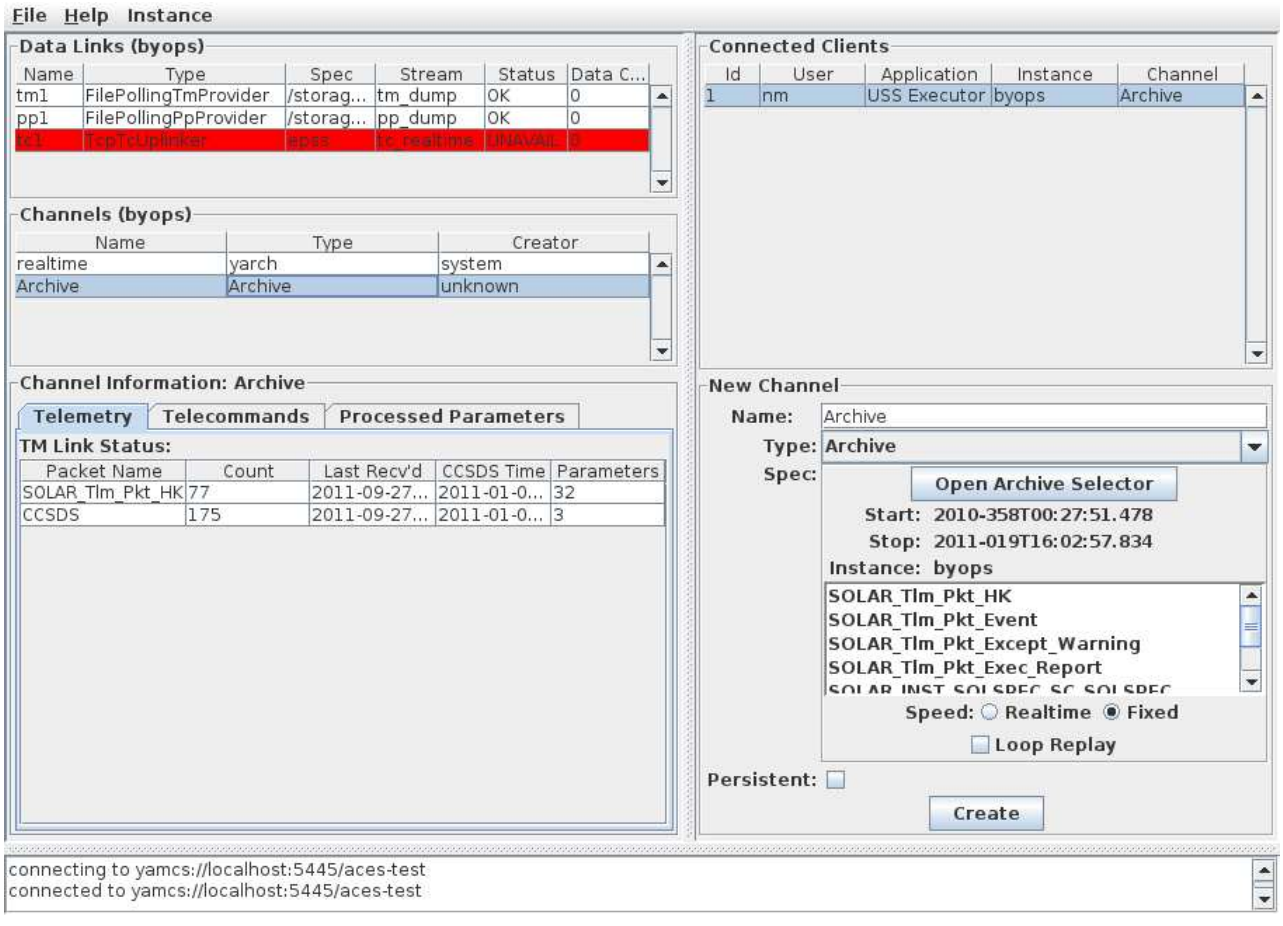
After startup, select **File > Connect to Yamcs** to connect to a Yamcs Server instance:

A URL can be provided on the command line to connect directly after the startup, without needing to connect from the menu:

```
$ yamcs-monitor.sh yamcs://localhost:5445/
```

The command line option `-na` causes Yamcs Monitor to run in so-called no-admin mode. In this mode a series of options and buttons are hidden from the GUI in order to not confuse the unaware user. These options are useful only for a user having admin privileges. For the remaining documentation, it is assumed that Yamcs Monitor has the admin options enabled.

User interface



The Yamcs Monitor window is divided in four parts:

- The left upper part shows the data links;
- The left lower part shows the channels;
- The right part shows client information;
- The right bottom part shows an input panel to create new replay channels.

Data Links

This box displays a list of data links. Each element in the list contains these items:

Name	has to be unique and can be specified in the `etc/yamcs.instance.yaml` configuration file. If not specified, it is chosen automatically by the Yamcs Server
Type	represents the Java class name of the implementor of the data link
Spec	represents the configuration of the data link. It can contain different information depending on the data link type
Stream	represents the stream name used by the data link to write (in case of TM and PP) or read (in case of TC) data
Status	can be one of OK, ERROR or DISABLED
Data Count	contains the list of items (e.g. TM packets) that have transited through the link

In addition, each line is color-coded as follows:

White	the link is connected
Green	the link is connected and data has been flowing in the last two seconds
Gray	the link is disabled
Red	the link is enabled but not connected

The data links provide a more detailed status when hovering the mouse on top of them. Note that the OK/ERROR status depends on the specific implementation of the Data link. For example the DaSS TM and PP provider will report the status as OK even though some of the requests have failed (we should perhaps introduce a *WARNING=yellow* status for this). The detailed report shows exactly which requests have succeeded and which ones have failed.

Channels

This box displays a list of channels currently available. The Name column indicates a unique channel name. It should describe the channel data briefly. The Creator column shows the user who created the channel.

At server startup there is one realtime channel automatically created.

Channel Information

This box displays current information about PathTM (**TM Status**), Processed Parameters (**PP Status**), and telecommands. Each of these parts can be temporarily disabled using the Disable buttons. To enable a part again, the Disable button is pressed again.

The table shows one row per packet type received via PathTM. Over time, this table may accumulate payload HK packets, TC response packets, science packets, and SSL event packets. All packets defined in the MDB can be listed here, if they appear in the PathTM stream.

Connected Clients

This box shows all connected processor clients. The ChannelName column tells the name of the processor the client is currently connected to.

By right-clicking on a client, a popup menu appears, and the client can be connected to any of the channels. This way, even several clients may be connected to a single processor. Processors without clients are instantly removed.

New clients are automatically connected to the `realtime` processor. This processor will never be removed, even if there are no clients connected.

New Channel

In this box, replay channels are created. The Name field contains the name of the new channel. The start time, stop time, and the packets to be received are shown. To populate these fields, the Archive Browser window is used. To open it, click **Open Archive Selector**.

Packets can be removed from the given list by selecting them and pressing the Del key.

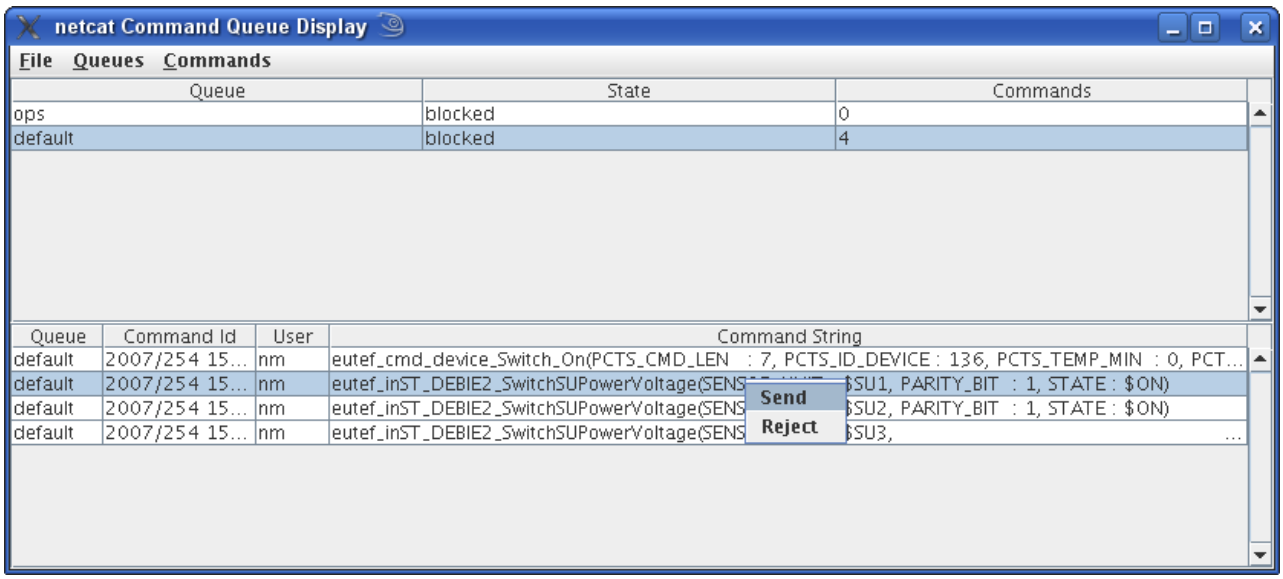
Realtime speed indicates that data is replayed at the same speed it was recorded. Fixed speed will play the data at one packet per second, no matter how fast they were recorded.

When the **Loop Replay** is ticked, the replay will wrap around and automatically restart from the beginning. Otherwise, the replay stops when it ends at the stop time.

To create the channel, click **Create**. One or more clients must be selected which will then be assigned to the new channel.

Command Queue Control

The Command Queue Control window can be opened either from the main Yamcs Monitor window by double-clicking on a channel name. The Command Queue Control only makes sense for processors which have commanding enabled.



The window is split into two panels:

- The upper panel contains a list with all the defined command queues. The queue name, the current state and the number of commands that are currently in the queue is displayed. Right-clicking on a command queue opens a menu with the possibility to change the state of the queue.

  In addition to setting the new state of the queue, the following additional actions happen when changing the state of a blocked queue:

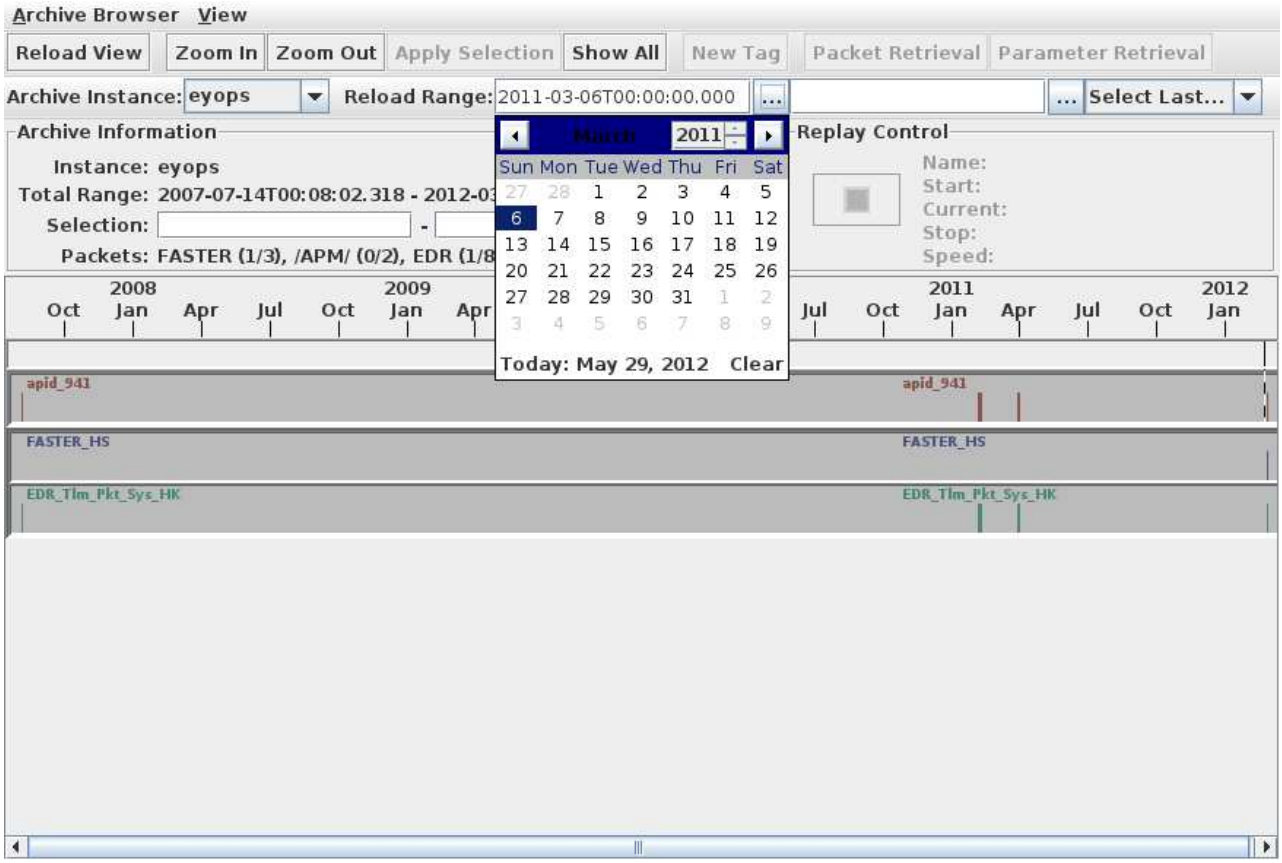
  - blocked → disabled: all the commands in the queue will be automatically rejected;
  - blocked → enabled: all the commands in the queue will be automatically sent.

- The bottom panel contains the list of commands currently present in the queue selected in the upper panel. For each command the queue name, the command id, the user that has sent the command and the command string are display. The list is empty if the selected queue is not in the state blocked.

  Right-clicking on a command gives the possibility to **Send** or **Reject** the command.

Chapter 2. Archive Browser

Archive Browser is an application that allows inspecting the content of the TM and PP archive, as well as retrieving data as packets or parameters. It can be run either as a standalone application (`archive-browser.sh`) or from the Yamcs Monitor.



Getting Started

The main part of the window comprises a display to visualize the content of the archive. When opening the window for the first time, it needs to be populated. This is done by entering the start and end range and clicking **Reload View**. The buttons next to the **Reload Range** input fields can be pressed to popup a calendar that can be used to select the date. The time of the day has to be entered manually. In addition, the **Select last…** dropdown can be used to fill in the range start with current_time (3, 6 or 12 months). Leaving any of the fields empty, means minus or plus infinity. To refresh data with the newest realtime data, the end of the range can be left empty.

Clicking the **Reload View** button, will request information from Yamcs Server about all data available in the selected range, so this operation may take some time, depending on the amount of data, and depending on the bandwidth of the network connection. During the reload process, the *Packets* row in the *Archive Information* box displays the progress.

The data panel contains three sub-panels for displaying three data types:

- **Tags**. These are simply names that can be used by the operator to mark special activities. Together with a name, a tag has associated a color, a description and a start/end time. New tags can be created by

selecting a data range and pressing the **New Tag** Button.

- **Completeness Data**. These are records created by a completeness checker running on the server. The way to check the completeness and the granularity, depends on the input data. For CCSDS packets, it can be checked at APID level based on the CCSDS Sequence Count.

- **Histogram Data**. These are records showing statistical information about the packets (or data items in general). Unlike the Completeness Data, heuristics are used to determine the start/end of a record. These are not useful to determine the data completeness but rather to have a overview of what data is available in the archive.

By default no data is shown. It is now up to the user to choose and display packets. This is done by right-clicking in the empty space left to the vertical divider. A popup menu offers to add packets. One packet can be added at a time, or with one mouse click all packets of a single payload can be added. Each packet is shown in a random colour to distinguish it visually from its neighbour packets. The colour can be changed by right-clicking on the packet label and choosing the appropriate menu item.

Payload names are detected from packet opsnames. It is expected that good telemetry packet opsnames start with their payload's name, separated from the remainder by an underscore.

When all desired packets are selected, the timeline display can be used to inspect the data. A solid rectangle represents a block of PathTM data received at a constant rate. The mouse can be moved over the rectangle to show a tooltip which describes the exact time range and the packet frequency.

To mark a selection, the left mouse button is pressed and held, and the mouse is moved to mark start and stop times.

When the **Zoom in** button is pressed, the current selection will be zoomed in to fit the view. The total scrollable range will then be limited to a reasonable time frame. This means that distant times may be out of reach using the horizontal scroll. This is because the selection may be so small that the total scrollable view would grow too large to handle.

While zooming into selections, previous zoom levels will be remembered. The **Zoom Out** button restores the previous zoom level. Depending on the zoom depth, the time scale will adjust in order to be as appropriate as possible to fit the current zoom resolution. The **Show All** button will discard all zoom levels, showing the total range of telemetry in the archive.

All dates shown in Archive Selector can be shown in a format using month and day (YYYY.MM.DD) or the day of the year (YYYY/DDD). This can be toggled in the **View** menu.

Selecting Data

When the **Apply Selection** button is pressed, the current selection is subject for replay. This includes all telemetry packets shown. Those packets visible but unwanted can be removed using the popup menu on the respective packet labels.

By pressing the **Apply Selection** button, the start time, stop time, and packet names are inserted into the Yamcs Monitor **New Channel** box. There, unwanted packets can still be removed using the Del key. Further details like playback speed and loop mode can be specified there.

The Archive Selector window remains open to allow the replay to be followed. It can be closed anytime if desired.

Replaying Data

When the selection has been applied, the new channel is ready to be created in Yamcs Monitor. Pressing the **Create** button will create the channel, connect it to the selected clients, and start replay immediately.

Once the replay has started, a start marker and a stop marker appear on the Archive Selector display. These are tagged with yellow rectangles. A third marker denotes the current position. It is tagged with two green triangles. The current position marker and the **Replay Control** panel are updated often.

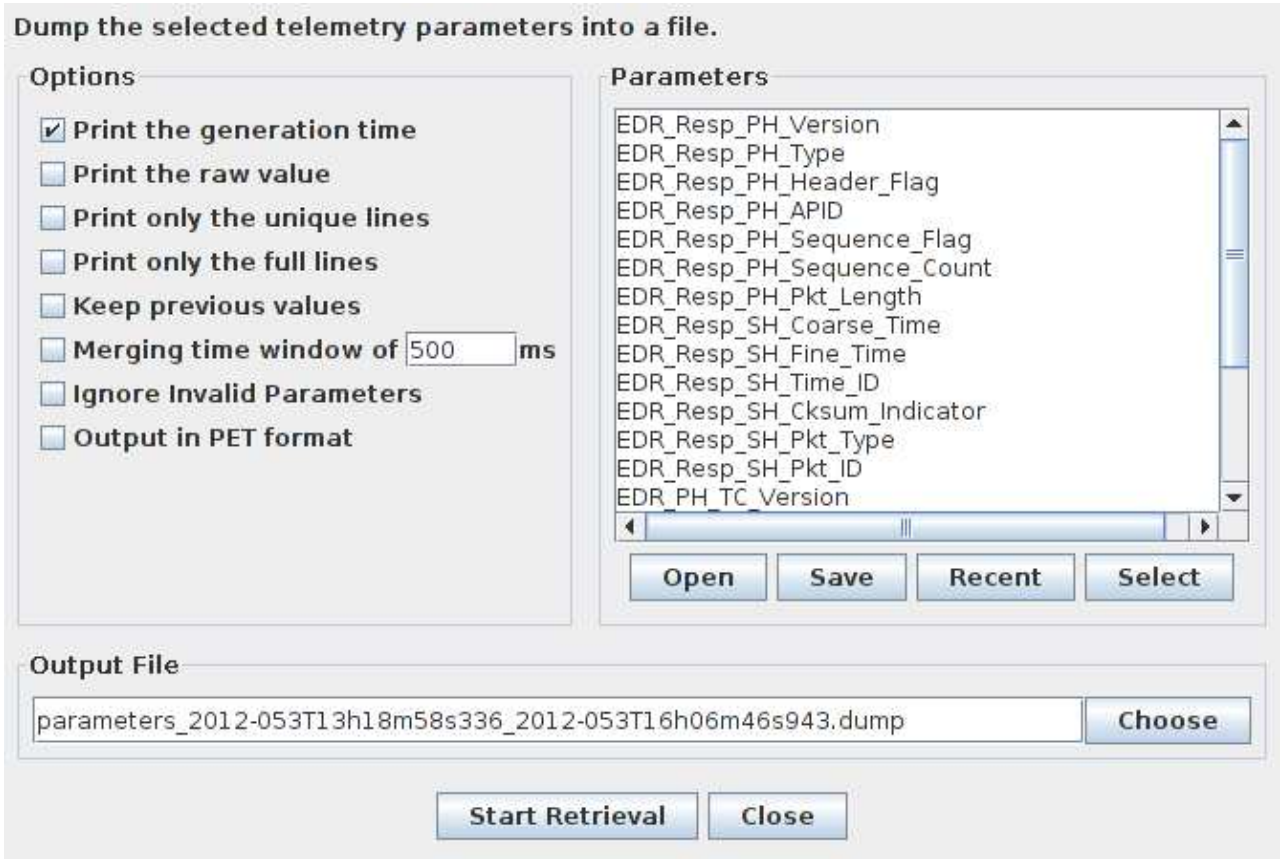
While the replay is progressing, selections can still be made in order to zoom in and to refine the display.

The archive replays are seekable with random access at any time. The right mouse button can be used to move the current position marker to any new position. The new position may be before or after the current position. If it is before the start marker, the replay will automatically jump exactly to the start marker. If the new position is after the stop marker, the replay will end and optionally restart if loop was enabled.

The Archive Selector will show replay progress of the current channel selected in Yamcs Monitor. To switch to another replay channel, the desired channel only needs to be selected. The Archive Selector Window is updated with the information taken from the newly selected channel.

Parameter Retrieval

The Parameter Retrieval tool can be started from the Archive Browser by pressing the **Parameter Retrieval** button once a time range has been selected in the histogram panel. Only the time range is used, the packet selection is automatically performed by the Yamcs server depending on the parameters requested.



The operation of the Parameter Retrieval tool is very simple: a number of parameter names have to be added to the left panel, and the **Start Retrieval** button pressed.

There are a number of methods for selecting parameters to be replayed:

- by entering the names in the text area;
- by opening a file containing a list of parameters one per line or a USS file;
- by selecting a recently opened file using the **Recent** button;
- by selecting parameters from a hierarchical display of the packets and parameters in the MDB using the **Select** button.

The following options can be selected to change how the output file is constructed and its contents:

Print the generation time	Causes a column containing the time to be added before the parameters columns. Selected by default.
Print the raw value	Causes the raw values to be printed in addition to the engineering values. Note that some processed parameters may not have raw values.
Print only the unique lines	Skip outputting the lines where all the parameters have the same values like the previous line. It is especially useful for printing enumerated parameters (i.e. parameter of type ON/OFF) such that only the changes are printed.
Print only the full lines	Discard lines that do not have all the columns filled in. For example if some headers parameters are selected in addition to parameters from a specific packet, this option will avoid printing the headers for all the packets.
Keep previous values	Avoids having empty cells in case data from multiple packets is selected.
Merging time window of X ms	Causes data coming in intervals smaller than X ms to be merged together.
Ignore invalid parameters	Do not raise an error if the list contains some invalid parameters.
Output in PET format	Produce output compatible with the PET tool, specifically the values are enclosed by quotes and separated by semicolon and there are some extra headers listing the parameter names and types.

Chapter 3. Event Viewer

The Event Viewer displays events from Yamcs Server. In older versions of Yamcs, the Event Viewer was in fact decoding and displaying on-board events only. Now the Event Viewer is just a display, the decoder being another component that runs inside the Yamcs Server (thus the events are decoded and saved in the archive even if no viewer is running). In addition, more and more components of Yamcs generate events (for example the DaSS TM/PP/TC components) when significant things happen.

Installing

Dependencies

OS	Linux or Windows, 32bit or 64bit
Java runtime (JRE)	Version >= 1.8

Installation

The Event Viewer is delivered as part of an archived client tools package. The package does not need to be installed, just extracted to a suitable location. The tools can be run from the extracted location using starting scripts found in the `bin/` folder.

Configuration

No further configuration is needed, but you may specify a custom sound file to be used when an event with "sound alert" enabled is received. In this case, edit the `etc/event-viewer.yaml` file in the extracted location and change the `soundfile` entry to a full path to a WAV format sound file.

Updating

Updated applications are made available as an archived client tools package. This should be extracted into its own folder, separate to any previous installation. The configuration files in `etc/` can be copied from a previous installation into the new installation.

Removing

To remove an installation, delete the extracted folder.

Starting the Event Viewer

On Windows and OS X, start Yamcs Monitor with the command

```
$ event-viewer.sh
```

On Windows use the bat-script instead:

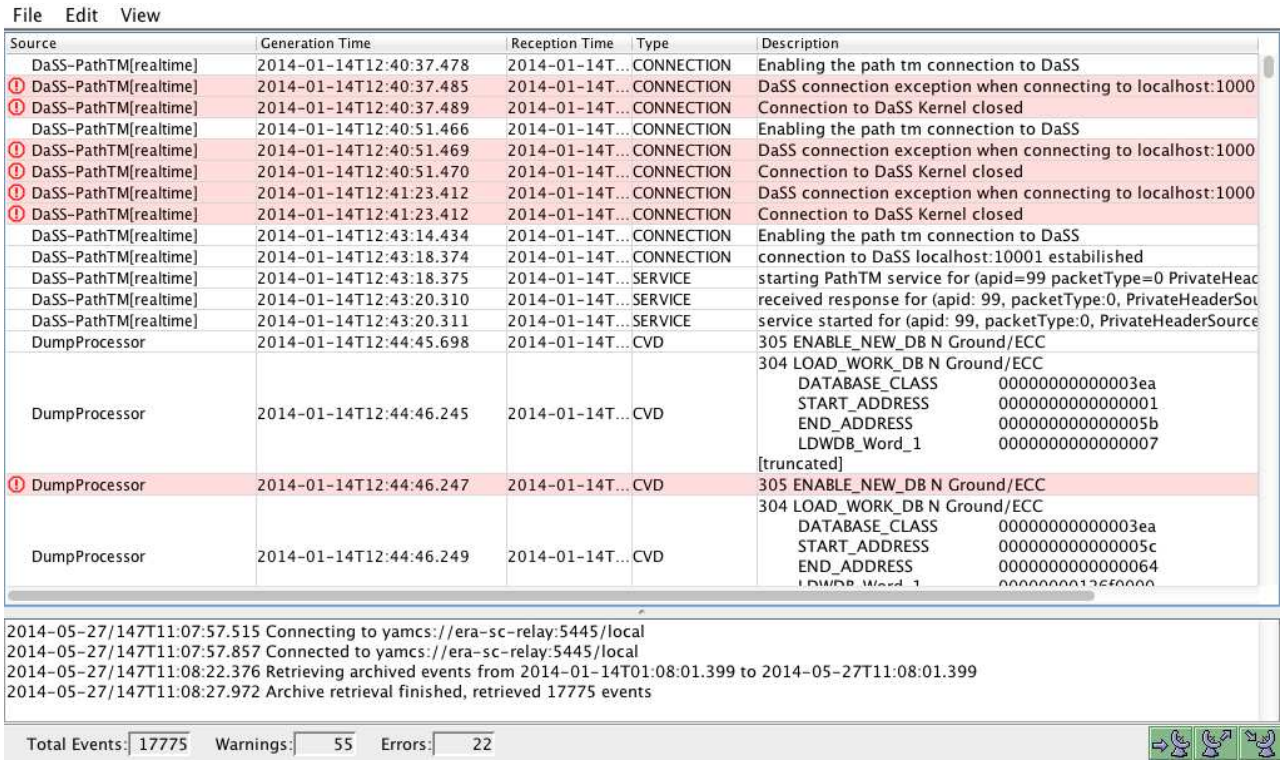
```
$ event-viewer.bat
```

After startup, select **File >Connect to Yamcs** to connect to a Yamcs Server instance:

A URL can be provided on the command line to connect directly after the startup, without needing to connect from the menu:

```
$ event-viewer.sh yamcs://localhost:5445/
```

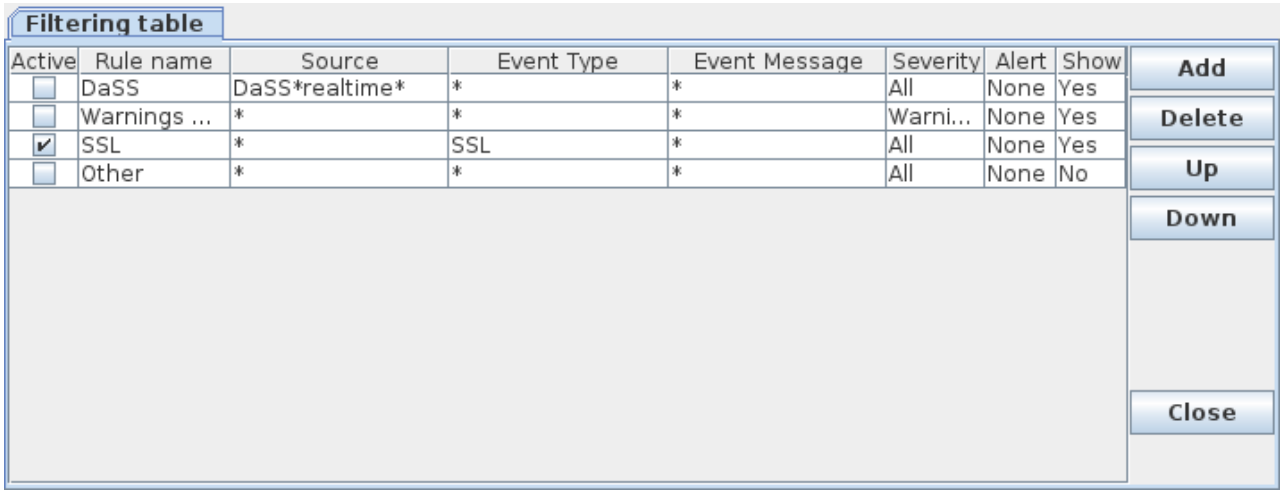
User interface



The Event Viewer main part is a table of events displayed in the order in which they are received from the Yamcs Server. Each event is displayed as one line in the table with the following properties:

Source	represents the system or subsystem that generated the event (e.g. EDR, DaSSPacketProvider)
Generation Time	the time when the event was generated
Reception Time	the time when the event has been received by Yamcs. For the events generated by the Yamcs components this is the same as the Generation time
Event Type	an indicative type that depends on the source of the event
Event Text	a human-readable text

In order to be able to display only relevant events, a filtering mechanism has been introduced.



The filters can be changed by selecting **Edit > Preferences**. Each filter can be applied on any of the Source, Type or Text properties of an event and can have a sound or popup alert properties. The **Show = Yes/No** means that the events matching the filter will be shown or not in the Event Viewer.

When the Event Viewer receives an event, it applies one by one all the filters until one matches. If a filter matches, then it is shown or not depending on the Show option. Independent of the Show option, if the matching filter has specified an alarm or a popup, the action is performed. If no filter matches, then by default the event is shown.

The filters can be activated or disabled in the preferences or by using the View menu. The filters that are not active, are ignored by the Event Viewer and not matched against incoming events.

The menu **File > Save as** allows to save the displayed events into a tab-separated file. The first line of the file is the header containing the column names as shown in the table.

The menu **File > Retrieve Past Events** pops up a dialog allowing to select a start/end range for retrieving events from the archive. All the retrieved events are subjected to the filters on the client side. In the future, the server might be improved to apply the filters directly on the server.

Chapter 4. PP Simulation

The Yamcs PP Simulation user interface allows to browse a library of scenarios, and select the one that should be played by the Yamcs PP Simulation Provider.

Installing

Dependencies

OS	Linux or Windows, 32bit or 64bit
Java runtime (JRE)	Version >= 1.8

Installation

The Yamcs PP Simulation is delivered as part of an archived client tools package. The package does not need to be installed, just extracted to a suitable location. The tools can be run from the extracted location using starting scripts found in the `bin/` folder.

Updating

Updated applications are made available as an archived client tools package. This should be extracted into its own folder, separate to any previous installation. The configuration files in `etc/` can be copied from a previous installation into the new installation.

Removing

To remove an installation, delete the extracted folder.

Enable PP Simulation Data Link

In order to play simulation scenarios, it is needed to add a SimulationPpProvider to the PP Providers list of the Yamcs instance.

Below is config example that should be added in the config file of the yamcs instance:

```
ppProviders:
    - class: org.yamcs.simulation.SimulationPpProvider
      stream: pp_realtime
      args: {simulationDataPath: "/opt/yamcs/etc/simulation.xml"}
```

Starting the Tool

On Windows and OS X, start the PP Simulation interface with the command

```
$ yamcs-pp-simulation.sh
```

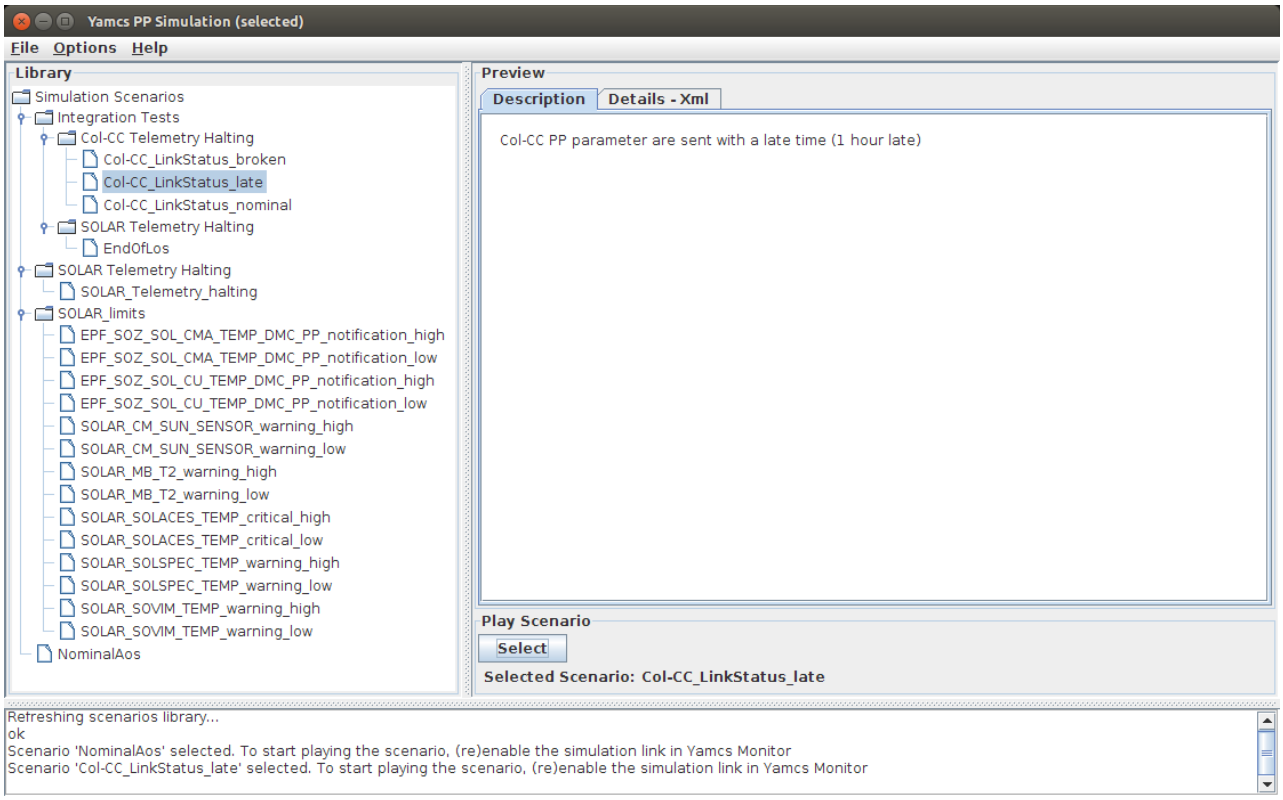
On Windows use the bat-script instead:

```
$ yamcs-pp-simulation.bat
```

After start-up, the menu entry **Options > Directories** has to be used to select:

- the “scenario library” path to a local directory containing XML scenario files.
- the “running scenario target” to the file that specified in the yamcs config file for parameter `simulationDataPath`

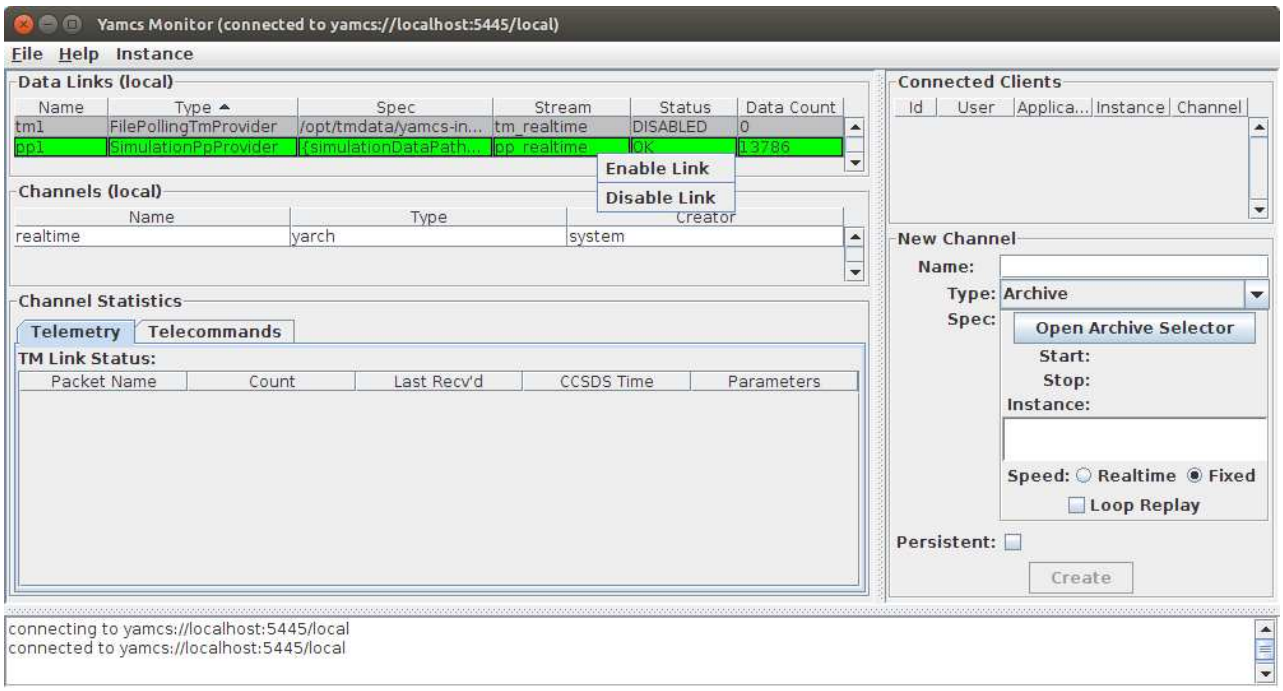
User Interface



To run a scenario in Yamcs:

- Browse to the desired scenario in the Library section
- Click **Select**
- (re)Enable the simulation data link from Yamcs Monitor

The simulation link in Yamcs Monitor should be disabled and enabled again to take into account the new simulation scenario. Below is a picture of the Yamcs Monitor with the simulation data link enabled:



Scenario file format

The scenarios are defined in XML files that follow the schema `scenario_data.xsd`, available in the Yamcs source code.

Examples of scenario files can be found in Yamcs sources, at location `yamcs-simulation/src/test/resources`.