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WorldFIP protocol analyser

"FipWatcher 7"

User's Manual

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Controller		

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1. INTRODUCTION

FipWatcher is a protocol analyser allowing the display of frames broadcasted on a FIP/WorldFIP network. All frames, even those erroneous, are acquired and their content displayed.

FipWatcher 7 or later is running thanks to a USB device available in the 3 standard bus versions (31.25 Kbits/s, 1 Mbits/s or 2.5 Mbits/s). Its software runs under Windows XP, 7, 8 (32-bits / 64-bits).

1.1. FEATURES

- Automatic detection of FIP or WorldFIP frames.
- Sampling triggered with one or more frames (up to three frames).
- All frames are time stamped.
- All detected frames are interpreted.
- Padding identifier can be interpreted, filtered at acquisition time or filtered at display.
- Erroneous frames detection.
- Transfer of acquired data in text files for WordPad or Excel.
- Frames analysis according to user parameters.

1.2. HARDWARE

FipWatcher is a protocol analyser integrated into a USB device, which is associated to different models of network coupler.

Two methods are possible for network connection depending if a free connector is available.

- At least one free connector is available: The “simple coupler” allows an easy access to the network.
- No free connector is available: two kind of “repeater couplers” (a mono-medium and a bi-medium) allow an access to the network with no adding cable or connector.

1.3. RECOMMANDATIONS

FipWatcher uses interruption of user’s computer to capture frames. It needs enough processor resources, so it is necessary to use a high performance computer.

To optimise processor treatments, and furthermore to limit hard disk access, it is recommended to avoid using other applications when FipWatcher is running.

Many applications (as network explorer, antivirus software, the system standby manager or all other application running silently) can monopolise the hard disk or the system. In this case, FipWatcher driver can lose frames, or can stop because of an error while acquiring. If one of these cases happens, the user should maybe deactivate programs, deactivate the system hibernate support or disconnect the PC from the network.

Note: with a laptop, plugging or unplugging to the AC power causes acquisition errors.

The minimal configuration is 1GHz for the processor frequency and 512 Mb of RAM.

2. INSTALL AND UNINSTALL

FipWatcher installation is done in two steps (in any order):

- Install the application.
- Install the USB device driver.

2.1. INSTALL THE APPLICATION

Before installing FipWatcher application, ensure to have administrator rights.

To install the application, download Fipwatcher software from www.exoligent.com then unzip it in a location of your choice and launch setup.exe.
And please follow the setup instructions.

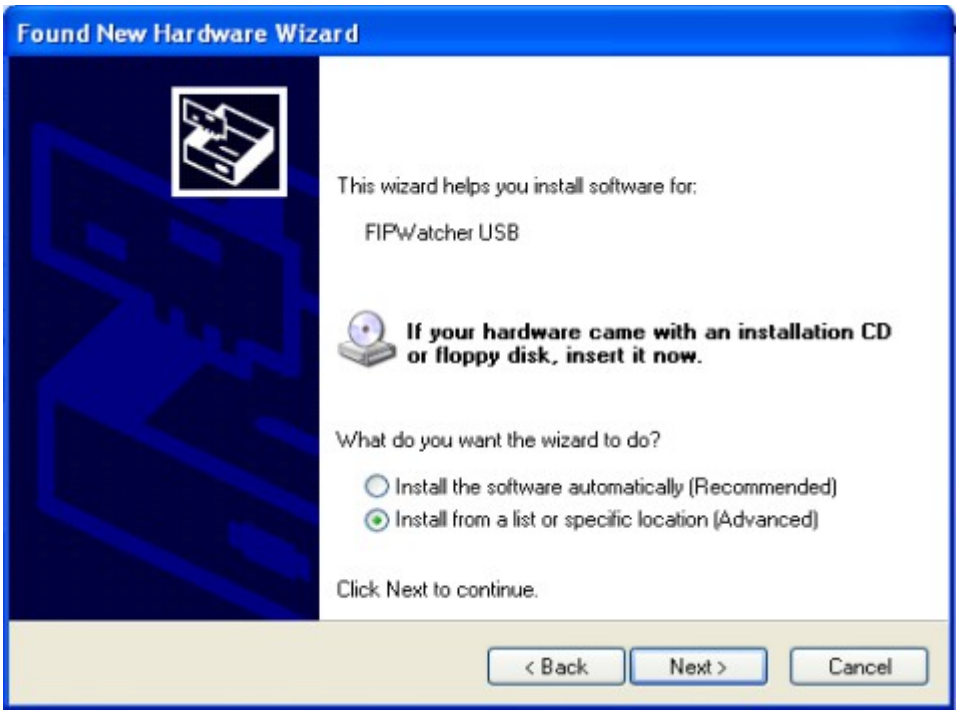
2.2. INSTALL THE DEVICE DRIVER

Warning: FipWatcher supports only Windows XP, 7, 8 (32-bits, 64-bits).

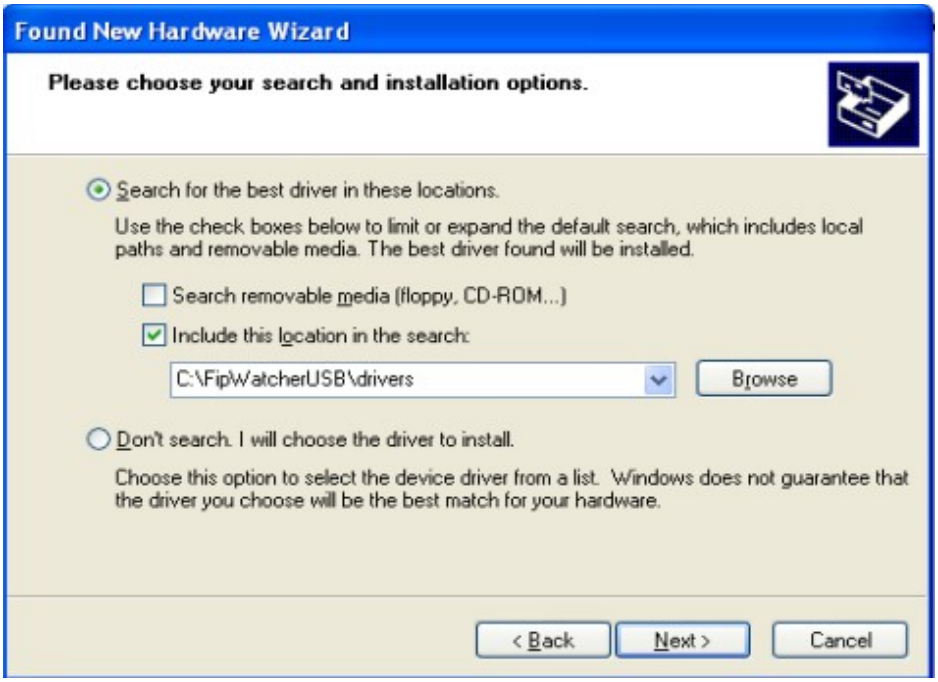
The procedure to install the driver for the first time is as follow:

1. Ensure to have administrator rights.
2. Plug in the USB device into a free connector. The system detects the device and opens the New Hardware Wizard.
3. Follow different steps of the Wizard, as indicated hereafter.

Under Windows XP, the Wizard suggests to use Windows Update, which is useless for FipWatcher.



Indicate to the Wizard to install the driver from unzipped directory ("drivers" directory).



Under Windows XP, when the Wizard is looking for the driver, it displays the window below. Click "Continue Anyway".
Then, the Wizard copies the driver.

The last window displayed by the Wizard indicates the installation status. Verify that the installation happens properly. Then click on "Finish".

2.3. UNINSTALL THE APPLICATION

The procedure to uninstall FipWatcher application is as follow:

1. Ensure to have administrator rights.
2. Use the Add / Remove Programs manager (from the panel control) to launch the setup.

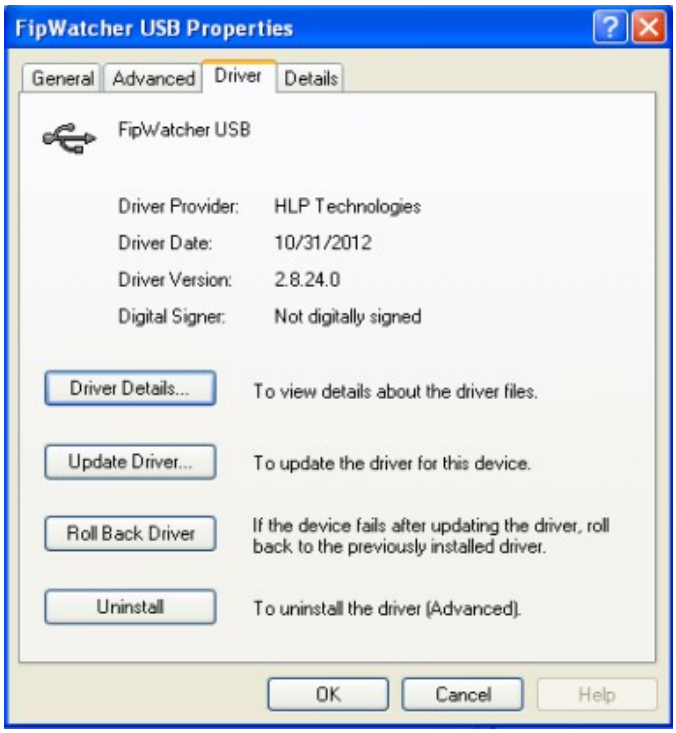
The setup just asks for a confirmation.

2.4. UNINSTALL THE DEVICE DRIVER

Note: to update the driver, it is recommended to **uninstall it** and then to **follow again** the installation steps with the updated version of unzipped directory.

The procedure to uninstall FipWatcher driver is as follow:

1. Ensure to have administrator rights.
2. Plug in the USB device into a free connector.
3. Go to the FipWatcher USB device properties window (by clicking twice on the USB icon of the task bar or by using the Windows device manager).
4. Click the "Uninstall" option of the "Driver" tab.



3. APPLICATION INTERFACE

When the application starts, the following window is displayed:

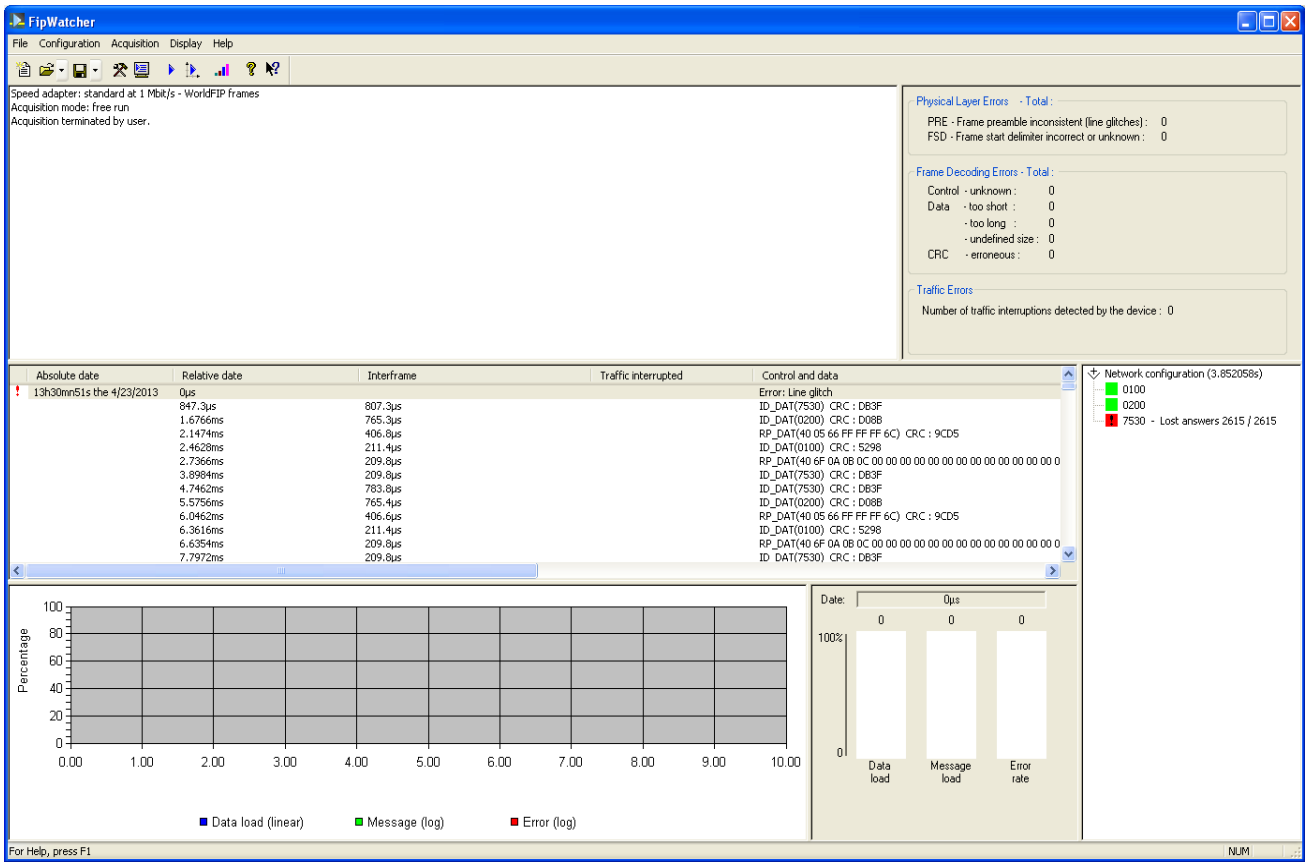


Figure 1: Main window of FipWatcher

Each view is detailed into the section 3.5 "Display menu and views detail".

3.1. MAIN PRINCIPLES OF FIPWATCHER

FipWatcher is used to watch, save and analyse traffic broadcasted on a FIP/WorldFIP network.
The user can do an acquisition by clicking only one button, the shortcut  , or by selecting the menu “Acquisition\Free run”. By default, the device driver stores acquired data up to 1Mbytes size to the file “fwatcher.dat" located into the installation directory of FipWatcher. During the same time, the application reads this file, parses it and displays frames.

FipWatcher can be configured to target the user’s need. Two types of configuration are available:

- **Configuration of acquisition**: it groups all the parameters defining the acquisition. They are:
  - path of the storage file,
  - storing size of the pre-trig and post-trig zones,
  - trigger method,
  - deferred starting,

- padding definition and its filtering at acquisition time.

These parameters are stored into the acquisition file and cannot be modified afterward

- **Configuration of display**: it groups all the parameters managing the analysis and the displaying of the acquired data. They allow:
  - analysing the network configuration,
  - calculating and display data rates,
  - filtering data when displaying,
  - marking events,
  - defining padding if it was not defined for acquisition time.

  These parameters are not mandatory and may be modified, applied and saved after an acquisition.

FipWatcher works with four types of file:

- **Acquisition files** (write and read): these files store at least raw acquired data and the configuration of the acquisition. Once an acquisition has been performed and the user has saved it, this file contains the configuration of display and analysis results (which avoid having to analyse again the entire file at the next opening).

- **Configuration files** (write and read): these files (which have to be saved by the user) contain the configuration parameters of acquisition and display. Using these files is not mandatory. The user can load a configuration by opening an acquisition file.

- **User data files** (read): these text files with the separator ";" contain data used to interpret frame contents. These files have to be created by the user, with word processing software or spreadsheet.

- **Exported data files** (write): these text files are generated when exporting all or parts of acquired data.

The functionalities of each menu are explained into the next sections.

3.2. FILE MENU

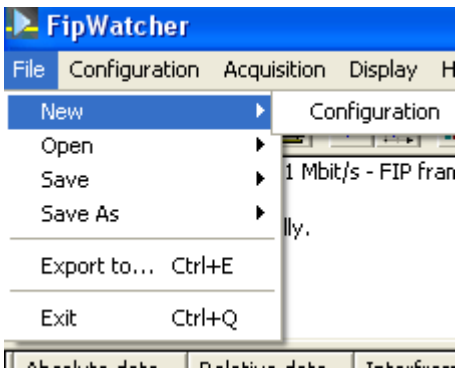


Figure 2: File menu

The application uses three types of file:

- A **configuration file** created by the application. This file contains at least a target filename for the acquisition and its minimum size. The user would complete it by using the sub-menus reserved for the configuration of the acquisition and the display. Before exiting, this file must be saved. The configuration parameters are also saved into the acquisition files and they can be reloaded by opening an old acquisition. In such a case, the previous configuration parameters would be replaced by the new parameters from the acquisition file.
- An **acquisition** file created by the application. All the frames broadcasted on FIP network are stored into this file. Only the padding frames can be filtered at acquisition time. This file can be voluminous according to the acquisition duration wished by the user. The configuration of the acquisition is also stored into this file, as a consequence it is always coherent with the stored data. Once an acquisition is finished, this file should be saved, especially if it is a large one. Furthermore, this action saves all the parameters of display and scrolling. Otherwise, the user should click the "Apply" button of the dialog box “configuration of the display in order to calculate again the acquisition parameters and to have an access to the frames and to the various statistics.

- A **user file of data definition** edited by the user. This text file, which uses semicolon as columns separator, is used to associate names to the received data to simplify the frame analysis according to the user context. This file can be edited by Excel and saved with the format "csv" (refer to section 4.1 "Format of the user data file" from annex).

3.2.1. NEW

This command is used to load a default configuration. This minimalist configuration allows the user to perform a free run acquisition into a 1 Mb file, which will be named "fwatcher.dat" and stored into the installation directory of FipWatcher.

This command is also accessible by the toolbar button:  .

3.2.2. OPEN

This command opens the three types of file the application uses, thanks to a sub-menu with three items.

This command is also accessible by the toolbar button:  .

3.2.2.1. *Acquisition*

This item is used to open an old acquisition file.
The configuration which is stored into this file will replace the configuration currently defined into the application. A message box informs the user about this consequence and allows him to cancel the file opening (and then to manually save the current configuration).

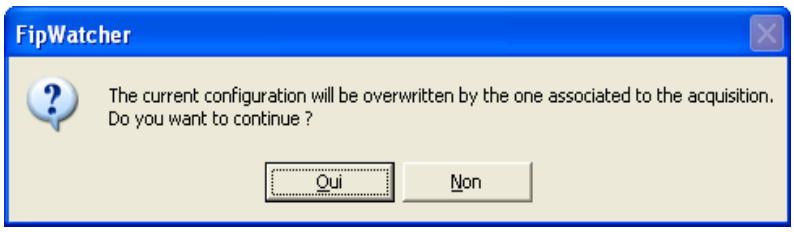


Figure 3: Message confirming the configuration overwrite

3.2.2.2. *Configuration*

This item is used to open a configuration file. This configuration will replace the configuration currently defined into the application.

3.2.2.3. *User data*

This item opens a user data file.
Once such file is loaded, a dialog box displays the frame details when the user clicks twice on it from the display list. If no user data file is loaded, the frame is displayed byte per byte (hexadecimal mode) in this dialog box.

3.2.3. SAVE

This command saves the current acquisition or configuration, thanks to a sub-menu of two items.

This command is also accessible by the toolbar button:  .

3.2.3.1. *Acquisition*

This item is used to save the acquisition file.
The configuration is also stored into this file, at the same time. This configuration includes the acquisition parameters and the display parameters. The acquisition parameters are saved once, at the time of the first storage of the acquisition. They cannot be modified at a later date since they are coherent with the acquisition processed. They will not be updated by next changes. On the other hand, the display parameters are systematically updated. As a consequence, they can be modified at any times later.

3.2.3.2. *Configuration*

This command saves a configuration file. This configuration includes the acquisition parameters and the display parameters. These two kinds of parameters are updated.

3.2.4. SAVE AS

This command saves the current acquisition or configuration with a customised name and location, thanks to two items.

3.2.4.1. Acquisition

This item opens the system "Save As" dialog box which saves an acquisition file with a new filename and to modify its location.

3.2.4.2. Configuration

This item opens the system "Save As" dialog box which saves a configuration file with a new filename and to modify its location.

3.2.5. EXPORT TO…

This command is used to transfer acquisition data with an ASCII format to a word processing software or a spreadsheet application.

The dialog box illustrated by Figure 4 allows to configure the text file format and to choose the elements to export.

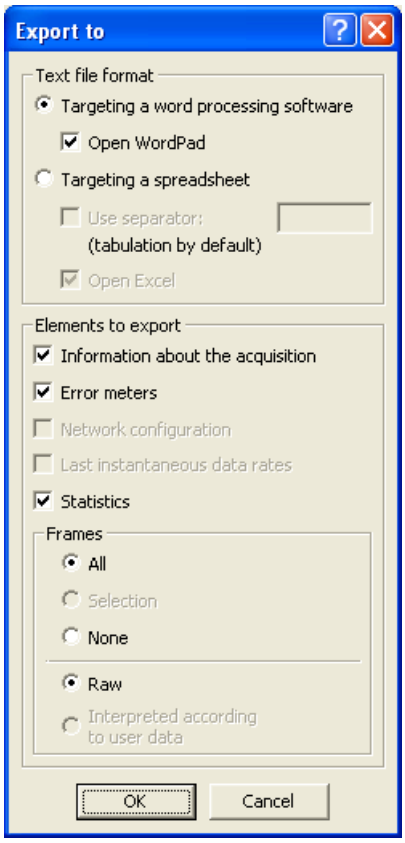


Figure 4: Export dialog box

This dialog box is divided into two subsets:

- **Subset 1, "Text file format"**: two types of export format are available according to the software which will be used to read the exported file:
    - **Targeting a word processing software**: in this case, the file is formatted to be re-used by a word processing software like "WordPad". The columns are not built with separators but with spaces.
        - **Open WordPad**: if this check box is checked, it allows to open automatically the WordPad application for displaying the file content and furthermore for printing it. If this check box is not checked, a text file will be generated.
    - **Targeting a spreadsheet**: in this case, the file is formatted to be re-used by a spreadsheet software like "Excel". The columns are built with separators.
        - **Use separator**: check box associated to an edit control which allows the user to define the column separator. If this box is not checked the separator used by default is the tabulation.
        - **Open Excel**: if this check box is checked, it allows to open the Excel application for displaying the file content and furthermore for printing it. If this box is not checked a text file will be generated.

Note: the maximum number of lines handling by Excel is 65535. As a consequence all the exported elements could not be displayed if the number of lines generated by FipWatcher during exportation is over this limit.

- **Subset 2, "Elements to export"**: analysis results displayed by the different views can be exported, except for instantaneous data rate chart (which cannot be exported in a text format but directly printed from the view).

  - **Information about the acquisition**: check box that allows to export information relative to the acquisition execution and status.
  - **Error meters**: check box that allows to export the error meters, the number of traffic interruptions and the number of transmission errors.
  - **Network configuration**: check box that allows to export the list of the identifiers that have been broadcasted and their state at the end of the acquisition.
  - **Last instantaneous data rates**: check box that allows to export the instantaneous data rates calculated on the last integration time of the acquisition.
  - **Statistics:** check box that allows to export the content of the statistics dialog box.
  - **Frames**: group of controls that allow to select which frames to export (or not) and their format.
    - **All**: if this box is checked all the displayable frames will be exported. If the acquisition is large and slightly filtered at display, the exportation can take a lot of time and a large amount of disk space.
    - **Selection**: if this box is checked only selected frames will be exported. If no frame is selected, this box is greyed.
    - **None**: if this box is checked no frame will be exported.

    - **Raw**: if this box is checked the frames will be exported with the same format used for the display list. The data fields will contain hexadecimal values.
    - **Interpreted according to user data**: if this box is checked the frames will be analysed and exported with the format defined by the current user data file. If no such file is loaded this box is greyed.

3.2.6. EXIT

This command is used to shut down FipWatcher.

Beware to save the configuration and acquisition analysis before exiting.

3.3. CONFIGURATION MENU

Figure 5: Configuration menu

This menu opens two dialog boxes to edit the acquisition and display parameters.

3.3.1. ACQUISITION CONFIGURATION

This dialog box allows configuring the parameters used to perform an acquisition of all FIP data broadcasted on the network. It contains five tabs detailed below in the following sections.

3.3.1.1. Acquisition configuration – Acquisition file tab

This tab contains two parts:

- **Part 1, "Full path"**: an edit control associated to a "Browse" button. This control must contain a valid file path corresponding to the acquisition storage filename.
  - **Browse**: button which opens the Open file dialog box. The user can select a storage location and a filename.

- **Part 2, "Action to perform at acquisition starting"**: group of three mutually exclusive radio buttons used to keep or not the previous acquisition.
  - **Ask before overwriting file**: if this button is checked and if the acquisition file already exists a dialog box will be displayed at acquisition starting, so the user would choose between continuing and overwriting the existing file or cancelling the acquisition. If the user choose cancelling, he will be able to rename the existing file or to change the storage filename.
  - **Always overwrite file**: if this button is checked all the acquisitions will have the same storage file and the last one will be stored instead of the previous one.
  - **Increment filename**: if this button is checked a number will be concatenated to the defined filename from the second acquisition. This number will be increase by increments along acquisitions.

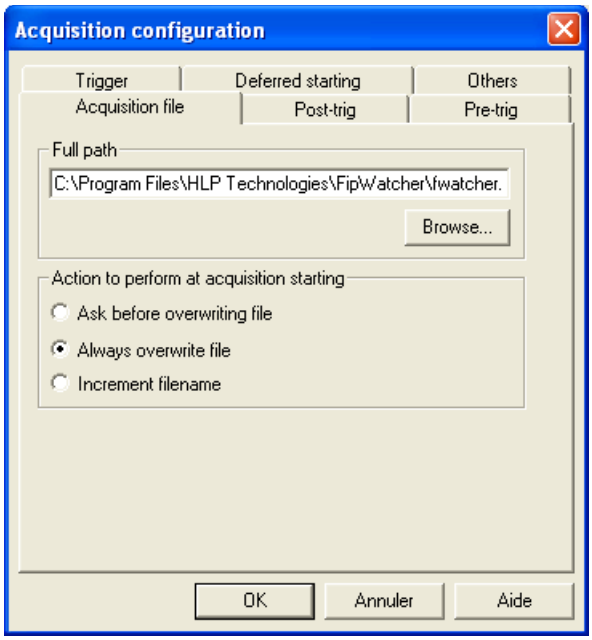


Figure 6: Acquisition configuration – Acquisition file tab

3.3.1.2. Acquisition configuration – Post-trig tab

All the acquired data is stored in a file located on a hard disk. An acquisition can be composed of two parts if the user defines the sizes of a pre-trig zone and post-trig zone and runs a triggered acquisition. The pre-trig zone corresponds to the data received before the triggering condition. The post-trig zone corresponds to the data received after the triggering condition. For a free run acquisition, the triggering condition is simply the acquisition starting up.
According to the FIP network version (speed) the acquisition file can quickly need a large amount of disk space. Therefore, the defined allocated size would be defined according to the free disk space available.

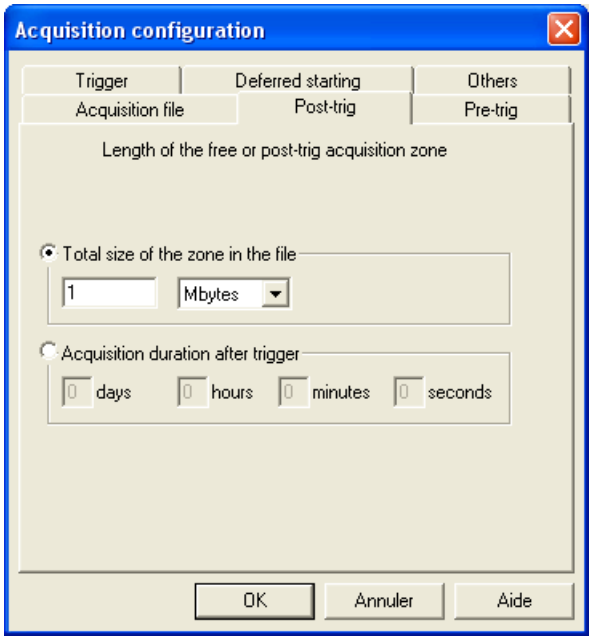


Figure 7: Acquisition configuration – Post-trig tab

This tab contains two mutually exclusive groups:

- **Total size of the zone in the file**: edit control associated to a unit drop-down list which allow to define the maximum size of the storage zone for the post-trig data. The size unit can be chosen among Kbytes, Mbytes or Gbytes.

- **Acquisition duration after trigger**: group of four edit controls that allow to define an acquisition duration in days, hours, minutes and seconds. The duration can be up to 48 days, 24 hours, 60 minutes and 60 seconds.

The size and the duration are two different means to define the end of the acquisition. The user must choose between the two type of ending. If a duration is defined, the acquisition will automatically be stopped at the end of the timer or before if the free disk space becomes less than 500 Mbytes.

3.3.1.3. Acquisition configuration – Pre-trig tab

For a triggered acquisition, the user can define to store (or not) the data received before the trigger.

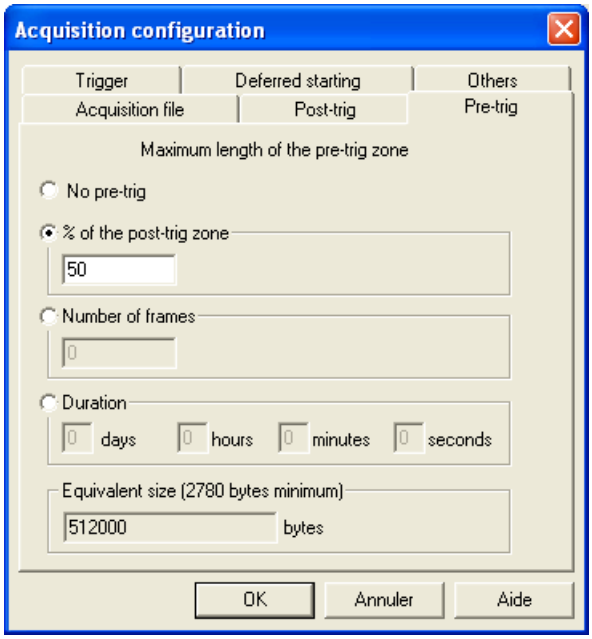


Figure 8: Acquisition configuration – Pre-trig tab

The "Pre-trig" tab allows to define the maximum length of data that can be stored before the trigger detection. Once the triggering condition is detected the storage continue into post-trig zone. The last frame of the triggering condition will have the relative date zero, all the frames of the pre-trig zone will have negative dates and the ones of the post-trig zone will have positive dates.

The tab contains five groups, of which four are mutually exclusive:

- **No pre-trig**: if this button is checked no pre-trig zone will be defined. As a consequence the first displayable frame will be the last frame of the trigger sequence (corresponding to the relative date zero). If this button is unchecked the user would define the maximum size of the pre-trig zone with one of the following controls.

- **% of the post-trig zone**: radio button which enables the user to define (with associated edit control) the size for the pre-trig zone in a percentage of size defined for the post-trig zone.

- **Number of frames**: radio button that enables the user to indicate (with associated edit control) the minimum number of frames to store in the pre-trig zone. This number is used to calculate a minimum size in bytes according to FIP traffic producing most of bytes per frame. This is the case when traffic is exclusively composed by message cycles: ID_MSG, RP_MSG(256), RP_FIN. The number of frames for the pre-trig zone can be up to four Giga.

- **Duration**: radio button that enables the user to define (With the four associated edit controls) a duration in days, hours, minutes and seconds. The duration can be up to 48 days, 24 hours, 60 minutes and 60 seconds. This duration is used to calculate a minimum size in bytes according to FIP traffic producing most of bytes per unit time. This is the case when traffic is exclusively composed by variable cycles: ID_DAT, RP_DAT(126).

- **Equivalent size (2780 bytes minimum)**: this read-only control indicates the minimum size for pre-trig zone assessed with previous controls. The pre-trig zone is a circular buffer where the last acquired data overwrite the oldest one. The pre-trig size must be greater than 2780 bytes.

3.3.1.4. Acquisition configuration – Trigger tab

A triggering sequence composed by three event frames (not necessarily consecutive) can be defined.
The user would define a group of fields to describe an event frame. Then the user should select a trigger method to apply to the defined frames.

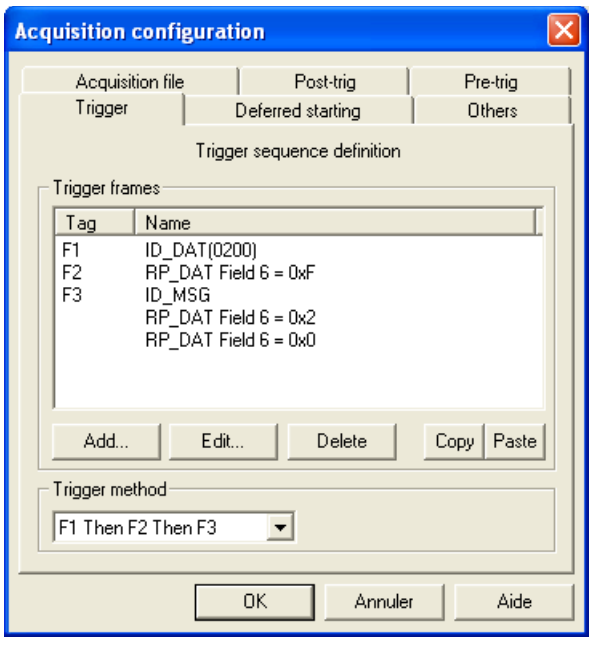


Figure 9: Acquisition configuration –Trigger tab

The trigger sequence definition tab contains two subsets:

- **Subset 1, "Trigger frames"**: list of event frames for the trigger associated to five management buttons. The list can contain up to twenty frames defined by the user. Moreover only the first three lines are referenced by the "Tag" column and will be used with the trigger method. The user can drag and drop each line of the list with the mouse to compose any sequence of trigger he wants. The other defined frames (those not tagged) are just storage.
  - **Add**: button used to add a trigger frame definition. It opens the "Event frame" dialog box (see section 3.3.3).
  - **Edit**: button used to modify a trigger frame definition. It opens the "Event frame" dialog box with the parameters of the (first) selected frame.
    Note: a frame can also be edited by double-clicking into the list.
  - **Delete**: button used to delete trigger frame definitions. It deletes the selected frames.
  - **Copy**: button used to copy an event frame definition. This copy can also be used for pasting into the following windows:
    - Window used to define the events to detect
    - Window used to define the frames relative to the filtering.
  - **Paste**: button used to paste the copied event frame definition.

- **Subset 2, "Trigger method"**: drop-down list giving all the available combinations with the trigger frames (from one and up to three).
  - **F1**: In order to trig, FipWatcher should receive a frame corresponding to the definition of the frame tagged as F1.
  - **F1 Then F2**: In order to trig, FipWatcher should receive a frame corresponding to the definition of the frame tagged as F1 then another one corresponding to the definition of the frame tagged as F2.
  - **F1 Or F2**: In order to trig, FipWatcher should receive a frame corresponding to the definition of one of the frames tagged as F1 or F2.
  - **F1 Then F2 Then F3** : In order to trig, FipWatcher should receive a frame corresponding to the definition of the frame tagged as F1, then another one corresponding to the definition of the frame tagged as F2 and finally a third one corresponding to the definition of the frame tagged as F3.
  - **(F1 Then F2) Or F3** : In order to trig, FipWatcher should receive a frame corresponding to the definition of the frame tagged as F3 or receive two frames:
    - one corresponding to the definition of the frame tagged as F1
    - a second one corresponding to the definition of the frame tagged as F2.
  - **F1 Then (F2 Or F3)**: In order to trig, FipWatcher should receive a frame corresponding to the definition of the frame tagged as F1 and then another one corresponding to the definition of one of the frames tagged as F2 or F3.
  - **(F1 Or F2) Then F3**: In order to trig, FipWatcher should receive a frame corresponding to the definition of one of the frames tagged as F1 or F2 and then a second one corresponding to the definition of the frame tagged as F3.
  - **F1 Or F2 Or F3** : In order to trig, FipWatcher should receive a frame corresponding to the definition of one of the frames tagged as F1 or F2 or F3.

3.3.1.5. Acquisition configuration – Deferred starting tab

The "Deferred starting" tab allows the user to program a delay between the acquisition starting and the real beginning of the FIP network scan.

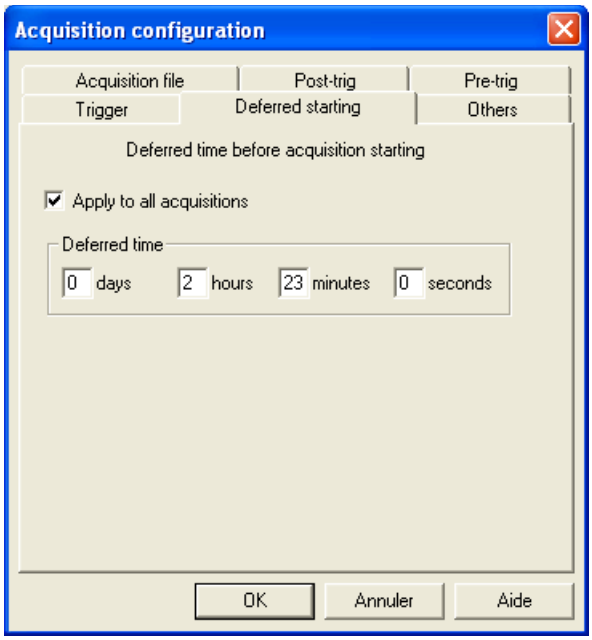


Figure 10: Acquisition configuration –Deferred starting tab

This tab contains two parts:

- **Apply to all acquisitions**: check box used to apply the delay to all acquisition types. For example if a two hours delay is defined, the scan for the triggering condition starts two hours after the user has launched its triggered acquisition.

- **Deferred time**: group of four edit controls used to define a delay for the acquisition starting, in days, hours, minutes and seconds. The duration can be up to 48 days, 24 hours, 60 minutes and 60 seconds.

3.3.1.6. Acquisition configuration – Others tab

This tab contains two parts:

- **Part 1, "Padding"**: this part allows the user to define padding identifier and to discard these frames from storage.
  - **Identifier**: edit control receiving the padding identifier (hexadecimal value). If the user does not configure FipWatcher to discard the padding frames at acquisition time (following check box), these frames are displayed as "padding" instead of "ID_DAT".
  - **Delete frames**: check box used to configure the driver to discard the padding frames from storage. This option can be useful to save space for the acquisition file. The user would be able to localise the padding frames into the display list by a lack of interframe time for the frame following the filtered padding.

- **Part 2, "Bi-medium device: Channel to listen"**: group of three mutually exclusive radio buttons used to define the channel to scan when a bi-medium device is running.
  - **Automatic** : in this case, the device automatically detects the channel where the frame is broadcasted first and uses this channel. According to the physical distribution of the cables the frames produced by different equipment would be acquired from one channel or from the other. The number of the channel from which a frame has been acquired is indicated by a column in the frame display list.
  - **Channel 1**: the device will scan only the channel 1.
  - **Channel 2**: the device will scan only the channel 2.

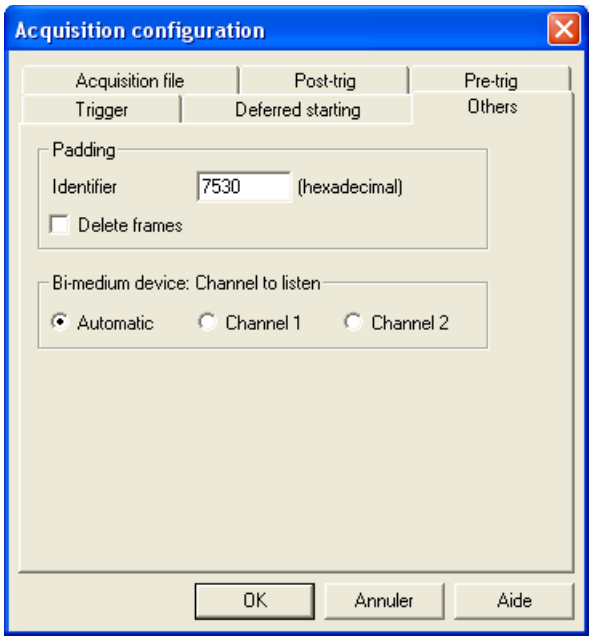


Figure 11: Acquisition configuration –Others tab

3.3.2. DISPLAYING CONFIGURATION

This dialog box allows configuring all the parameters used to display an acquisition. It contains four tabs detailed into the following sections.

The user can quit this dialog box from three buttons:

- **Validate**: this button is used to close the dialog box and to save modifications without applying them. They will be used for the next acquisition.
- **Cancel**: this button is used to close the dialog box without saving modifications.
- **Apply**: this button is used to close the dialog box and to save modifications. Furthermore, the application performs a re-calculation of the current opened acquisition applying the new parameters to update the display views. The re-calculation can take a long time according to the file size, but it can be stopped whenever.

3.3.2.1. *Displaying configuration – Views tab*

This tab is composed by three subsets:

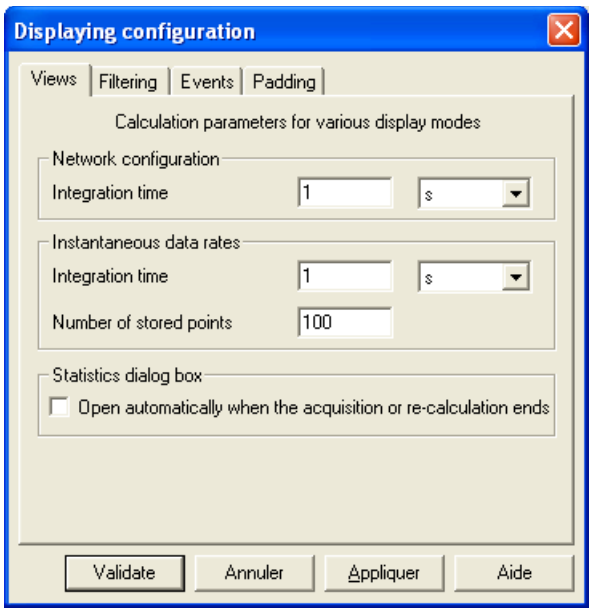


Figure 12: Displaying configuration – Views tab

- **Subset 1, "Network configuration"**: this group allows to define the integration time used for network configuration display. Network configuration is presented by a tree which lists all the identifiers broadcasted on the network. The display view is shown when the item "network configuration" of the menu "Display" is checked.
  - **Integration time**: edit control associated to a unit drop-down list which allows to define the integration time to be used to establish the identifier table. We advise to choose a multiple of the macrocycle duration, in order to establish a complete table during one integration time.

- **Subset 2, "Instantaneous data rates"**: this group defines parameters for the instantaneous data rates management. These data rates are displayed by meters and charts. These two kind of display are shown when the items, respectively, "Data rate meters" and "Data rate chart" of the "Display" menu are checked. The data rate meters display only the current data rates (in other word the last calculated). When the chart is refreshed, 'n' new point are displayed, where 'n' corresponds to refresh time divided by integration time. The displayed data rates are the data load, the message load and the error rate (see section 3.5.8). Note that data rates cannot be calculated if the padding is filtered at acquisition time.
  - **Integration time**: edit control associated to a unit drop-down list which allows to define the integration time to be used to calculate the data rates. More this time will be small, more the number of calculated points will be numerous and variations important. It is recommended to integrate on a multiple of the macrocycle to reduce the variations coming from the integration steps. If integration time is too important variations coming from messages would be averaged.
  - **Number of stored points**: edit control used to define the number of points that can be stored. The chart displays the last hundred points stored. The number of points to store can be up to 6000 (360 kbytes of memory).

- **Subset 3, "Statistics dialog box"**: this set allows the user to automate the opening of the statistics dialog box.
  - **Open automatically when the acquisition or re-calculation ends**: check box used to configure the automatic display of the statistics dialog box at the end of each acquisition or each acquisition display re-calculation.

3.3.2.2. Displaying configuration – Filtering tab

The application can apply filters at display time. This operation does not modify the acquisition file which is always exhaustive, except for the padding that can be filtered by driver at acquisition time. As a consequence the filtering definition at display can be applied to an acquisition currently performing or to any existing acquisition. The filtered frames are still stored in the acquisition file.

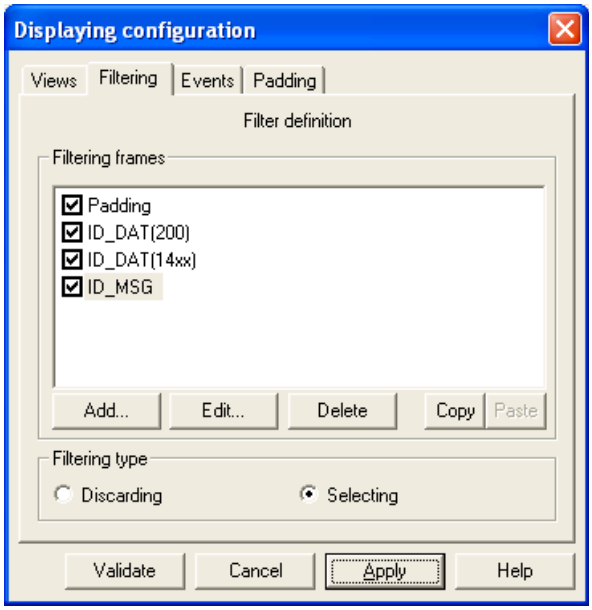


Figure 13: Displaying configuration – Filtering tab

The filtering definition tab contains two subsets:

- **Subset 1, "Filtering frames"**: list of event frames for the filtering associated to five management buttons. The list can contain up to twenty frames defined by the user. A check box is associated to each frame to define if this frame must be taken into account or not for the next filtering.
  - **Add**: button used to add a filtering frame definition. It opens the "Event frame" dialog box (see section 3.3.3).
  - **Edit**: button used to modify a filtering frame definition. It opens the "Event frame" dialog box with the parameters of the (first) selected frame.
    Note: a frame can also be edited by double-clicking into the list.
  - **Delete**: button used to delete filtering frame definitions. It deletes selected frames.
  - **Copy**: button used to copy an event frame definition. This copy can also be used (for pasting) into the following windows:
    - Window used to define events to detect
    - Window used to define trigger frames.
  - **Paste**: button used to paste the copied event frame definition.

- **Subset 2, "Filtering type"**: group of two mutually exclusive radio buttons used to define the filtering type to perform:

- **Discarding**: if this button is checked the acquired frames corresponding to the definition of the filtering frames will not be displayed.
- **Selecting**: if this button is checked, only the acquired frames corresponding to the definition of the filtering frames will be displayed. For example, the previous dialog box screenshot (Figure 13) will configure FipWatcher to display only the ID_MSG frames and the associated response frames (if the corresponding check box is checked into the "Event frame" dialog box).

3.3.2.3. Displaying configuration – Events tab

The application can mark the detected events as shown in figure below (Figure 14: first column). To perform marking, the user has to configure the Events tab of the displaying configuration dialog box.

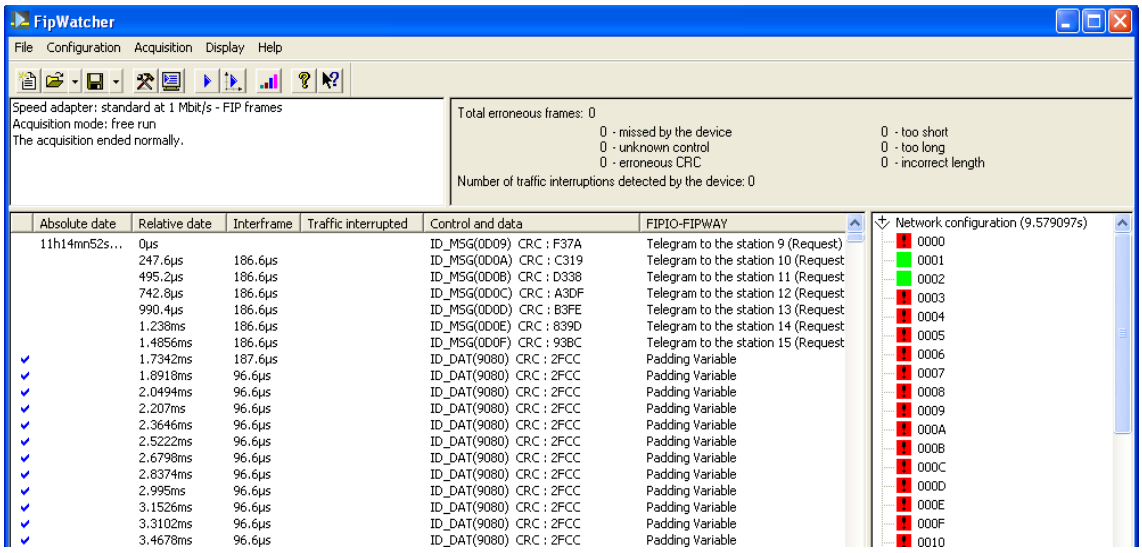


Figure 14: Events marking

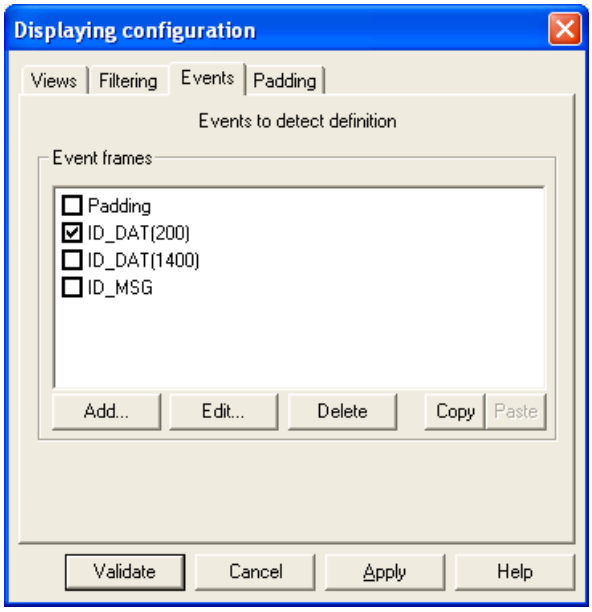


Figure 15: Displaying configuration – Events tab

The events to detect definition tab contains a list of the events associated to five management buttons:

- **Event frames**: list of event frames. This list can contain up to twenty frames defined by the user. A check box is associated to each frame to define if this frame must be taken into account or not for the next event marking.
  - **Add**: button used to add an event definition. It opens the "Event frame" dialog box (see section 3.3.3).
  - **Edit**: button used to modify an event definition. It opens the "Event frame" dialog box with the parameters of the (first) selected frame.
    Note: a frame can also be edited by double-clicking into the list.
  - **Delete**: button used to delete event definitions. It deletes selected frames.
  - **Copy**: button used to copy an event frame definition. This copy can also be used (for pasting) into the following windows:
    - Window used to define frames relative to the filtering
    - Window used to define trigger frames.
  - **Paste**: button used to paste the copied event frame definition.

3.3.2.4. *Displaying configuration – Padding tab*

This tab can be useful to analyse an acquisition performed without defining the padding identifier.

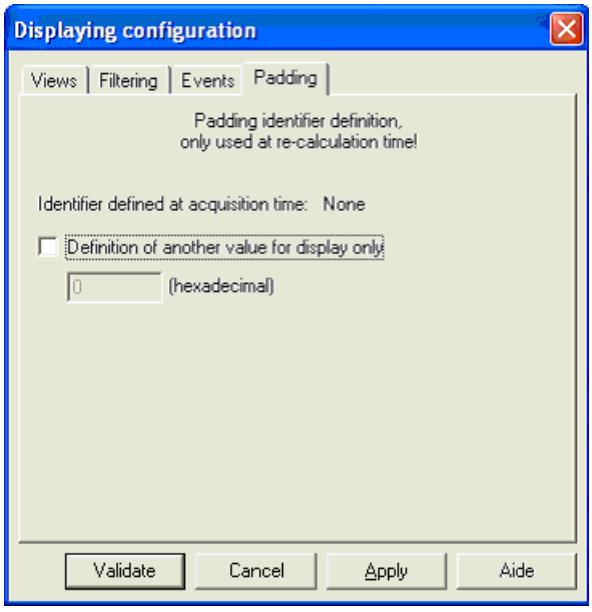


Figure 16: Displaying configuration – Padding tab

A new padding identifier can be defined here and it will be used only for display. This change does not modify the padding value stored into the configuration zone of the acquisition file.
In order to define a new padding identifier, the user have to check the "Definition of another value for display only" check box and then to fill the edit control with the wished hexadecimal value.
A click on the "Apply" button performs a new analysis of the file. If the new value is valid, the data rates will be calculated.

3.3.3. DEFINING AN EVENT FRAME

An event frame can be a trigger frame, a filtering frame or an event frame to detect.

An event frame is defined by several elements contained into the frame.

FipWatcher considers that an acquired frame corresponds to an event frame when all the states defined for each frame elements are true.
An element is constituted by any bit fields of the frame, CRC included. The bit field can have a size from one to sixty four bits.
Beware, during the following definitions we will talk about "words" when a bit field has a size greater than height bits (do not mix up with 16 bits “words” of programming).

The window used to define an event frame is composed by two main subsets, each containing several groups, detailed hereafter.

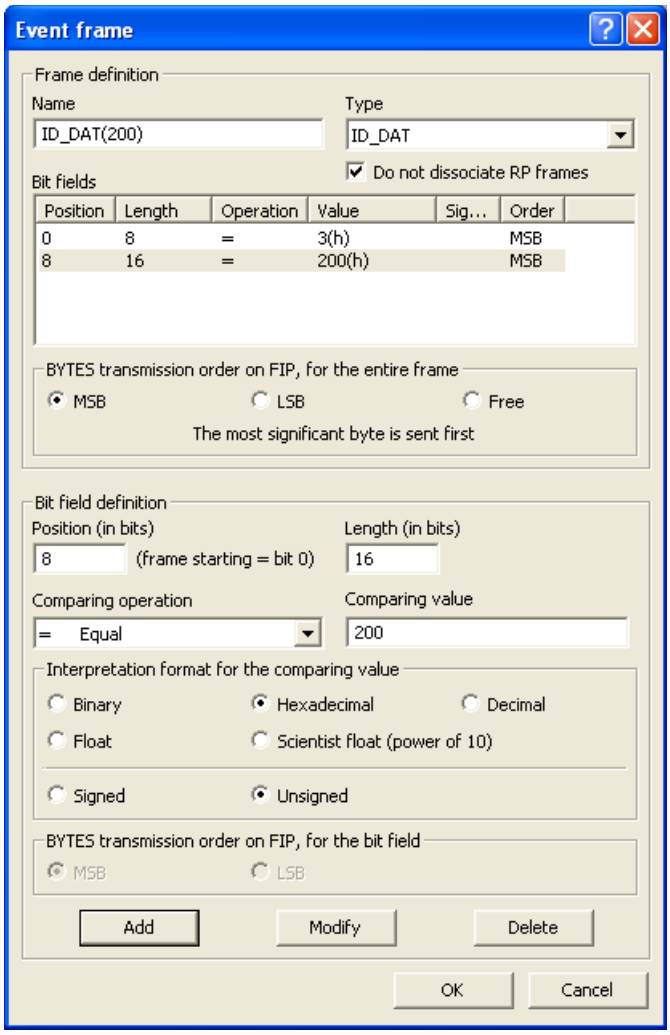


Figure 17: "Event frame" dialog box

- **Name**: text edit control used to name the event frame. This field is limited to 50 characters.

- **Type**: list of predefined FIP frame to watch. This field define the control byte of a FIP frame, that is to say the first one. Selecting "User defined" allows to perform a search upon the content of any frame or to use a mask upon the first byte in order to define a group of frame types.

- **Do not dissociate RP frames**: this check box appears only when defining filtering frames. It is enabled when defining an "ID_XXX" frame, and it allows to not dissociate the response frame from the filtered question frame.

- **Bit fields:** list of the bit fields to search into the frames. In order to define an event frame, at least one bit field must be defined to be compared with an acquired field. The user can define up to 2120 bit fields for a frame. This limit allows to separately define all the bits of the longer FIP frame. In order to validate the frame comparison, the results of operations performed upon the bit fields must all be true. It is not mandatory to fully define a frame (in other words some bits can be undefined) and the user can define several operations upon a same bit field.
- **BYTES transmission order on FIP, for the entire frame**: group of three mutually exclusive radio buttons defining the transmission order of frame. When a word is greater than height bits, the user must define the order in which bytes are broadcasted. Usually, all frames respect the same rule. However we can imagine special cases where the transmission order of the bytes can change during frame production. There is three possible cases:

    - **MSB**: this radio button has to be checked if the most significant byte of acquired fields is the first transmitted. This rule applies for all words of the frame (Motorola format). Beware about the definition of the comparing value for a bit field with a size different from 16, 32 or 64.
    - **LSB**: this radio button has to be checked if the least significant byte of acquired fields is the first transmitted. This rule applies for all the words of the frame (Intel format).
    - **Free**: the user has to check this button for a FIP device that appends data complying Intel format with data complying Motorola format to construct a frame. Then the user would define the data transmission order for each bit field.

- **Bit field definition**: group of controls used to define a bit field.

    - **Position**: the position (in bits) can start from the bit zero of the frame till the last bit, CRC included. The position is given in bit because it can start anywhere in a byte. This position always corresponds to position of the bit zero of the bit field. For instance:
        - For a MSB transmission the position points to the bit zero of the part of the most significant byte of the word.
        - For a LSB transmission the position points to the bit zero of the part of the less significant byte of the word.

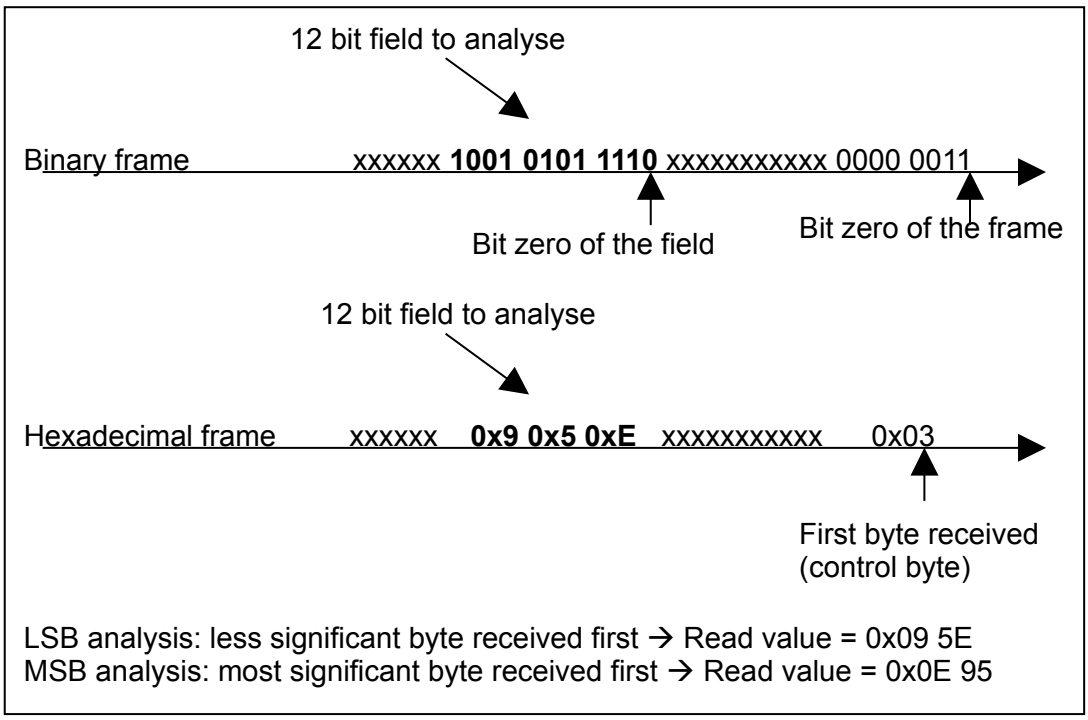


Figure 18: Example of analysis a 12 bit field into LSB and MSB contexts

- **Length**: the length must be included between one and sixty four bits. If the bit field value is formatted as a "Float", the size can only be equal to thirty two or sixty four bits.

- **Comparing operation**: list of ten comparing operations as follows:
  - **Equal**: the acquired value must be equal to the comparing one.
  - **Different**: the acquired value must be different than the comparing one.
  - **Less**: the acquired value must be less than the comparing one.
  - **Greater**: the acquired value must be greater than the comparing one.
  - **Less or Equal**: the acquired value must be less or equal to the comparing one.
  - **Greater or Equal**: the acquired value must be greater or equal to the comparing one.
  - **AND**: a bitwise AND is performed on acquired value and the comparing one. The result must be true, which means that at least one bit of the result must be equal to one. This operation is used to test if a bit of the acquired bit field is one. This operation is representative when all the bits of the comparing value are set to zero except the bit to be tested.
  - **NOT OR**: a bitwise OR is performed on acquired value and the comparing one and result is complemented. The result must be true, which means that at least one bit of the result must be set to one or one bit must be set to zero after the OR operation. This operation is used to test if a bit of the acquired bit field is zero. This operation is representative when all the bits of the comparing value are set to one except the bit to be tested.
  - **AND and Equal**: a bitwise AND is performed on the acquired value and the comparing one, and the result must be equal to the comparing value. This operation is used to test if a group of bits is one.
  - **OR and Equal**: a bitwise OR is performed on the acquired value and the comparing one, and the result must be equal to the comparing value. This operation is used to test if a group of bits is zero.

- **Interpretation format for the comparing value**: group of seven mutually exclusive radio buttons:
  - **Binary**: the comparing value is given by binary digits set to one and zero. If the "Signed" option is checked, the bit 7, 15, 31 or 63 for bit field sizes of 8, 16, 32 or 64 will be interpreted as sign bit. Value is negative when the most significant bit is one.
  - **Hexadecimal**: the comparing value is given into hexadecimal notation (base 16). If the "Signed" option is checked, the bit 7, 15, 31 or 63 for bit field sizes of 8, 16, 32 or 64 will be interpreted as the sign bit. Value is negative when the most significant bit is one.
  - **Decimal**: the comparing value is given into decimal notation (base 10), signed or not.
  - **Float**: the comparing value is given into floating-point notation, formatted as following "Sign n Decimals.Precisions", for bit field sizes of thirty two or sixty four. In this case the value is always interpreted as signed. For a size of thirty two bits the user can enter values with 7 digits and for a size of sixty four bits the user can enter values with 15-16 digits.
  - **Scientist float (power of 10)**: the comparing value is given into floating-point notation, formatted as following "Sign 1 Decimal. Precisions E Sign Exponent", for bit field sizes of thirty two or sixty four bits. In this case the value is always interpreted as signed. For a size of thirty two bits the user can enter values from $1,5 \times 10^{-45}$ up to $3,4 \times 10^{38}$ with a 7 digits accuracy. For a size of sixty four bits the user can enter values from $5,0 \times 10^{-324}$ up to $1,7 \times 10^{308}$ with 15-16 digits accuracy.
  - **Signed**: if this button is checked the value is interpreted as a signed number. **Unsigned: if this button is checked the value is interpreted as an unsigned number.**
- **BYTES transmission order on FIP, for the bit field**:
  - **MSB**: this radio button has to be checked if the most significant byte of the acquired bit field is the first transmitted (Motorola format).
  - **LSB**: this radio button has to be checked if the less significant byte of the acquired bit field is the first transmitted (Intel format).

- **Add**: button used to add a line to the list of the bit fields to be tested, according to the parameters entered from the controls of the bit field definition. The data is analysed and then the real comparing value is displayed (due to the approximation of the float value). The bit fields are sorted into the list by position and by adding date.

- **Modify**: button used to modify the first bit field selected into the list, according to the parameters entered from the controls of the bit field definition.

- **Delete**: button used to delete the bit fields selected into the list.

- **OK**: button used to validate the event frame definition and to close dialog box.

- **Cancel**: button used to close the dialog box without saving modifications.

3.4. ACQUISITION MENU

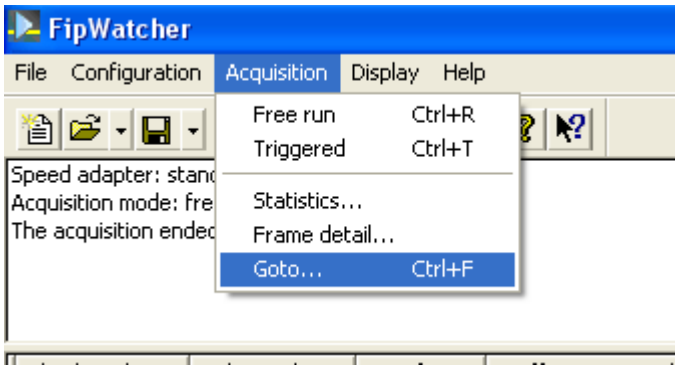


Figure 19: Acquisition menu

This command allows the user to start an acquisition. Two acquisition types are available: "Free run" (also accessible by the button) and "Triggered" (also accessible by the button). Once an acquisition is performed, this command also allows, to open the "statistics" dialog box (also accessible by the button), to obtain detail about the currently selected frame and to go to particular frames.

The section 3.3.1 about the acquisition configuration gives details about the different acquisition type available.

A dialog box is displayed when the acquisition is performed in order to indicate the acquisition status and to stop it whenever.

The dialog box below may be displayed if USB device is not or badly plugged in or if driver cannot be loaded.

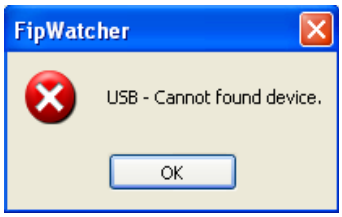


Figure 20: Message box indicating a connection error of the device

Figure 21: Message box indicating a dialog error with the device

In this case, it is recommended as a first step to close FipWatcher, disconnect and reconnect the card and restart FipWatcher. If the problem persists the driver must be reinstalled.

3.4.1. FREE RUN

A free run acquisition can also be started from the button  .

In order to start a free run acquisition, the user must at least have configured a name and a size or a duration for the acquisition storage file from the "Acquisition configuration" dialog box (also accessible by the button ).

According to the acquisition configuration, the user can perform:

- **Quick acquisition by one click**: a default configuration is loaded when the application is opened. A click on  starts a free run acquisition. If the USB device is plugged in, the speed adapter targets the version of the network and traffic is currently broadcasted, the first acquired frames are displayed. A 1 Mbytes file called "fwatcher.dat" is saved into the installation directory of FipWatcher.

- **"Deferred starting" option**: the free run can be performed with a differed starting of scan. If the corresponding option is checked in the "Deferred starting" tab of the "Acquisition configuration" dialog box, data scan and storage begin only when the defined duration is elapsed. This option can be applied to all different acquisition types.

3.4.2. TRIGGERED

A triggered acquisition can also be started from the button  .

In order to start a triggered acquisition, the user must at least have defined:
- a name for the acquisition storage file
- a size or a duration for this same file
- a trigger sequence. The trigger sequence can contain up to three frames. Each trigger frame is defined by a list of bit fields to be compared with the content of the acquired frames. The trigger sequence is defined into the "Trigger" tab of the "Acquisition configuration" dialog box (also accessible by the button ).

According to acquisition configuration, the user can perform:

- **Triggered acquisition without pre-trig**: the network scan begins when the user launches it. The data storage starts only when the last frame of the trigger sequence is detected.

- **Triggered acquisition with pre-trig**: the network scan begins when the user launches it. The data storage in the pre-trig zone of the file begins at the same time. When the last frame of the trigger sequence is detected the data storage continues in the post-trig zone of the acquisition file. Frames acquired before the end of trigger sequence are negatively time stamped, the last frame of trigger sequence has a date zero and frames of the post-trig zone are positively time stamped.

- **"Deferred starting" option**: the triggered acquisition can be performed with a deferred starting of the scan. If the corresponding option is checked in the "Deferred starting" tab of the "Acquisition configuration" dialog box, the data scan and the search of triggering condition begin only when the defined duration is elapsed. This option can be applied to all different acquisition types.

3.4.3. STATISTICS

The dialog box displaying the statistics is also accessible by the button  .

The statistics are available only when an acquisition has been performed. The user can configure FipWatcher to display this dialog box when the acquisition or its re-calculation end. To configure this option, go to "Views" tab of the displaying configuration dialog box.

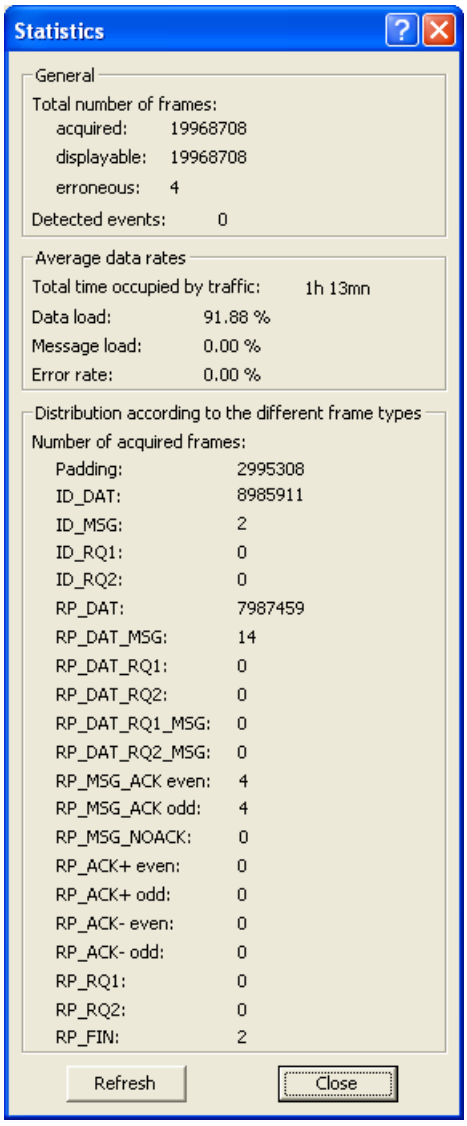


Figure 22: Statistics dialog box

3.4.4. FRAME DETAIL

The "Frame detail" dialog box can be opened:

- By double-clicking on the targeted frame.
- By pressing the "Enter" key when the targeted frame is selected (it concerns the first one selected only).
- By selecting the command "Display – Frame detail" when the targeted frame is selected (it concerns the first one selected only).

If a user data file has been loaded, the targeted frame is analysed according to this definition. Otherwise the frame content is displayed byte per byte in hexadecimal notation (default display).

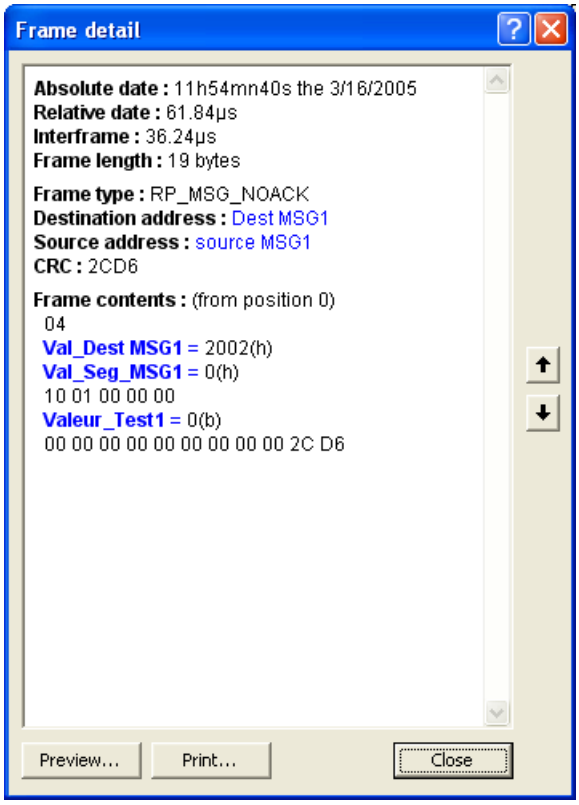


Figure 23: Frame detail dialog box

Two buttons allow performing a print preview and the printing. For these two cases, FipWatcher calls "Internet Explorer" software and uses its page setup.

The arrow buttons allow displaying the detail of the previous or next displayable frames. The up and down arrow keys are also usable to navigate between the frames.

The time stamp parameters are detailed by the section 3.5.5 "Display menu and views detail: Frame list". The other elements displayed correspond to the example of user data file given by the section 4.1 "Annex : Format of the user data file".

3.4.5. GOTO

This functionality allows to reach a pre-defined displayable frame.

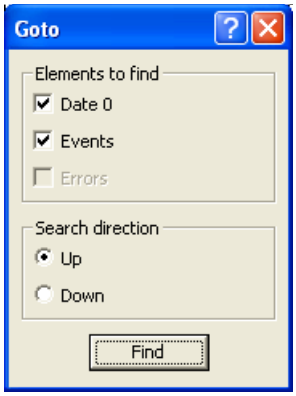


Figure 24: "Goto" dialog box

This dialog box contains two subsets:

- **Subset 1, "Elements to find"**:
  - **Date 0**: this check box is used to search the displayable frame of date zero or the first displayable frame that follows it if filtered.
  - **Events**: this check box is used to search displayable detected events. If no event has been defined or detected or if they are all filtered this check box is greyed.
  - **Errors**: this check box is used to search erroneous frames and traffic interruptions detected by the device. If the acquisition contains no error or if they are all filtered this check box is greyed.

- **Subset 2, "Search direction"**:
  - **Up**: this button is used to start the search from the selected frame and towards the beginning of acquisition. If none occurrence is found between the starting point and the beginning of file, search continue from the end of the acquisition to the first found occurrence or the selected frame (in other words the starting point).
  - **Down**: this button is used to start the search from the selected frame and towards the end of acquisition. If none occurrence is found between the starting point and the end of file, search continue from the beginning of the acquisition to the first found occurrence or the selected frame (in other words the starting point).

The "**Find**" button starts the search.

The "**F3**" key allows starting the same search to the "following" occurrence without using the dialog box.

3.5. DISPLAY MENU AND VIEWS DETAIL

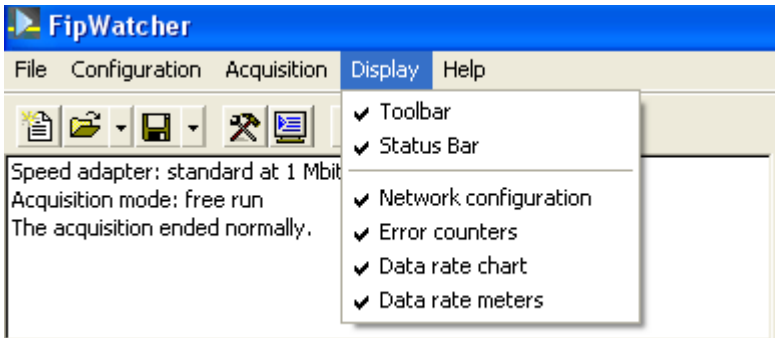


Figure 25: Display menu

This command is used to show or hide the status bar, the toolbar and the different views of the application main window.

3.5.1. DISPLAY PRESENTATION

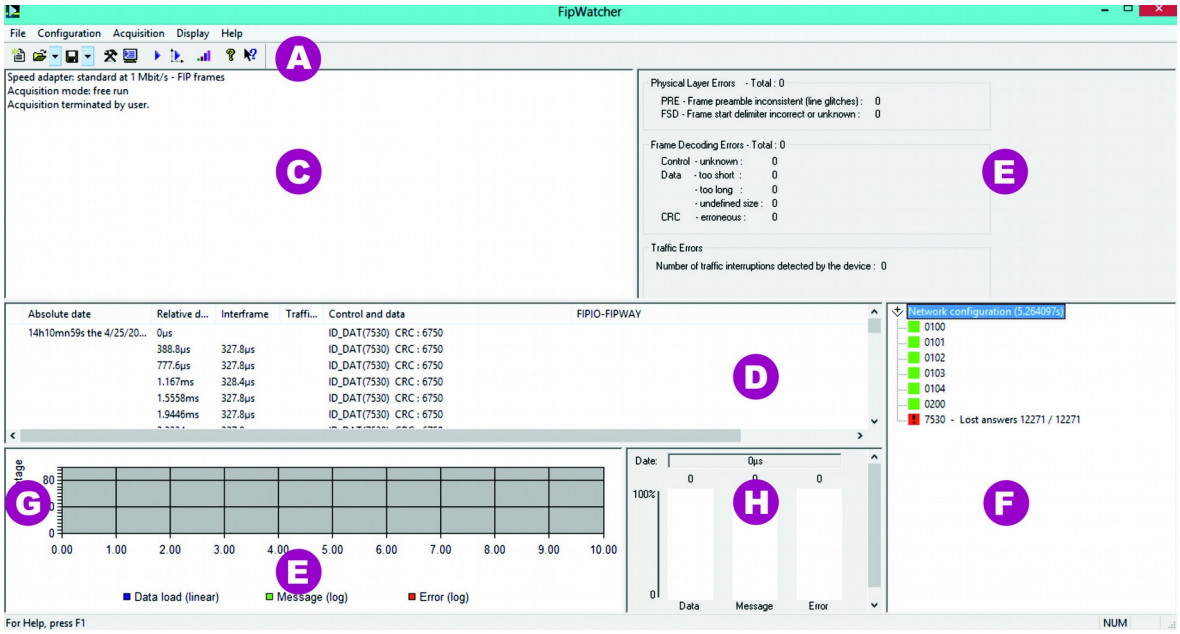


Figure 26: Main window of the FipWatcher application

The main window contains several parts tagged into Figure 26 and detailed by the following sections.

- A:Toolbar
- B: Status bar
- C: View displaying general information about the acquisition
- D: Frame list
- E: Error meters
- F: Network configuration
- G: Data rate meters
- H: Data rate chart

3.5.2. TOOLBAR

Figure 27: Toolbar

This element, by default located under the menu bar, contains shortcuts for main menu commands. This bar can be hidden via the "Display" menu or moved with the mouse.

3.5.3. STATUS BAR

Figure 28: Status bar

This element, located at the bottom of main window, displays a description for commands and shortcuts hovered by the mouse. This bar can be hidden via the display menu.

3.5.4. VIEW OF GENERAL INFORMATION ABOUT ACQUISITION

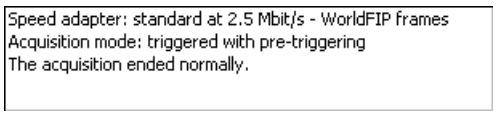
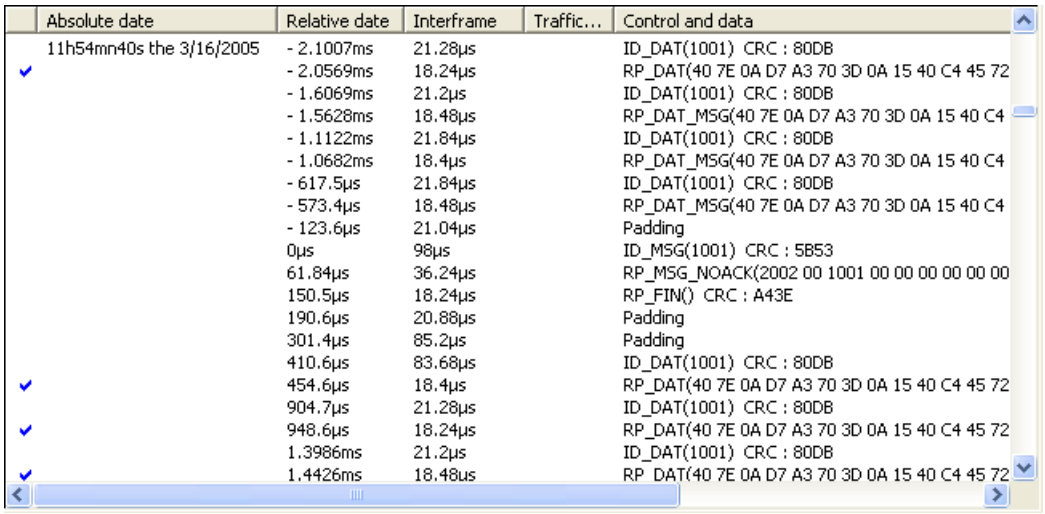


Figure 29: View of general information about acquisition

This view displays information relative to the acquisition status.
Once an acquisition has been performed, this view would indicate:

- The type of the adapter used to be connected to FIP network and its associated speed.
- The type of broadcasted frames: "FIP" or "WorldFIP".
- The type of acquisition performed according to configuration and starting menu used.
- The errors.
- The end status of acquisition.

3.5.5. FRAME LIST



	Absolute date	Relative date	Interframe	Traffic...	Control and data
	11h54mn40s the 3/16/2005	- 2.1007ms	21.28µs		ID_DAT(1001) CRC : 80DB
✔		- 2.0569ms	18.24µs		RP_DAT(40 7E 0A D7 A3 70 3D 0A 15 40 C4 45 72
		- 1.6069ms	21.2µs		ID_DAT(1001) CRC : 80DB
		- 1.5628ms	18.48µs		RP_DAT_MSG(40 7E 0A D7 A3 70 3D 0A 15 40 C4
		- 1.1122ms	21.84µs		ID_DAT(1001) CRC : 80DB
		- 1.0682ms	18.4µs		RP_DAT_MSG(40 7E 0A D7 A3 70 3D 0A 15 40 C4
		- 617.5µs	21.84µs		ID_DAT(1001) CRC : 80DB
		- 573.4µs	18.48µs		RP_DAT_MSG(40 7E 0A D7 A3 70 3D 0A 15 40 C4
		- 123.6µs	21.04µs		Padding
		0µs	98µs		ID_MSG(1001) CRC : 5B53
		61.84µs	36.24µs		RP_MSG_NOACK(2002 00 1001 00 00 00 00 00 00
		150.5µs	18.24µs		RP_FIN() CRC : A43E
		190.6µs	20.88µs		Padding
		301.4µs	85.2µs		Padding
		410.6µs	83.68µs		ID_DAT(1001) CRC : 80DB
✔		454.6µs	18.4µs		RP_DAT(40 7E 0A D7 A3 70 3D 0A 15 40 C4 45 72
		904.7µs	21.28µs		ID_DAT(1001) CRC : 80DB
✔		948.6µs	18.24µs		RP_DAT(40 7E 0A D7 A3 70 3D 0A 15 40 C4 45 72
		1.3986ms	21.2µs		ID_DAT(1001) CRC : 80DB
✔		1.4426ms	18.48µs		RP_DAT(40 7E 0A D7 A3 70 3D 0A 15 40 C4 45 72

Figure 30: Frame list

This view contains the list of frames that are displayable which means not filtered. If the user double-clicks upon one line, a dialog box displaying frame details is opened. The frame list is presented with columns:

- The first column can contain two types of marks:
  - "✔": the frame corresponds to an event to detect defined into the displaying configuration dialog box.
  - "❗": the frame is erroneous.
- **Absolute date**: the absolute date in seconds is displayed in the first line of the view.
- **Relative date**: the third column contains the relative date with a ten microseconds accuracy. The date zero corresponds to the first frame acquired during a free run acquisition or to the last frame of the trigger sequence for a triggered acquisition. Frames acquired before the trigger are negatively time stamped for an acquisition with pre-trig.
- **Interframe**: the interframe is illustrated by the figure below. It corresponds to the time measured between each frame. This information is useful for checking if the turn around and silent times are correct. When one or several following frames are filtered, the interframe is not displayed because it does not correspond to the time between the associated frame and the one displayed by the previous line. When the padding is filtered at acquisition time this column is empty for the line corresponding to the frame that follows the padding.

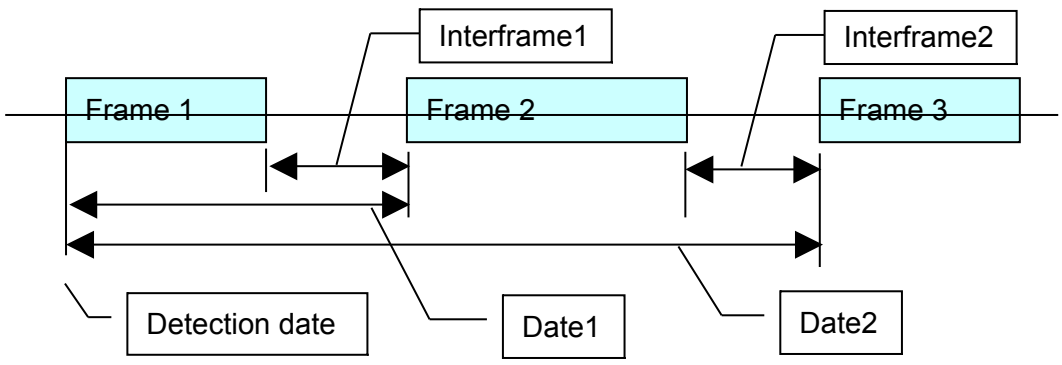


Figure 31: Time measurement and displaying principle

- **Traffic interruption**: this column contains the character "X" into the line corresponding to the first frame received after a traffic interruption detected by the device. The device returns this error when its time counter recycles between two frames. In such a case the device is no more able to date the frames with a ten microseconds accuracy. When the traffic restarts the absolute date associated is the one given by the computer. According to the network version, the device can perform the dating during a fixed time:
  - 2.5 Mbits/s => 85 seconds of dating is possible without traffic.
  - 1 Mbits/s => 214 seconds of dating is possible without traffic.
  - 31.25 kbits/s => 6871 seconds of dating is possible without traffic.
- **Channel**: this column is only displayed when using a bi-medium adapter. It indicates the channel number on which the frame has been received. The medium to listen can be configured into the "Others" tab of the acquisition configuration dialog box.
- **TxErr1**: this column is only displayed when using a mono or bi-medium repeater. The character "X" indicates a transmission error from the channel 1 of the repeater.
- **TxErr2**: this column is only displayed when using a bi-medium repeater. The character "X" indicates a transmission error from the channel 2 of the repeater.
- **Control and data**: this column contains acquired FIP frames. If the padding identifier has been defined (into "Others" tab of the acquisition configuration dialog box), the padding frames are interpreted and replaced by the "Padding" term. All other frames (and the padding ones if the identifier has not been configured) are formatted as following:
  - **Control name**: ID_DAT, RP_DAT, …
  - **(Data)**: for an ID_DAT frame the data field contains only the identifier. A column can display up to 259 characters, so to obtain the entire detail of a frame the user can double-click in the concerned line or press the "Enter" key. If a user data file has been loaded frame is interpreted according to this definition.
  - **CRC**: value of CRC read.

3.5.6. ERROR METERS

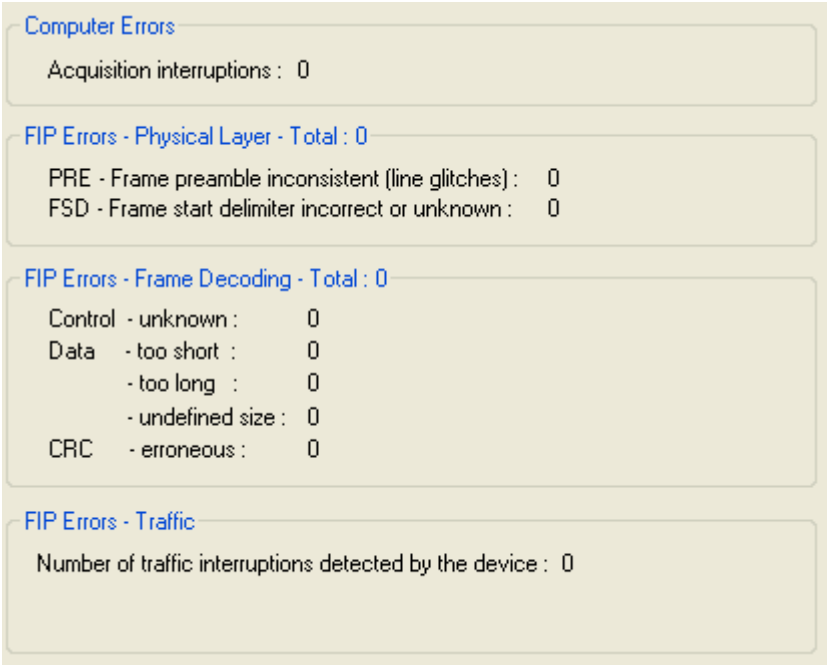


Figure 32: Error meters

This view (which can be hidden) displays the detected errors. It is divided into four groups:

- **“Computer Errors”:** contains the acquisition errors related to USB and / or acquisition computer.

  - **Acquisition interruptions:** this counter indicates the acquisition interruptions related to computer activity. To avoid this problem, do not run CPU-intensive parallel tasks, so avoid antivirus scans.

- **“FIP Errors - Physical Layer”:** contains frame detection errors. These errors are related to the physical layer (FIP/WorldFip) and are potentially frames missed by the card. Nevertheless, it often represents a noise detection on the line.

  - **PRE – Frame preamble inconsistent (line glitches):** device could not recognize frame preamble.
  - **FSD – Frame start delimiter incorrect or unknown:** device could not recognize the frame start delimiter.

- **“FIP Errors – Frame Decoding”:** contains frame decoding errors.

  - **Unknown control**: the first byte of the frame does not correspond to any FIP control byte.
  - **Too short**: this counter is increased by increments when the length of an acquired frame is less than the minimum awaited length according to the FIP control byte.
  - **Too long**: this counter is increased by increments when the length of an acquired frame is greater than the maximum awaited length according to the FIP control byte.
  - **Undefined size**: this counter is increased by increments when the length of the data field of a RP_RQ1 or RP_RQ2 frame does not match with a value multiple to the size of an identifier.
  - **Erroneous CRC**: the CRC calculated from the data of acquired frame does not match with the read CRC.

- **“FIP Errors - Traffic”:** contains traffic interruptions and locates transmission errors according to the channel.

  - **Number of traffic interruptions detected by the device**: the device returns this error when its time counter recycles between two frames. In such a case the device is no more able to perform the dating with a ten microseconds accuracy. When the traffic restarts the absolute date associated is the one given by the computer.
  - **Number of transmission errors detected on channel 1**: this counter is displayed when using a mono or bi-medium repeater.
  - **Number of transmission errors detected on channel 2**: this counter is displayed when using a bi-medium repeater.

3.5.7. NETWORK CONFIGURATION

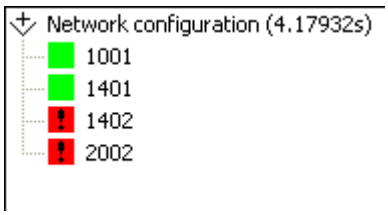


Figure 33: Network configuration

This view (which can be hidden) displays the list of the identifiers that are or have been broadcasted on the FIP network. According to the integration time defined (into "Views" tab of the displaying configuration dialog box) this tree gives broadcasting information about an identifier with different icons:

- "■": the green colour indicates that device producing this identifier (given next the icon) has been called by the bus arbitrator and has send out its response during the last integration time.
- "■": the red colour indicates that device producing this identifier (given next the icon) has been called by the bus arbitrator but has not send out its response during the last integration time.
- "■": the blue colour indicates that device producing this identifier (given next the icon) has not been called by the bus arbitrator during the last integration time but this identifier has already been broadcasted.
- "!": An exclamation mark is added to indicate that device producing this identifier (given next the icon) has been called by the bus arbitrator but has not send out its response at least once during the acquisition.

The refreshment of the tree will take at least some seconds in order to limit the hard disk accesses during acquisition.

The information about "network configuration" is never stored into the acquisition file. The user must replay the acquisition to obtain again this information at the next opening.

3.5.8. INSTANTANEOUS DATA RATE METERS AND CHART

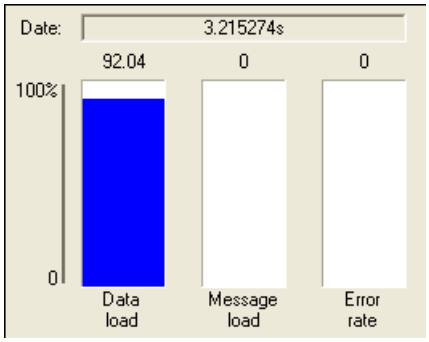


Figure 34: Instantaneous data rate meters

This view (which can be hidden) displays three instantaneous data rate meters:

- Data load (%) = Integration time minus the total time occupied by padding / Integration time.
- Message load (%) = Total time occupied by message frames / Integration time.
- Error rate (%) = Total time occupied by erroneous frames / Integration time.

The refreshment of the data rate meters will take at least some seconds in order to limit the hard disk accesses. The data rate meters only display the last current data rates. The data rates cannot be calculated if the padding is filtered at acquisition time. The integration time for the data rates can be defined into the "Views" tab of the displaying configuration dialog box.

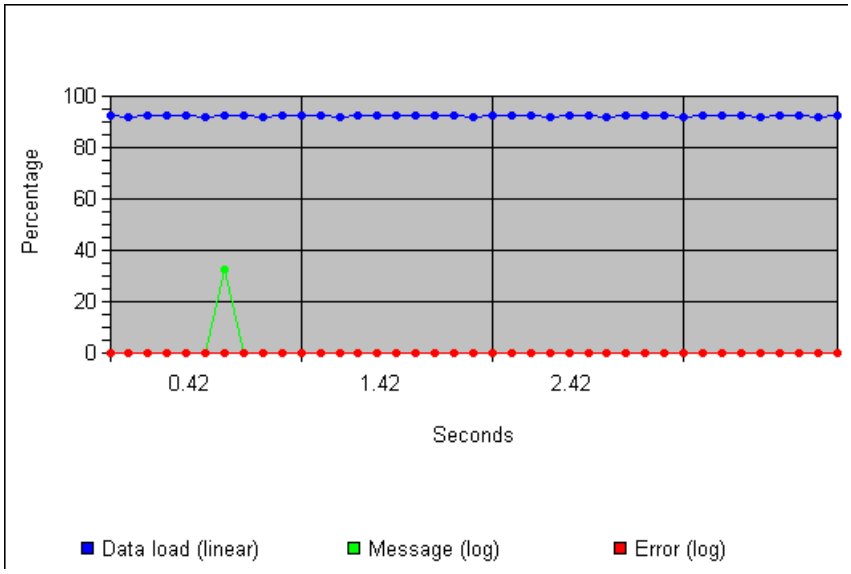


Figure 35: Instantaneous data rate chart

This view (which can be hidden) displays three plots of instantaneous data rates.

Warning: in order to render the variations of message load and error rate visible, the two associated plots use a logarithmic scale. But if the user puts the mouse cursor over the point to examine, a floating window indicates the date and the real value in percentage. The data load and the ordinate axis use a linear scale.

The number of displayed points is limited to hundred, but the number of stored points can be up to six thousand (see section 3.3.2.1 "Displaying configuration – Views tab"). To navigate into the chart, several shortcut keys are defined:

- **"Home" key**: used to display the first hundred points stored in memory.
- **"End" key**: used to display the last hundred points stored in memory.
- **"Page up" key**: used to display the hundred points preceding the displayed zone.
- **"Page down" key**: used to display the hundred points following the displayed zone.
- **"Left** or **up arrow" key**: used to stagger the display from one point towards the left.
- **"Right** or **down arrow" key**: used to stagger the display from one point towards the right.

During an acquisition, moving into the chart freezes it when the acquisition continues. When the displayed data rates are out of the storage a message is displayed above the chart to warn the user. In such a case, navigating towards previous data rates is impossible and navigating towards following values, even for only one point, the displayed values jump to the beginning of the current storage. Going back to the previously displayed data would be impossible.

The information about data rates is never stored into the acquisition file. The user must replay the acquisition to obtain again this information at the next opening.

In order to print the chart, use the contextual menu obtained by right-clicking into the chart.

3.6. HELP MENU

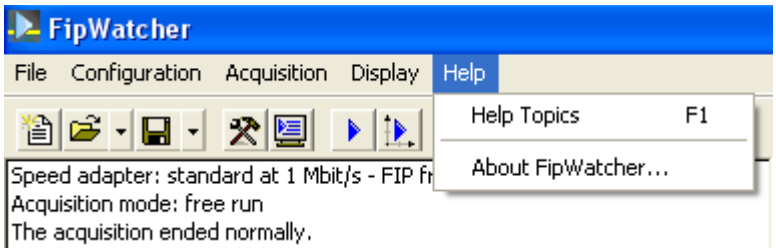


Figure 36: Help menu

3.6.1. HELP TOPICS

The "Help Topics" command gives access to the online help.

A contextual help is accessible by selecting the button  (the mouse cursor changes) and then by selecting the element for which help is wished.

3.6.2. ABOUT FIPWATCHER

This command (also accessible by the button ) displays a dialog box that indicates the versions of the used software and device driver.

3.7. INTEGRATION OF FIPIO/FIPWAY

Interpretation and filtering functions are integrated in version 7 of FipWatcher for frames in compliance with the standard FIPIO/FIPWAY.
New functions are available at acquisition level,at filtering level, at general and/or detailed display levels.
FIPIO is a fieldbus allowing intelligent sensors and actuators and simple control systems to communicate, with the aspect of real-time having priority.
FIPWAY operates at a higher level (cell level): all devices connected to the cell share, via the network, data controlled by an overall control system(program, parameters, control messages, ,,,).
FIPIO and FIPWAY conform to the WorldFip Standard and are properties of Schneider Electric.

3.7.1. FIPIO/FIPWAY AND FILTERING

The user can select filtering functions bound with the FIPIO/FIPWAY specifications.
Available functions are:

- Frames with specific cyclic identifiers like:
  - Variable "Presence of stations" (9002H)
  - Variable "Synchronisation of the bus arbitrator" (9003H)
  - Variable "Segment parameters" (9008H)
  - Variable ″ Padding ″ (9080H)
- Frames bound with the variable "Presence of a station" (1400H à 143FH)
- Frames bound with the variable "Identification of a station" (1000H à 103FH)
- Frames associated with common words exchanges.
- Frames associated with telegrams exchanges.
- Frames associated with UNI-TE requests.

The user can access these functions in the dialog box "Configuration of display" if he clicks the "Filtering" or "Events" tab and then "Add".
The dialog box "Definition of frames" (event or filtering) suggests then these functions in the top. The user selects functions and parameters and the corresponding bits fields are automatically generated

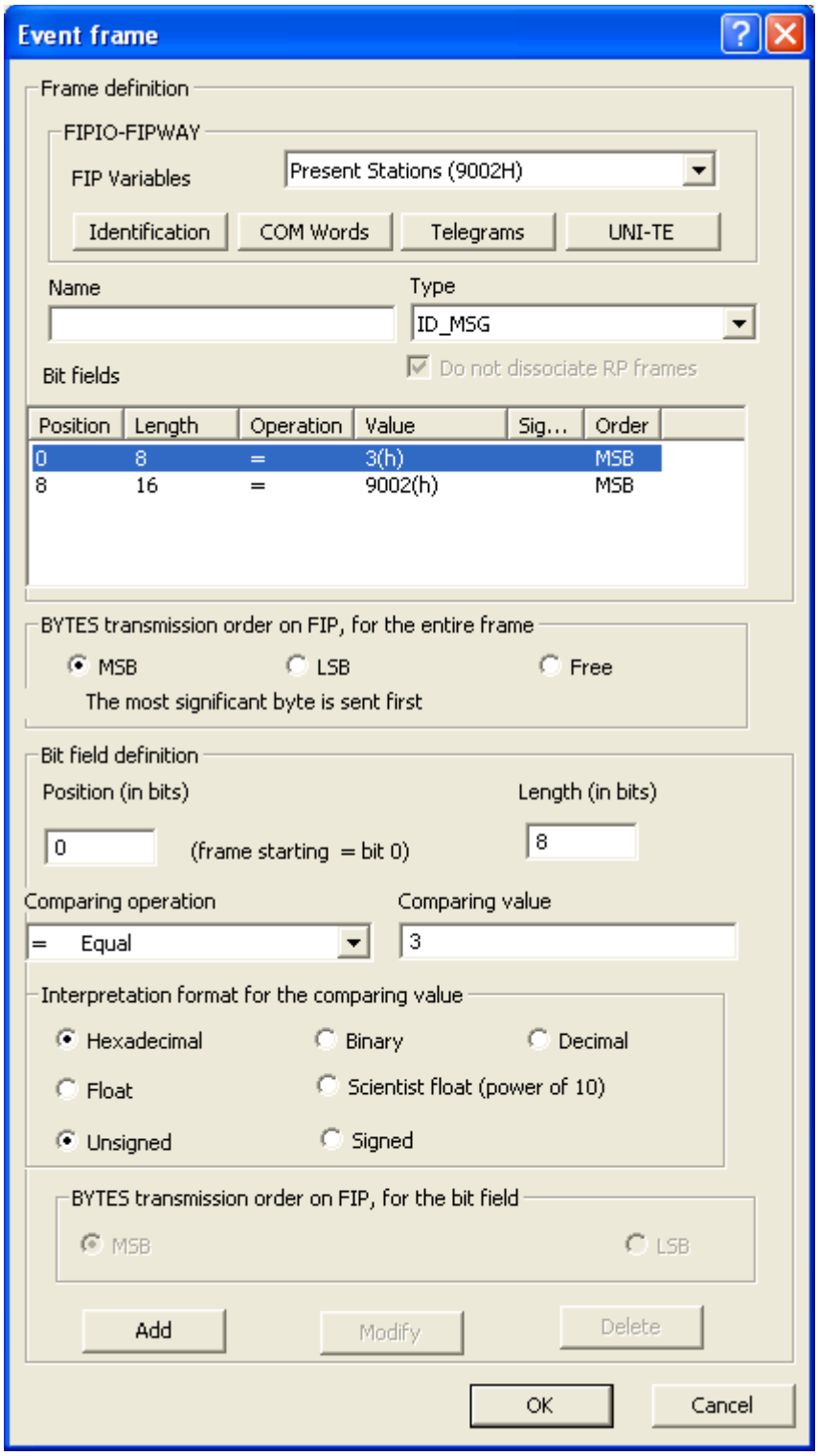


Figure 37 : Definition of " Filtering " or " Event " frames

3.7.1.1. *Frames with specific predefined identifiers*

Frames with predefined FIP identifiers are directly accessible via the top combo box and the corresponding bits fields are automatically generated
The predefined identifiers are:

- Variable "Presence of stations" (Identifier 9002H)
  This variable is generated and produced by the active bus arbitrator. It contains the list of the devices connected on the bus.
- Variable "Synchronisation of the bus arbitrator" (Identifier 9003H.)
  This variable is used to resynchronize the devices
- Variable "Segment Parameters" (Identifier 9008H)
  This variable is produced by the bus arbitrator in order to ensure consistency of the datalink protocol parameters.
- Variable "Padding" (Identifier 9080H)

The generated bit field for this kind of variable is like:

- Bits 0-7 ID_DAT
- Bits 8-15 Identifier

The concerned frames are ID_DAT(identifier) frames sent by the bus arbitrator and the corresponding RP_DAT answers.

3.7.1.2. *Frames associated with "Presence of a station" and "Identification of a station" variables*

This function allows to filter frames carrying information about the presence and identification variables.
To access these functions, the user must click the "Identification" button, and then he must check:one of the box:
-Identification or Presence
The user must too define a station.
If the user checks the box "Presence", the filtered frames are frames like ID_DAT(14XX) and the corresponding RP_DAT answers (XX is the station address).
If the user checks the box "Identification", the filtered frames are frames like ID_DAT(10XX) and the corresponding RP_DAT answers.(XX is the station address).

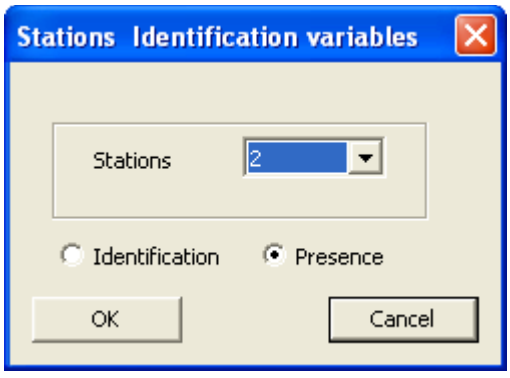


Figure 38 : Dialog box "Identification or presence variable selection"

-The Presence variable is produced by the device of address XX in reply to the bus arbitrator message ″ ID_DAT(14XX). It indicates logical connection to the bus.
The Identification variable is produced by the device of address XX in reply to the bus arbitrator message ID_DAT(10XX). It contains data relating to identification of the device.

3.7.1.3. Frames associated with common words

The COM service is used to exchange numeric data (common words) between devices forming part of the series 7 range.
The complete set of common words forms a database which is distributed among some or all of the devices connected on the same network.
For FIPWAY, the database comprises 128 word of 16 bits.
When the common words of a station have been updated by the CPU, they are broadcast on the network.
The exchanges of common words or COM words are exchanges of cyclic identifiers. A station with the physical address XX (from 0 to 1F) produces 4 COM words.
To access this function, the user must click the button "COM words", and then choice astation address in the dialog box.
The generated bits field:is like:

- Bits 0-7 ID_DAT
- Bits 8-15 Identifier 00XX where XX is the station address.

Filtered frames are frames like:
ID_DAT(00XX) sent by the bus arbitrator and the response RP_DAT from the station:
RP_DAT(40 09 MM MM MM MM MM MM MM MM SS)
MM MM is a COM word and SS is the status of transmission.

Figure 39 : Dialog box "Filtering frames associated with COM words of a station"

3.7.1.4. Frames associated with the exchange of telegrams

The exchanges of telegrams are processed on the FIPWAY network like cyclic messages exchanges.
A station with physical address XX (from 0 to 0FH) responds to one identifier frame like ID_DAT(0DXX) if it wants to send a telegram.
To access this function, the user must click the "Telegrams" button , this opens a dialog box suggesting as first option to choice a source station.
If the user selects this function, filtering is about all the ID_DAT(0DXX) frames and their responses.
The generated bit field is like:
- Bits 0-7 ID_DAT
- Bits 8-15 Identifier = 0DXX where XX is the station address.

If there is a response, exchange format is like:

- ID_MSG(0DXX)
- RP_MSG_ACK(09 -----series7 datagram).
- RP_ACK acknowledge frame from recipient station.
- RP_FIN end of transaction frame sent by the source to BA.

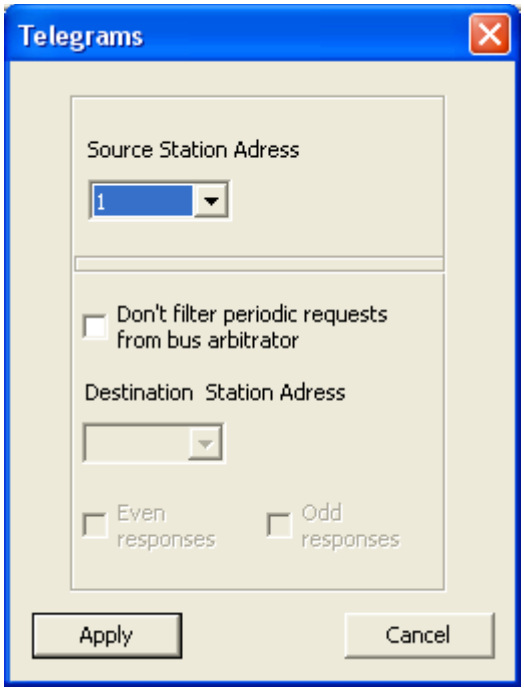


Figure 40 : Dialog box"Telegram Frame Definition"

If the user is only interested by the frame with the telegram, he must check the box ″ Do not filter the periodic requests from the bus arbitrator ″. The user must then define if the wants to process odd (RP_MSG_ACK_odd) or even frames.
He can too define the recipient station address.

Figure 41 : Dialog box "Telegram Frame Definition"

3.7.1.5. *Frames associated with the exchange of UNI-TE requests*

It is too possible to filter frames associated with UNI-TE exchanges.
UNI-TE is an industrial message handling system allowing communications by a question/answer mechanism called Request/Confirmation. UNI-TE is a CLIENT-SERVER system.
Requests and confirmations are exchanged by aperiodic message transfer with acknowledge.
The client device initiates communication. It asks a question, transmits data or send orders.
The server device executes the order requested by the client and send a confirmation after execution.
Bus arbitrator broadcasts cyclically the frame ID_DAT(00XX) to the station with physical address XX as it does with COM words but if the station wants to transmit a UNI-TE request, its response is a frame like RP_DAT_MSG instead of RP_DAT for a common word.
The standard UNI-TE list of requests (UNI-TE V2.0 version) is available in appendix.
The message transmission starts when the bus arbitrator operates its aperiodic scanning window, the sequence is the following one:

- ID_MSG(00XX) :the bus arbitrator allows the station with addresse XX to send its request.
- RP_MSG_ACK(09---series 7 datagram): response of station
- RP_ACK: frame of acknowledgement from the recipient station
- RP_FIN: end of transaction frame reported by the transmitter to the bus arbitrator.

The user can operate a filtering like **"Research by transmitting station"** and must for this check the corresponding box He must then specify the address of the source station and the generated bits field is like:
Bits 0-7: ID_MSG
Bits 8-15:identifier 00XX.
The filtered frames are like the four frames sequence described previously.

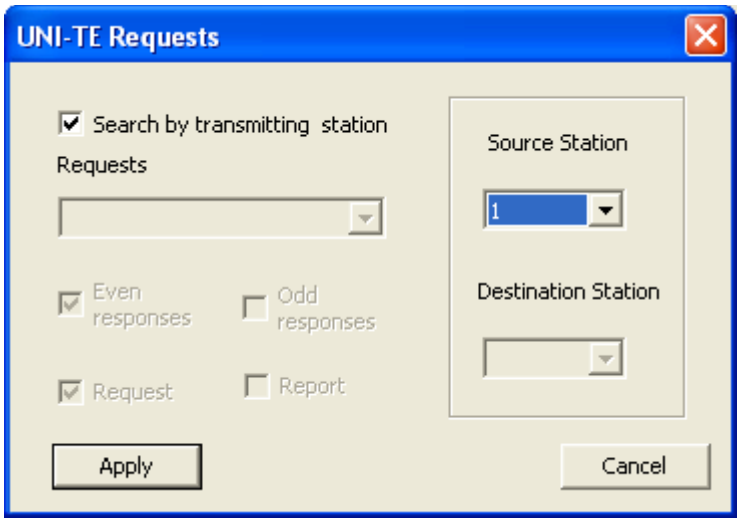


Figure 42 : Dialog box "UNI-TE Frame Definition"

The user can also operate a **filtering by type of request** (or report/confirmation). In that case, he must specify the operation name, the operation type (request or report) and the response type (even or odd). He can too specify the addresses of source and/or destination stations.

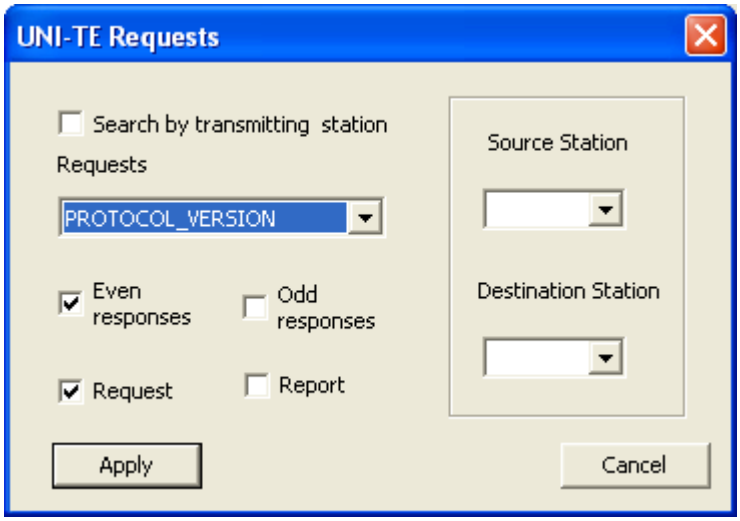


Figure 43 : Dialog box "UNI-TE Frame Definition"

In that case, the filtered frames are frames like RP_MSG_ACK transmitting the request (or the report).

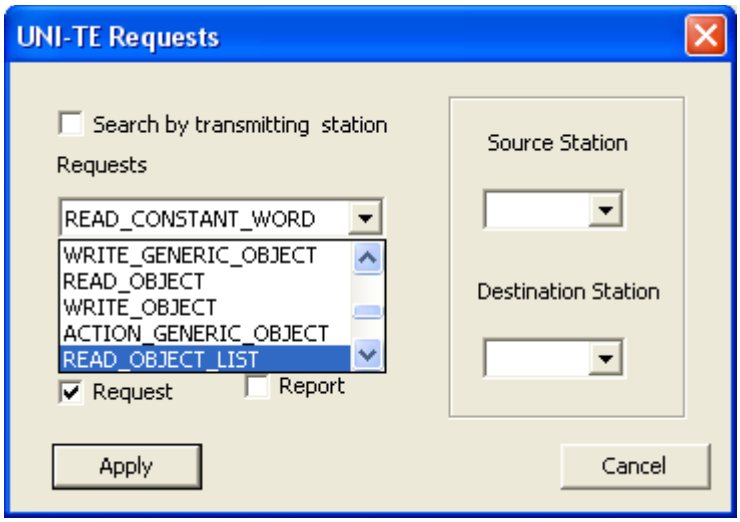


Figure 44 : UNI-TE requests list

3.7.2. FIPIO/FIPWAY AND ACQUISITION

At acquisition level, the user can ask for defining and even eliminating the padding frames for FipIO. They are the frames ID_DAT(9080).
So, 9080H is the padding identifier for FipIO.
For this, the user must click the tab ″ Others ″ in the dialog box ″ Configuration of acquisition ″ and check the appropriate boxes.
If the user wants only define the ID_DAT(9080) frames as padding frames, he must check the box ″Define FipIO padding frames ″ and if he wants to suppress then, he must too check the box ″Delete frames ″

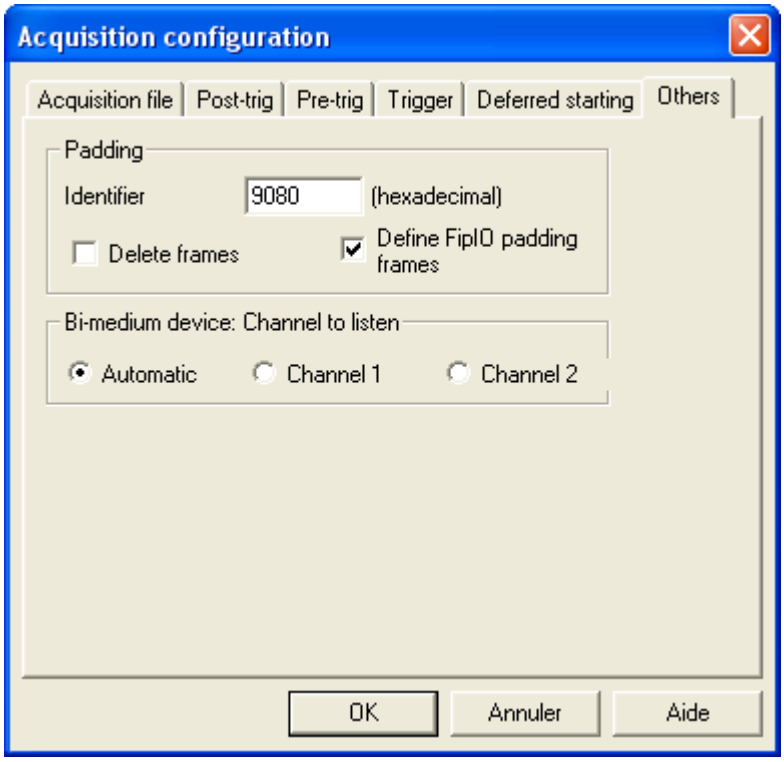


Figure 45 : Define the FipIO padding frames

To define the padding frames without eliminating them at the time of the acquisition allows to compute the data rate according to these padding frames in the views ″ Data rate chart ″ and ″ Data rate meters ″ and in the statistics too.
If the frames are suppressed, the computing is no more possible and this is indicated by the display and if no padding frame is defined, data rate will be 100%.

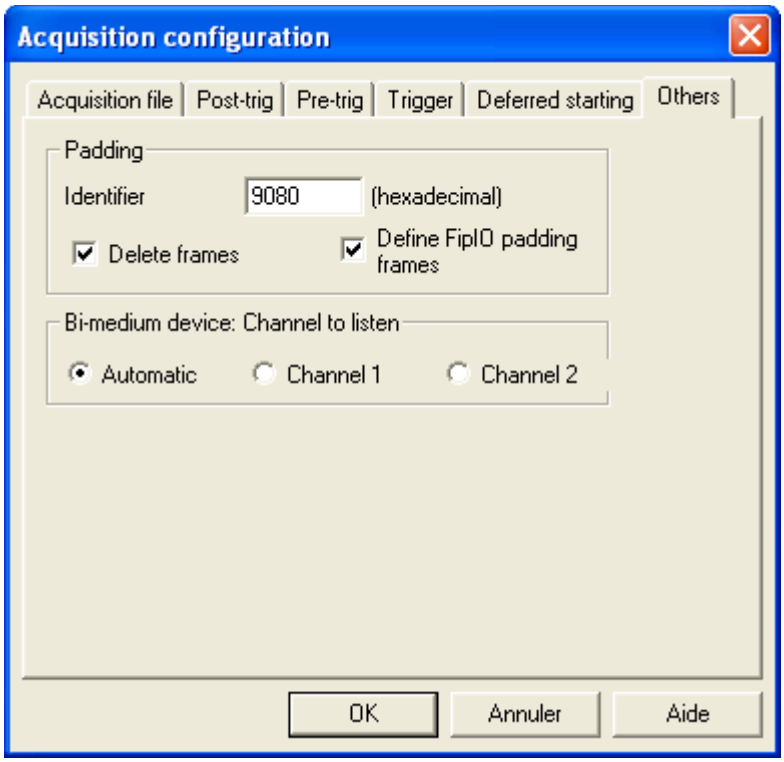


Figure 46 : Eliminate the FipIO padding frames

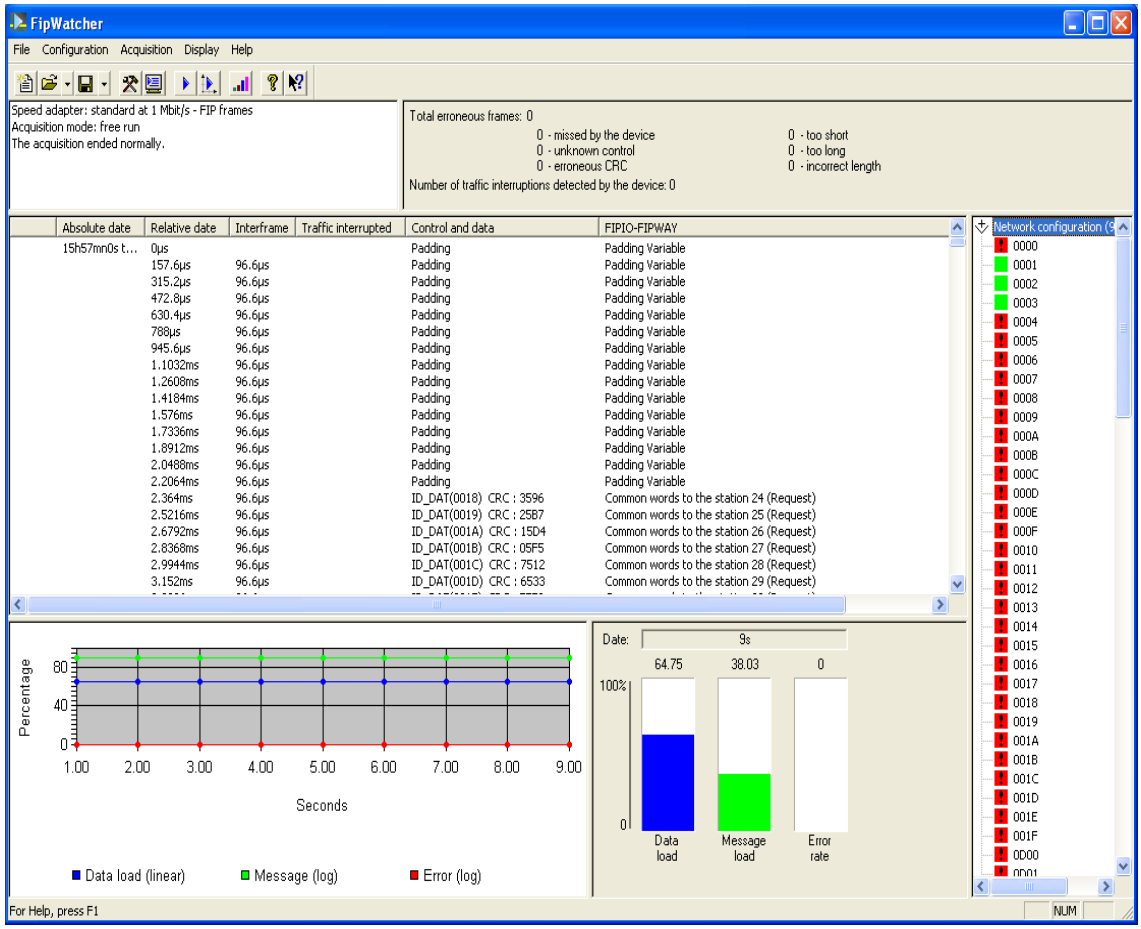


Figure 47 : Compute the data rate with defined FipIO padding frames.

3.7.3. FIPIO/FIPWAY AND GENERAL DISPLAY

At the display level, one column iin the main view is used to give information about the FipIO/FipWay frames interpretation.

Control and data	FIPIO-FIPWAY
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(9080) CRC : 2FCC	Padding Variable
ID_DAT(0018) CRC : 3596	Common words to the station 24 (Request)
ID_DAT(0019) CRC : 25B7	Common words to the station 25 (Request)
ID_DAT(001A) CRC : 15D4	Common words to the station 26 (Request)
ID_DAT(001B) CRC : 05F5	Common words to the station 27 (Request)
ID_DAT(001C) CRC : 7512	Common words to the station 28 (Request)
ID_DAT(001D) CRC : 6533	Common words to the station 29 (Request)
ID_DAT(001E) CRC : 5550	Common words to the station 30 (Request)
ID_DAT(001F) CRC : 4571	Common words to the station 31 (Request)
ID_DAT(9008) CRC : 3F4C	Segment Parameters Variable (Request)
RP_DAT_MSG(50 06 80 04 5A 00 ...	
ID_DAT(9002) CRC : 9E06	Check_Stations_Presence variable (Request)
RP_DAT(50 22 80 20 06 00 00 00 ...	Check_Stations_Presence variable (Answer)
ID_DAT(9003) CRC : 8E27	Bus Arbitrator Synchronisation Variable (Request)
RP_DAT(50 04 80 02 00 FF) CRC ...	Bus Arbitrator Synchronisation Variable (Answer)
ID_MSG(0D00) CRC : 6253	Telegram to the station 0 (Request)
ID_MSG(0D01) CRC : 7272	Telegram to the station 1 (Request)
RP_FIN() CRC : B73B	
ID_MSG(0D02) CRC : 4211	Telegram to the station 2 (Request)
RP_FIN() CRC : B73B	
ID_MSG(0D03) CRC : 5230	Telegram to the station 3 (Request)

Figure 48 :FipIO/FipWay display in main window

3.7.4. FIPIO/FIPWAY AND DETAILED DISPLAY

If the user clicks the mouse left button on a frame displayed in the main view, a popup window displays FipIO interpretation of the frame if it exists.
Bits fields are interpreted according to FipIO/FIPWAY specifications.

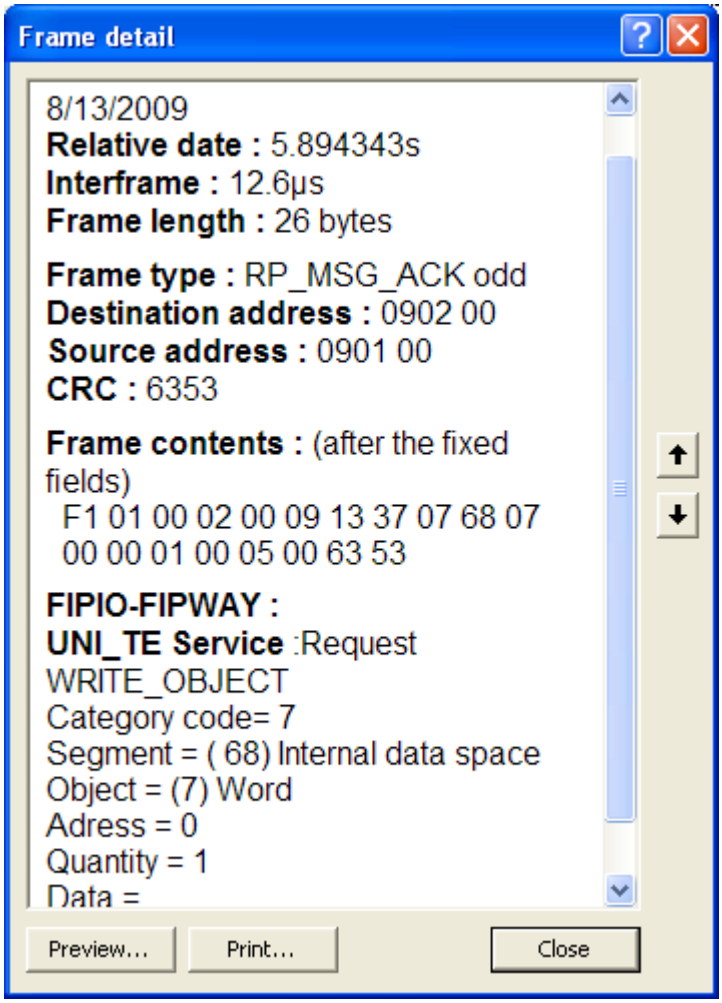


Figure 49 : Detail of a FipIO/0FipWay frame

4. ANNEX

4.1. FORMAT OF THE USER DATA FILE

The user data file is a ASCII file. It allows defining a bit field per line.

A comment line must begin with the characters "//".

Fields separator into a line is ";".

Values separator (into a field) is "!".

The hexadecimal values must be preceded by "0x" otherwise they will be interpreted as decimal values.

A line must contain eleven fields, so eleven ";".

☞ **Trick**: Using Excel, we can insert any character into the twelfth column in order to force the application to take into account all the columns (and so to save the file with all the ";"). On the other hand, we should insert nothing into this cell when the line is empty.

List of the fields for a line of the user data file:

- Mnemonic (up to 50 characters): user name associated to the bit field.

- Definition of header values for frame. This field can be set to four values:
  - "ID": in this case the identifier of an "ID_XXX" frame, displayed into the generalities part of the frame detail dialog box, will be replaced by the mnemonic defined in this line.
  - "DEST": in this case the destination address of the "RP_MSG_XXX" frame, displayed into the generalities part of the frame detail dialog box, will be replaced by the mnemonic defined in this line.
  - "SRC": in this case the source address of the "RP_MSG_XXX" frame, displayed into the generalities part of the frame detail dialog box, will be replaced by the mnemonic defined in this line.
  - Empty: when the line defines a bit field.

- Control byte (mandatory): the column is used to define the control byte of the frame to search. Several values can be defined, separated by "!".

- Identifier: This column is used to:
  - Define the identifier to display into the header of the corresponding frame detail
  - Or define the identifier to associate to the "RP_DAT_XXX" frame that contains the bit field to search.

  This column must contain only one identifier or be empty.

- Destination address: This column is used to:
  - Define the destination address to display into the header of the corresponding "RP_MSG_XXX" frame detail
  - Or to define the destination address of the "RP_MSG_XXX" frame that contains the bit field to search.

This column can contain two values: the identifier and/or the segment, separated by "!". In order to define only the segment, this one must follow a "!".

- Source address: This column is used to:
  - Define the source address to display into the header of the corresponding "RP_MSG_XXX" frame detail
  - Or define the source address of the "RP_MSG_XXX" frame that contains the bit field to search.

  This column can contain two values: the identifier and/or the segment, separated by "!". In order to define only the segment, this one must follow a "!".

- Position in bits: this column is used to define the position of the first broadcasted bit of the bit field to search. The position 0 corresponds to the control byte of the frame.

- Length in bits: this column is used to define the size of the bit field to interpret. The size of a numeric field can vary from 1 up to 64 bits for the formats: binary, hexadecimal, decimal, floating or scientific. For an alphanumeric field defined by the ASCII format, the length will vary from 8 up to 2048 and must be a multiple of 8 bits.

- Interpretation format: this column is used to define the interpretation format to display value of the bit field. The available values are:
  - "BIN": for binary.
  - "HEXA": for hexadecimal. This value is used as default when this column is empty.
  - "DEC": for decimal.
  - "FLT": for float, of 32 or 64 bits.
  - "SCT": for float, of 32 or 64 bits displayed with scientist notation.
  - "ASCII" : for string displayed in ASCII.

- Sign: this column is used to define if the value to parse is signed or not. The available values are:
  - "S": for signed.
  - "NS": for unsigned. This value is used as default when this column is empty.

- Transmission order on FIP: this column is used to define the transmission order of the bytes for values with a size greater than one byte. Available values are:
  - "MSB": when most significant byte is broadcasted first in the frame. This value is used as default when this column is empty.
  - "LSB": when less significant byte is broadcasted first in the frame.

☞ **Warning**: frames and bit fields must be ordered.

The definition order defines the search order into these frames for an acquired frame. For instance, if the user defines two RP_DAT frames: frame A associated to identifier 0x200 and frame B associated to none identifier. If A is defined before B, the acquired frame associated to the identifier 0x200 will be interpreted according to the format of A. On the other hand, if B is defined before A, the same acquired frame will be interpreted according to the format of B.

When defining a frame the bit fields must be sorted according to their position (note that several bit fields can begin at the same position). If a bit field A is defined at the position 120 and then a bit field is defined at the position 32, the bit field B will never be displayed.

4.2. EXAMPLE OF A USER DATA FILE AND ASSOCIATED RESULTS

//Mnemonic up to 50 characters	Definition of header fields: ID, DEST, SRC	Control bytes: separator !	Value of the identifier to display ot to associate	Value the destin (RP_) to displ							
// Padding definition											
Padding	ID	0x03	0x7530								

Figure 50: Example of user data file (edited with Excel)

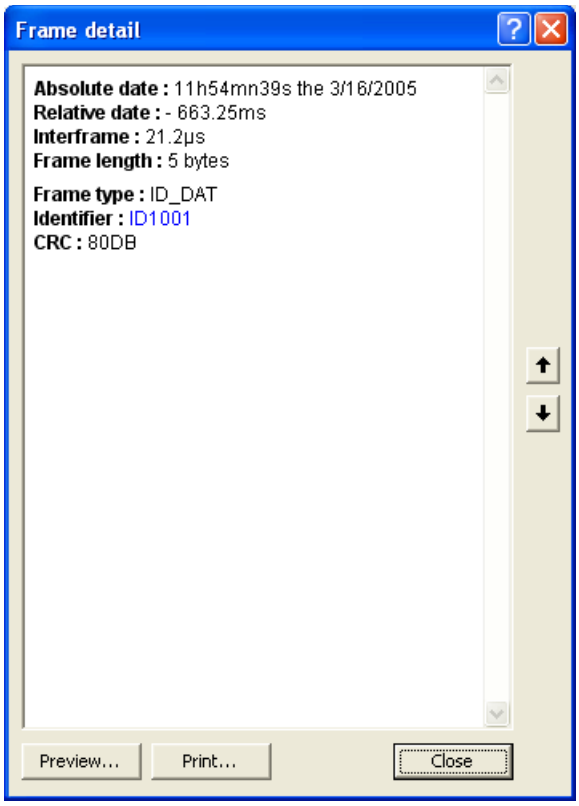


Figure 51: Result of the detail of an "ID_DAT" frame according to the example file

The value of the identifier has been replaced by the mnemonic defined by the user data file.
We can notice that frame content is not detailed because an ID_DAT frame contains only an identifier. Meanwhile, it is possible to define bit fields that overlap the "fixed" fields like control, identifier and CRC of the frame. In such a case, the detailed content of the frame should be displayed into a third part in this dialog box.

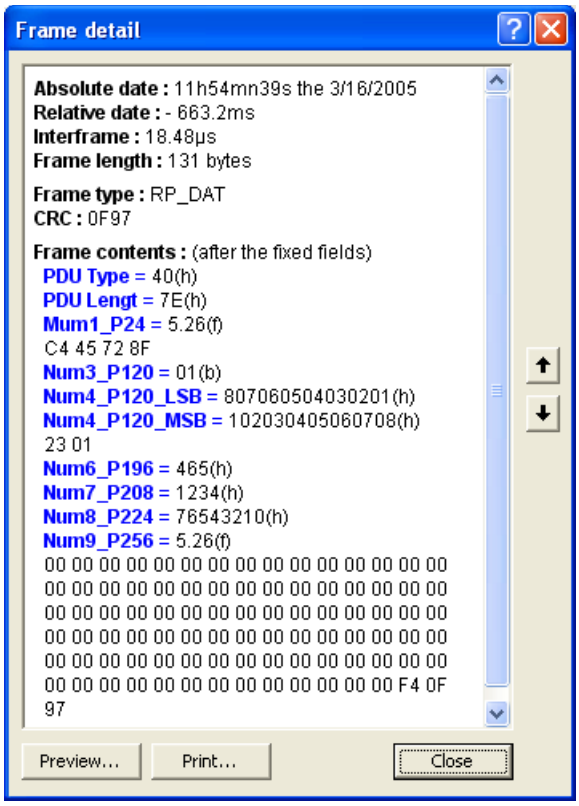


Figure 52: Result of the detail of an "RP_DAT" frame according to the example file

For a RP_DAT_XXX frame, the only field considered as fixed is the control byte. The frame content is displayed before the fixed fields because the bit fields defined by the user data file do not overlap the control byte.

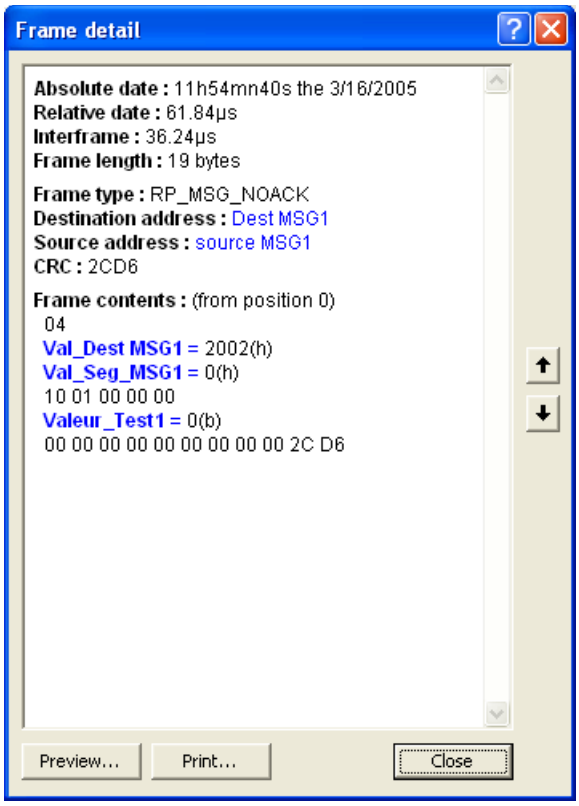


Figure 53: Result of the detail of an "RP_MSG" frame according to the example file

For a RP_MSG_XXX frame, fields considered as fixed are the control byte and the destination and source addresses. Because the bit fields defined by user data file do overlap these fixed fields, the frame content is displayed since the position zero.

4.3. TABLE OF ERROR AND INFORMATION MESSAGES

List of the error (E) and information (I) messages that can be displayed by the application:

Type	Text	Context	Cause	Fix
I	FipWatcher is not or badly installed.	This message will be displayed each time the software will start, but it would not prevent its use.	The software is launched when it is badly installed.	Re-install the software.
E	Acquisition impossible: the driver is already busy.	Displayed when an acquisition starts.	Another FipWatcher is already launched.	Keep only one FipWatcher opened.
			The previous acquisition has aborted (for example the software has crashed during an acquisition) and it could not stop the driver.	Unplug the USB device and then plug in it again.
E	Unable to open the driver.	Displayed when an acquisition starts. This message can contain an supplemental explanation.	The driver (and so the device) is not installed.	Check that the driver is correctly installed (from the device properties window).
				Re-install the device.
			The device is not plugged.	Plug in the device.
			The device is badly plugged.	Correctly plug in the device.
E	Error to start the driver: A parameter is incorrect.	Displayed when an acquisition starts.	If a triggered acquisition has been started, maybe the trigger frames are not correctly defined.	Check the definition of the trigger frames.
			If the device or the software has recently been re-installed, maybe the versions of the driver and of the application does not match.	Re-install the element not previously re-installed or the whole product.
E	Error to start the driver: The acquisition file is invalid.	Displayed when an acquisition starts.	The name or path defined for the acquisition storage file is not right.	Define another path for the acquisition storage file (from the acquisition configuration dialog box).
E	Error to start the driver: Device not managed.	Displayed when an acquisition starts.	The USB device plugged is not managed by the version of the installed driver.	Use the device sold with the version of the installed driver or contact your reseller.
E	Error to start the driver.	Displayed when an acquisition starts.		
E	Error during driver stop.	Displayed when an acquisition ends. The acquisition has been well performed and it is usable, but it may be impossible to start another acquisition (then see errors at acquisition starting).		
E	Not enough free space on drive … to create the acquisition file. Please, choose another drive or enter another size.	Displayed when an acquisition starts.	The drive defines for the acquisition file path has not enough free space to allow a file creation.	Define another path for the acquisition file (from the acquisition configuration dialog box).
				Define another size for the acquisition file (from the acquisition configuration dialog box).
E	The selected directory is not valid. Please, choose another one.	Displayed when an acquisition starts.		Define another path for the acquisition file (from the acquisition configuration dialog box).
E	Unable to create the directory. Please choose another one.	Displayed when defining the path of the acquisition file or when an acquisition starts.	The application has encountered an error when creating the directory for the acquisition storage file.	Define another path for the acquisition file (from the acquisition configuration dialog box).
E	The acquisition file path or	Displayed when defining	The path or the filename	Define another path or

	name is not valid. Please, enter another one.	the path of the acquisition file or when an acquisition starts.	defined is not correct or not complete.	name for the acquisition file (from the acquisition configuration dialog box).
E	The acquisition filename cannot be incremented. Please enter another one.	Displayed when an acquisition starts.	The application has encountered an error when increasing by increments the name of the acquisition file.	Define another path or name for the acquisition file (from the acquisition configuration dialog box).

E	Driver error during acquisition.	Displayed during an acquisition. Causes the end of the acquisition.	The driver does not get the data from the device fast enough.	Stop all other application that is running and restart another acquisition.
				Unplug the computer from the Ethernet network and restart another acquisition.
				Change your computer to use one with enhanced performance.
			The computer hibernates.	Disable the system hibernate support (from the power properties from the control panel and by plugging the computer to the sector) and restart an acquisition.
E	Driver error during acquisition (not enough resources).	Displayed during an acquisition. Causes the end of the acquisition.	The driver has not enough resources to properly run.	Change your computer to use a higher performance one.
			The device has been unplugged.	Plug in the device again and restart another acquisition.
E	Driver error during acquisition (error accessing the acquisition file).	Displayed during an acquisition. Causes the end of the acquisition.	The driver has encountered an error when accessing the acquisition file.	
E	Error accessing the acquisition file.	Displayed during an acquisition. Causes the end of the acquisition and the end of its analysis. This message can contain a supplemental explanation.	The application has encountered an error when accessing the acquisition file.	
E	Error getting information about the acquisition.	Displayed during an acquisition. Causes the end of the acquisition and the end of its analysis. This message can contain a supplemental explanation.	The driver did not respond to the requests from the application.	
I	The frames list view is full.	Displayed during an acquisition, into the view that displays messages about the acquisition status.	The view displaying acquired frames is full. Last frames are not visible,nevertheless they are analysed.	None.

I	WordPad cannot be opened. Please open the … file with a word processing software.	Displayed when exporting acquisition data to a text file with WordPad launching requested.	The application has encountered an error when launching the WordPad application.	Manually open the generated file with a word processing software.
I	Excel cannot be opened. Please open the … file with a spreadsheet.	Displayed when exporting acquisition data to a text file with Excel launching requested.	The application has encountered an error when launching the Excel application.	Manually open the generated file with a spreadsheet.
E	Unable to create the text file.	Displayed when exporting acquisition data to a text file.	The application has encountered an error when creating the text file. The file has not been created.	Check the permissions of the targeted directory.
				Start a new exportation with another name and/or path of the file to generate.

E	Error opening the acquisition file.	Displayed when opening an existing acquisition or when saving the opened acquisition. The requested operation has not been performed.	The application cannot accede to the acquisition file.	Check the permissions of the targeted directory or file.

E	Acquisition file invalid.	Displayed when opening an existing acquisition.	The file selected by the user is not supported by the application because it has not been generated by FipWatcher or it has been generated by a previous version.	
I	No configuration data in acquisition file.	Displayed when opening an existing acquisition. Do not prevent the acquisition opening.	The acquisition file does not contain the acquisition configuration.	
E	Error copying the acquisition file.	Displayed when saving the opened acquisition. The operation has not been performed.	The application has encountered an error when copying the acquisition file.	Start a new saving with another name and/or path of the file to generate.

E	Insufficient memory space.	Can be displayed at anytime.	The application has not enough memory space to perform the requested operation.	Stop all other application that is running and restart the operation.
				Change your computer to use one with enhanced performance .

E	Error creating the configuration file.	Displayed when saving the current configuration.	The application has encountered an error when creating the configuration file. The file has not been created or modified.	Check the permissions of the targeted directory.
				Start a new saving with another name and/or path of the file to generate.
E	Error opening the configuration file.	Displayed when opening an existing configuration file.	The application cannot access to the configuration file.	Check the permissions of the targeted directory or file.
E	Configuration file invalid.	Displayed when opening an existing configuration file.	The file selected by the user is not supported by the application because it has not been generated by FipWatcher or it has been generated by a previous version.	

E	Error initialising frame detail dialog box: Impossible to define a temporary file.	Displayed when opening the frame detail dialog box.	The application has encountered an error when defining the name of the temporary detail file.	Check the permissions of the directory where FipWatcher is installed.
E	Error formatting frame detail: Impossible to create a temporary file.	Displayed when opening the frame detail dialog box.	The application has encountered an error when creating the temporary detail file.	Check the permissions of the directory where FipWatcher is installed.
				Avoid navigating too quickly between the frames.

E	Error opening the user data file	Displayed when opening a user data file.	The application cannot access to the selected file.	Check that the file is not currently in use.
				Check the permissions of the targeted directory or file.
E	Invalid user data file (line …)	Displayed when opening a user data file. The data are not loaded.	The application has encountered an error into the definition of the user data.	Check the content of the file, mainly for the line whose number is indicated by the error message.

4.3.1. LIST OF UNI-TE REQUESTS

RQ = Request
CR = Report

Type	Name of request	Code RQ	Code CR
General use	IDENTIFICATION	0F	3F
General use	READ_CPU	4F	7F
General use	PROTOCOL_VERSION	30	60
General use	MIRROR	FA	FB
Standard objects	READ_INTERNAL_BIT	00	30
Standard objects	WRITE_INTERNAL_BIT	10	FE
Standard objects	READ_SYSTEM_BIT	01	31
Standard objects	WRITE_SYSTEM_BIT	11	FE
Standard objects	READ_INTERNAL_WORD	04	34
Standard objects	WRITE_INTERNAL_WORD	14	FE
Standard objects	READ_SYSTEM_WORD	06	36
Standard objects	WRITE_SYSTEM_WORD	15	FE
Standard objects	READ_CONSTANT_WORD	05	35
Standard objects	FORCE_INTERNAL_BIT	1B	FE
Standard objects	READ_GRAFCET_BIT	2A	5A
I/O modules	READ_DIGITAL_MODULE_IMAGE	49	79
I/O modules	WRITE_DIGITAL_MODULE_IMAGE	4A	7A
I/O modules	READ_STATUS_MODULE	44	74
I/O modules	READ_IO_CHANNEL	43	73
I/O modules	WRITE_IO_CHANNEL	48	78
Generic objects	READ_GENERIC_OBJECT	82	B2
Generic objects	WRITE_GENERIC_OBJECT	83	B3
Generic objects	READ_OBJECT	36	66
Generic objects	WRITE _OBJECT	37	FE

Generic objects	ACTION_GENERIC_OBJECT	9F	CF
List of objects	READ_OBJECT_LIST	38	68
List of objects	WRITE_OBJECT_LIST	39	69
Operating mode	RUN	24	FE
Operating mode	STOP	25	FE
Operating mode	INIT	33	63
Data transfer	OPEN_DOWNLOAD	3A	6A
Data transfer	WRITE_DOWNLOAD	3B	6B
Data transfer	CLOSE_DOWNLOAD	3C	6C
Data transfer	OPEN_UPLOAD	3D	6D
Data transfer	READ_UPLOAD	3E	6E
Data transfer	CLOSE_UPLOAD	3F	6F
Data transfer	BACKUP	45	75
Semaphore	RESERVE	1D	FE
Semaphore	RELEASE	1E	FE
Semaphore	I_AM_ALIVE	2D	FE