

SVScout

User Manual



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1 General

1.1 Purpose

SVScout is a tool for receiving, processing, viewing and saving Sampled Values according to the implementation guideline of the UCA International Users Group [1] and the recommended DataSets in the IEC 61869-9 standard.

1.2 Concepts

SVScout obtains data packets from one or multiple Sampled Values sources.

When capturing is started, data are processed and displayed.

The recording of Sampled Values can be started when capturing is active.

1.3 Using SVScout with a special network adapter

OMICRON offers a special network adapter that works with SVScout as part of a product version or as an upgrade. This special network adapter delivers highly accurate timestamps with errors below one μs . The timing analysis functions presented in the histograms will only contain valid data when the data are acquired with this special network adapter.

If you are using the special network adapter, new icons will be added to the SVScout toolbar (see section 3).

1.4 System requirements

Operating systems

SVScout supports the following operating systems:

- Microsoft Windows 7 (32-bit and 64-bit version)
- Microsoft Windows 8.1
- Microsoft Windows 10

Computer hardware

Some specifications of a recommended minimal configuration are:

- Dual Core processor with 2 GHz
- 2 GB RAM
- Ethernet interface, 100 Mbit/s
- USB port
- 200 MB free hard disk space (for the installation process)
- PCI-Express slot, x8 or x16 (only needed for special network adapter)

These specifications are just a rough hint. The actual performance of a computer depends on many factors (installed hardware and software, running processes, performance of individual hardware components, etc.) that are beyond our control. It is not guaranteed that SVScout will run properly under all circumstances on a system as described above. Since Microsoft Windows is no real-time operating system, packet loss is possible when using a normal network adapter (especially in case of higher sample rates).

1.5 Licensing

SVScout is licensed with a USB license key. You can install SVScout on as many computers as you desire, but you can only execute the software on the computer to which the license key is assigned to. You cannot start SVScout without a license key.

When you remove the license key from the computer, SVScout will stop working.

1.6 Installation of the software

SVScout is delivered as a self-installing software package.

Launch the installation process and follow the instructions.

When installing SVScout, drivers for the license key and other infrastructure components that are required by SVScout are installed as well. Depending on the overall setup, the WinPcap installation (which should be performed with default settings) might be started too.



1.7 Installation of the special network adapter

The special network adapter is connected to a PCI Express slot. The installation of the network adapter, the specific hardware options, and the software drivers are described in separate manuals. Information on the installation of the network adapter and driver can be found on the installation medium.

For measuring the time offsets of packets, a time signal must be supplied to the connector at the network adapter.

2 Menu

The menu bar comprises four sections. Most of the functions in the menus can be found on the toolbar as well.

File

This menu gives you access to the configuration dialog and to the saving and loading configurations. You can close *SVScout* via Exit.

View

In this menu, you can select the same views as in the toolbar.

For more information, see the explanation of the toolbar functions in the section below.

Actions

In this menu, you can select the same actions as in the toolbar.

For more information, see the explanation of the toolbar functions in the section below.

Help

Information on the *SVScout* version is provided.

Additionally, you can access this user manual.

3 Toolbar

The toolbar comprises buttons/icons for accessing the configuration, displaying and hiding views, and performing the actions.

Configuration

Opens the configuration dialog.

The functions are explained in detail in section 4.

I-Pane

Shows or hides the time signal view and the display settings for the current traces.

V-Pane

Shows or hides the time signal view and the display settings for the voltage traces.

Cursors

Shows or hides the display of the cursors details and difference calculation.

Detail view

Shows or hides the detail view.

Phasor diagram

Shows or hides the phasor diagram.

Errors

Shows or hides the list of errors.

If a file for the application log is specified, the error messages will be logged to this file as well.

Timing analysis

Shows or hides the results of the timing analysis.

Test report

Shows the report and offers the possibility to print it.

**Start capture**

Starts the reception of Sampled Values as well as the processing and display of the data.

Stop capture

Stops the reception of Sampled Values as well as the processing and display of the data.

Start recording

Starts the recording of Sampled Values. This function is only available when capture has been started.

Stop recording

Stops the recording of Sampled Values manually.

Open last record

Opens the COMTRADE viewer (e.g. OMICRON TransView) associated with COMTRADE files or the packet capture program associated with PCAP files (e.g. Wireshark®).

PPS monitoring

Starts the synchronization of the special network adapter with an external PPS signal. The synchronization was successful when ClockSkew is below 100 ns.

PTP monitoring

Starts the synchronization of the special network adapter with an external PTP master clock. The special network adapter works like a PTP slave device. To adjust the PTP slave settings of the special network adapter according to your needs, it is necessary to change the configuration file **NT4E2.ini** stored at **C:\Program Files\OMICRON\SVScout\config** and to restart NTSservice. The synchronization was successful when PTP is selected as current reference in the PTP monitoring tool.

When the special network adapter supports both PPS and PTP synchronization methods, PPS has priority over PTP.

4 Configuration

The configuration of the various features of *SVScout* is done in different tabs, each dedicated to a certain set of features.

4.1 Network

Sampled Values source

Sampled Values can come from a network interface or from a capture file.

The available network interfaces are offered via a drop-down list.

Some network adapters need to be switched to promiscuous mode for receiving Sampled Values.

ET2000 Timestamps are only used with special hardware for debugging purposes. This setting is not intended for the regular user and should be left unselected.

The capture file from which data packets are read must be in PCAP format. With the special network adapter it is possible to physically inject all packets from the capture file via a selected port of the special network adapter. Port 3 is located close to the external time synchronization connector. Port numbers decrease by one as you move away from port 3. The packets are injected using the relative times between packets taken from the capture file.

Streams

The Sampled Values streams in the list will be processed by *SVScout*.

The entries work as filters for the received data and also apply when the source is a capture file.

The Find stream function sniffs the network or the capture file and offers detected Sampled Values streams to add them to the list.



4.2 Application

Application settings

The configured Sampled Values variant must match the one of the Sampled Values streams.

SV unit conversion

The conversion factors are used to calculate the physical primary currents and voltages from the raw numbers. The default values per LSB correspond to the values defined in the implementation guideline [1].

Application log

If a file name is specified, error messages and other messages from the application will be logged to this file. If no file name is specified, logging is disabled. This is intended for debugging purposes. Do not use this feature unless you have been instructed to do so by OMICRON's technical support.

4.3 Recording

An automatically incrementing index (000, 001, ...) is appended to the base file name when saving records. The records will be saved in the specified directory.

Recording stops without user interaction when the maximum recording time is reached.

When Auto Start is selected, recording starts as soon as capturing is started.

File format

Recordings can be saved in COMTRADE or PCAP format.

When recording to COMTRADE files, the SV streams can be recorded to individual files or can be merged into one file. In order to merge the SV streams, they need to be synchronized.

When recording to PCAP files, either all packets or only the Sampled Values packets can be saved.

4.4 Report

A custom header text can be specified and formatted with HTML tags. This header is printed at the top of the report.

A specified logo image (*.jpg, *.gif, *.png, *.bmp) will be displayed in the upper right corner of each page.

The selected font applies to the whole text in the report.

4.5 Histograms

Packet delay histogram

The measured packet delays (time intervals between the Sample Values packets) will be sorted into the specified number of bins within the specified range.

The hit ratio specifies the percentage of the measured packet delays that will be in the calculated hit range. For an explanation of how the ratio is used in measurement results, see section 9.

Time offset histogram

The measured time offsets from the theoretical sampling time to the reception of the corresponding packet will be sorted into the specified number of bins.

The hit ratio specifies the percentage of the measured offsets that will be in the calculated hit range. For an explanation of how the ratio is used in measurement results, see section 9.

4.6 Expert

Zero crossing detection

SVScout searches for zero crossings in the specified range around sample count zero. Zero crossings outside this range are not detected.

You can select one out of three different interpolation methods for determining the zero crossings. The first detected zero crossing within the range is shown.

The Detail View shows the specified number of samples around sample count zero.



5 Main window

The main application window shows the time signal views (oscilloscope display) of the current and voltage traces and related controls to determine which values are displayed and how they are displayed.

On top of the time signal views, cursor details are shown. The two cursors can be assigned to different traces, also from different Sampled Values streams.

The I-Panes and V-Panes hold the indicators and setting for displaying the traces.

Appropriate units (mA, A, kA, mV, V, kV) can be selected according to the range of the values.

The zoom of the vertical axis is controlled by a set of buttons (zoom in, fit, zoom out).

The information below this is grouped and repeated for each Sampled Values stream, headed by its stream identification (SvID).

A green indicator flashes when measurements are taken and the display is updated.

An Errors counter shows the number of occurred errors in red figures. The corresponding messages are listed in the Errors window.

Other settings control the displayed traces, the colors of the traces, and the displayed markers.

The zoom of the horizontal axis is controlled by a set of buttons (zoom in, center, zoom out) below the time signal view. When selecting center, the display will be realigned with sample count zero in the center.

6 Detail view

This view provides detailed information about a selected Samples Values stream and about the individual channels in this stream.

The Synchronization status refers to the Sampled Values source, typically a merging unit.

Zero crossing

The calculated zero crossing time for detected zero crossings is displayed. The detection range and the calculation method to be used are defined in the Expert configuration (4.6).

When no values are shown, there is no zero crossing in the specified range.

Time offset

The Time Offset is the time from the top of the second to the reception of the packet with sample count zero. "Last" means the most recent measured value. This measurement works only with the special network adapter.

Sampled Values

For each channel, the values for the specified range of sample counts are displayed in the list.

When you select Show displayed range, the values listed are taken from the range around the center of the time signal view. Otherwise, the values listed are taken from the range around sample count zero.

Values at cursors

The values of the individual channels at the cursors are displayed together with the calculated differences.

Quality bits

For the selected channel, the decoded quality bits are displayed together with their semantics.

7 Phasor diagram

The Phasor Diagram shows the phasors for the currents and voltages from one Sampled Values stream.

The phasors are calculated from the instantaneous values. The displayed data are only correct if the signals have nominal frequency; the errors at non-nominal frequencies are not specified.

A phase reference can be selected. Absolute phase means that the reference is a sinewave with phase zero at sample count zero. The phasors can also be displayed relative to IA or VA.



8 Errors

This window displays a list of messages for the selected Sampled Values stream. Only the ten most recent errors are shown.

9 Timing analysis

This window displays a set of histograms for the selected Sampled Values stream.

The histograms will only show useful results if *SVScout* is used with the special network adapter. This special network adapter delivers highly accurate time tags for the received packets with an error well below one μs . When obtained with a standard network interface, the time tags are not accurate enough for a useful evaluation and "N/A" will be shown.

Packet delay

The frequency of occurrence of the measured packet delays (time intervals between the Sample Values packets) within the time intervals is displayed.

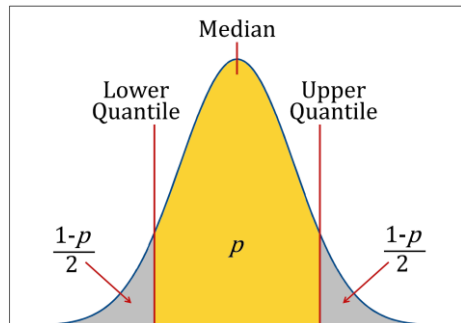
The hit range is described by its lower and upper quantile. This is the time interval that includes the specified hit ratio of the measured packet delays. For an explanation of how hit range and hit ratio relate, see below.

Time offset

The frequency of occurrence of the measured time offsets (time intervals from the theoretical sampling time to the reception of the corresponding packet) within the time intervals is displayed.

The hit range is described by its lower and upper quantile. This is the time interval that includes the specified hit ratio of the measured offsets. For an explanation how hit range and hit ratio relate, see below.

Definition of hit ratio and hit range



The hit ratio as given in the settings (see 4.5) corresponds to the value p ($= \text{hit ratio}/100\%$).

The total area below the curve contains all measurements, and the area shall be 1 ($= 100\%$).

The upper and lower quantile delimit the hit range. The area of the hit range has the value p and corresponds to a share of the total measurements according to the *hit ratio*.

Note that if a distribution is not as idealized and symmetrical as in the figure, the median will not be in the exact middle between the lower and upper quantiles.

10 Report

The report summarizes the essential information of a measurement.

First, some general data, basic settings from the configuration, and stream information are listed.

Next, all the information and results provided in the individual views are included for each captured Sampled Values stream:

- Errors
- Detail View
- Phasor Diagram
- Timing Analysis

Printing can be initiated directly from the report window.

References

- [1] UCA International Users Group: Implementation Guideline For Digital Interface to Instrument Transformers Using IEC 61850-9-2



Support

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