

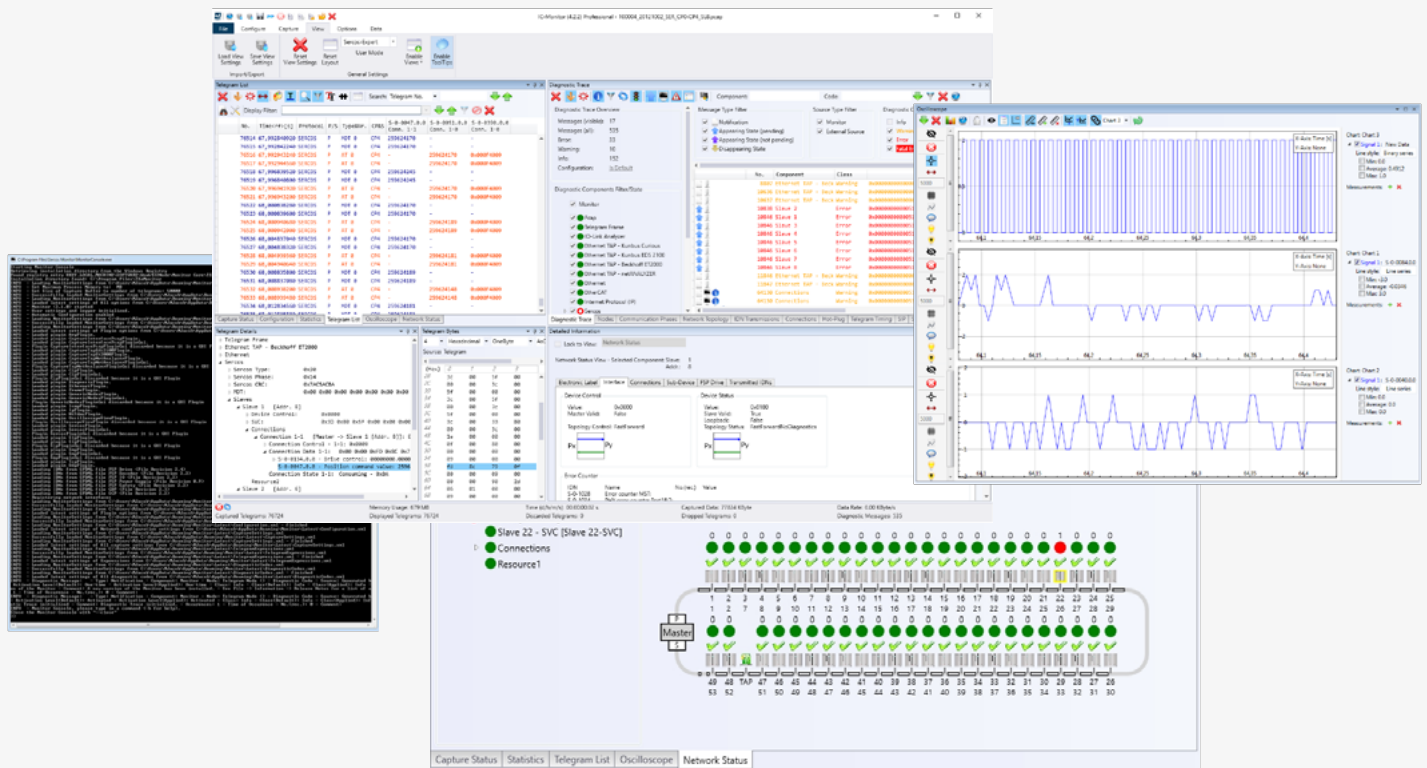


PRODUCT INFORMATION



IC-MONITOR | INTRODUCTION

The IC-Monitor is a platform for the diagnosis of industrial communication systems. With extensive knowledge of various communication protocols, it supports its users in problem analysis in a variety of ways.



Graphical User Interface of the IC-Monitor

APPLICATION SCENARIOS

ANALYSIS

Analysis of communication behavior during the development phase

TEST

Automated testing of industrial automation components

DIAGNOSIS

Troubleshooting in production facilities

MONITORING

Monitoring of network and process data in industrial networks

🕒 NETWORK ANALYSIS IN REAL-TIME

Recording and evaluation of network packets in real-time and simultaneous analysis of different communication protocols

🔧 QUICK AND EASY TROUBLESHOOTING

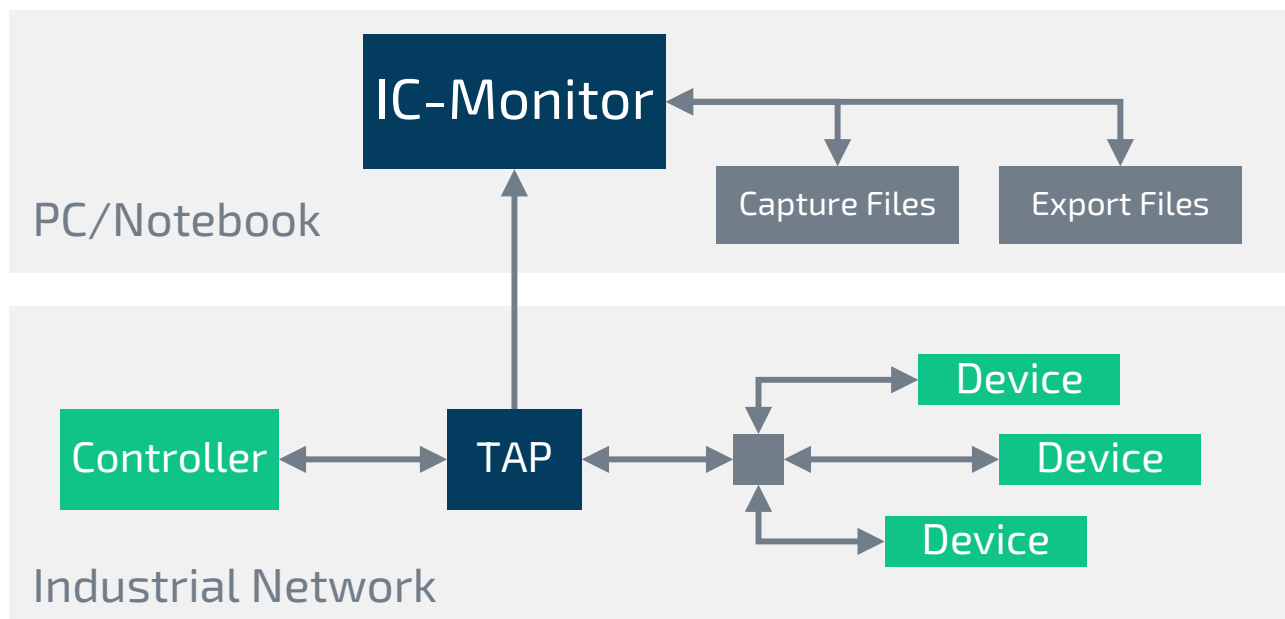
Automatic detection of network participants and network configurations as well as display of network and device errors

📋 IMPORTANT INFORMATION AT A GLANCE

Extensive graphical user interface, including detailed display of packet transmissions, acyclic communication, network topologies and timing behavior

⚙️ AUTOMATED OPERATION AND LONG-TERM ANALYSIS

Analysis of sporadically occurring events through trigger and filter configurations as well as automated operation via program APIs



Use of the IC-Monitor for the analysis of an industrial network

PROTOCOL ANALYSIS

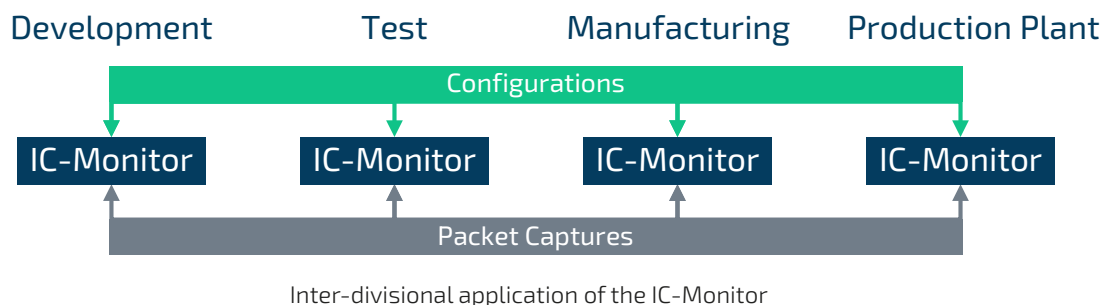
With the IC-Monitor you have expert protocol knowledge at your fingertips for your use-cases.

- / Extensive protocol support for:
 - › Ethernet based protocols, e.g.
 - › Ethernet, TCP/IP Stack
 - › EtherCAT
 - › Sercos
 - › IO-Link
 - › INTERBUS
 - › CAN
 - › Serial communication
- / Definition and integration of proprietary protocols
- / Interpretation of network protocols and cross-packet-content in real-time
- / Detection and reporting of protocol errors
- / Statistical values for the most important network parameters
- / Exact timestamps and visual representation of timing-behavior

NETWORK ANALYSIS AND ERROR DIAGNOSIS

The IC-Monitor offers a comprehensive set of tools to extract and process-specific data from the packet-oriented communication between multiple participants.

- / Automatic detection and visualization of networks and topology
- / Display of network and device errors in a diagnostic trace
- / Compact display of acyclic parameter transmissions
- / Data reduction through filter and trigger expressions
- / Long-term monitoring and continuous operation
- / Chart View for graphical analysis of protocol- and process-data

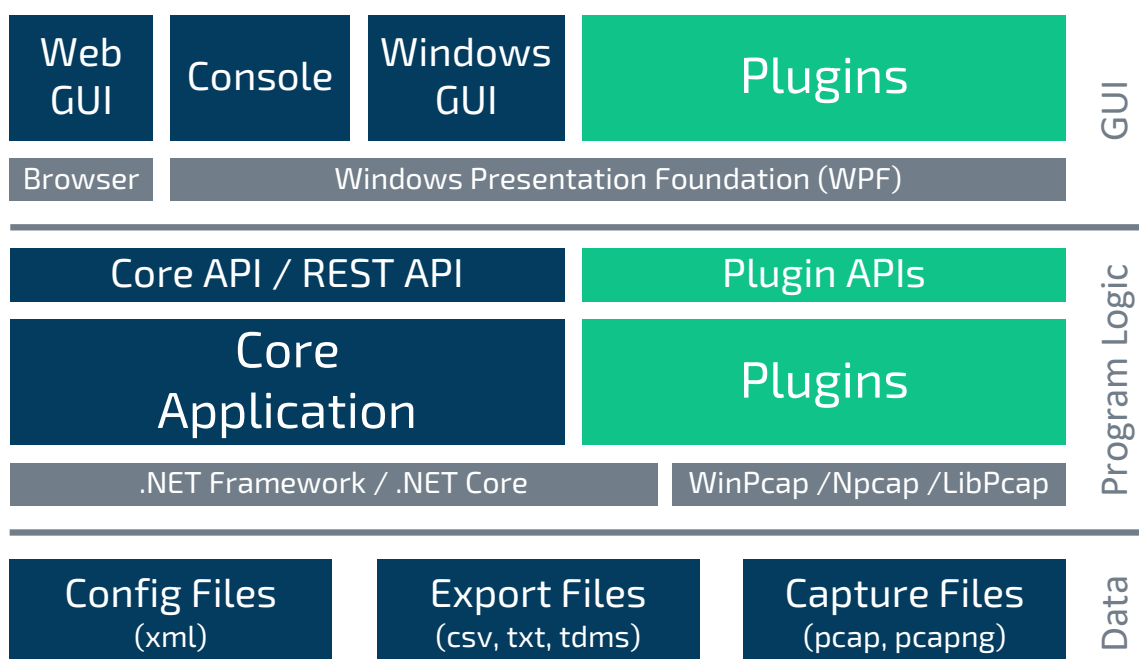


The areas of application of the IC-Monitor range from analysis during development to automatic tests in production and fault diagnosis in production plants. Interfaces for configuration and for package records allow the exchange of settings and measurement results between users across different divisions, leading to quicker success in troubleshooting.

INTERFACES

The IC-Monitor offers various interfaces for the preparation, configuration and implementation of analysis tasks.

- / Control of the IC-Monitor
 - › Graphical user interface or console application
 - › Automation with Program-API or REST-API
- / Support for Test Access Points (TAPs) for exact timestamps and detection of faulty network packets
- / Export of packet data to common file formats, e.g. .pcapng, .txt, .csv or .tdms
- / Import and export of settings and network configurations in .xml-files
- / Packet capture via USB, Ethernet and Serial Port
- / Simplified evaluation of parameters and process data through device-description files



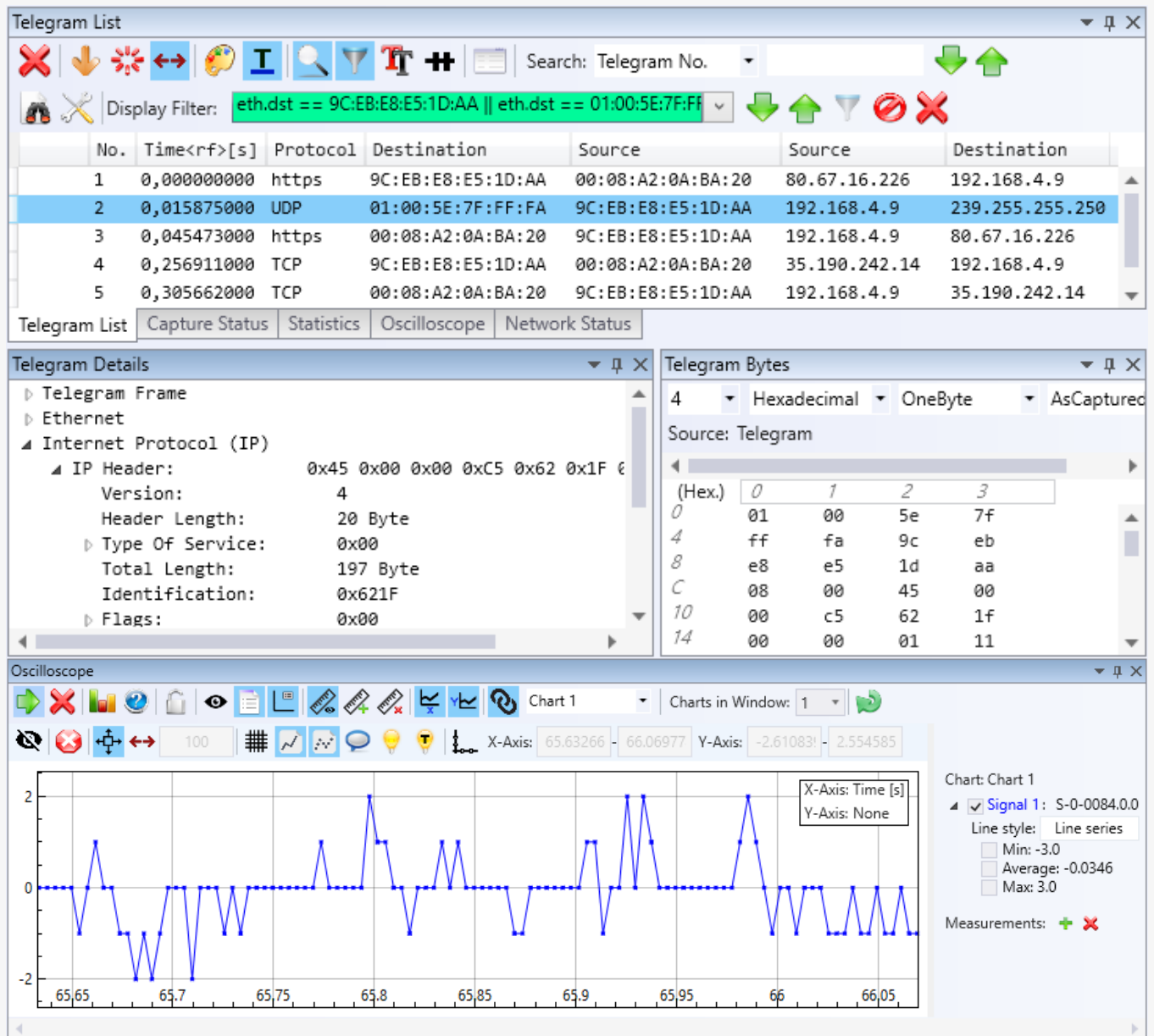
System architecture and interfaces of the IC-Monitor

The different configuration-interfaces enable the flexible adaptation of the IC-Monitor to network and hardware configurations. Using the various APIs, the IC-Monitor can also be remotely controlled from your own applications for test and analysis purposes.

ANALYSIS OF PROTOCOL DATA

Analyze network communication with bit-level accuracy using a wide range of display options for protocol data

Comparable with the well-known network analyzer „Wireshark“, the IC-Monitor offers analysis of communication protocols on a packet-, byte-, or bit-level.



Analysis of network packets

A flexible language for filter-expressions facilitates data reduction during the analysis. Particular elements of the packets can be visualized in different data formats.

In addition to the presentation in list format, packet data can also be displayed in charts in the integrated software oscilloscope, thus enabling users to quickly identify patterns that can then be analyzed further.

ANALYSIS OF NETWORK PROPERTIES

Get a quick overview of important properties and events in your network

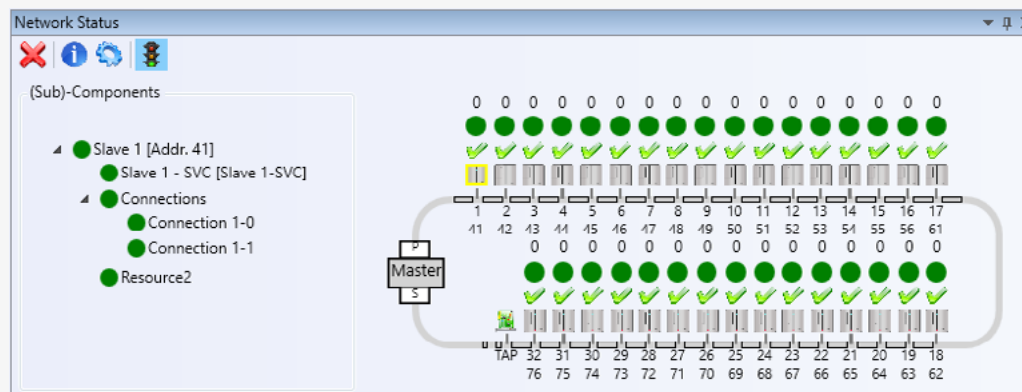
The IC-Monitor captures relevant data from the network communication and represents it in protocol-specific views. This, for example, can be leveraged to easily analyze parameter settings for all network members.

The screenshot shows the 'IDN Transmissions' window with various filters applied. The table below represents the data shown in the window:

No.	Protocol	Phase	Slave	IDN	R/H	Element	IDN Name	Transmitted Data	Trans
5007	SVC	CP2	Slave 1	5-0-1050.4.1	Write	Operation Data	Connection setup	0x0000	
5043	SVC	CP2	Slave 1	5-0-1050.5.1	Write	Operation Data	Connection setup	0x0000	
5079	SVC	CP2	Slave 1	5-0-1050.0.6	Write	Operation Data	Configuration List	[5-0-0135.0.0, 5-0-004	
5135	SVC	CP2	Slave 1	5-0-1050.1.6	Write	Operation Data	Configuration List	[5-0-0134.0.0, 5-0-003	
5287	SVC	CP2	Slave 1	5-0-1050.0.5	Read	Operation Data	Current length of conn 8		
5243	SVC	CP2	Slave 1	5-0-1050.1.5	Read	Operation Data	Current length of conn 8		
5379	SVC	CP2	Slave 1	5-0-1032.0.0	Write	Operation Data	Communication control	0x00000000_00000000_00	
5411	SVC	CP2	Slave 1	5-0-1009.0.0	Write	Operation Data	Device Control (C-DEV)	0x00CE	

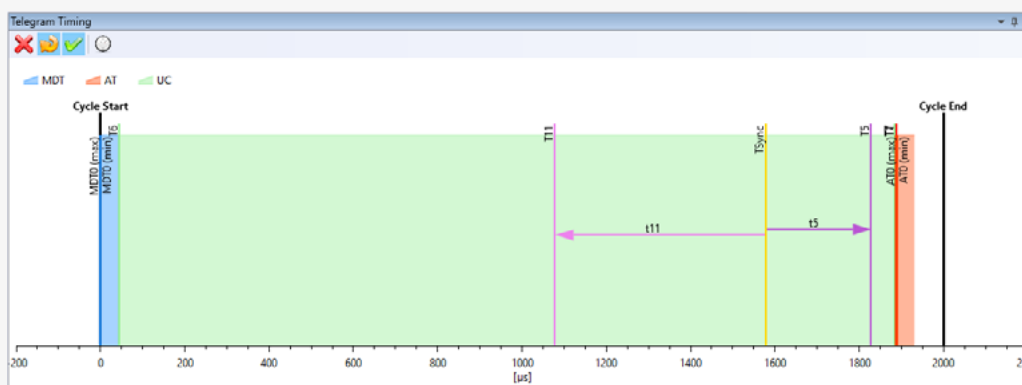
Visualization of a device parameterization

Moreover, the interpretation of the detected network communications is made easier by technology specific representations of the detected network topology and device status.



Topology visualization of an industrial network

The visualization of timing behavior helps to understand network timing and latency problems.

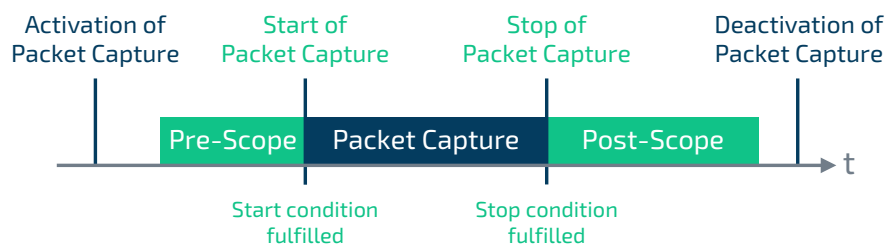


Timing behavior visualization of a network communication

LONG-TERM MEASUREMENT

Identify sporadic problems in long-term measurements and isolate them via extensive trigger and filter options

Particularly with sporadic network errors, it is important to be able to perform long-term measurements. The IC-Monitor supports data capture in continuous operation and enables you to pin-point the errors with extensive trigger and filter options.



Schematic representation of a packet capture with enabled trigger conditions

For example, a configuration to trigger on specific bits in the status words of connected participants, e.g. an error, is easily configured.

Definition of a trigger by means of the built-in expression language

In the following recording only telegrams that match the trigger expression will be captured – in this case, all telegrams that have the error bit set.

No.	Time<rf>[s]	Protocol	P/S	Type&Nr.	CP&S	Slv.Valid Slave 1	C1D Slave 1
7606	3,811223000	SERCOS	P	MDT 0	CP4	-	-
7607	3,811233640	SERCOS	P	AT 0	CP4	valid	no error
7608	3,819222960	SERCOS	P	MDT 0	CP4	-	-
7609	3,819233600	SERCOS	P	AT 0	CP4	valid	error
7610	3,827223000	SERCOS	P	MDT 0	CP4	-	-
7611	3,827233640	SERCOS	P	AT 0	CP4	valid	error
7612	3,835222920	SERCOS	P	MDT 0	CP4	-	-
7613	3,835233560	SERCOS	P	AT 0	CP4	valid	error

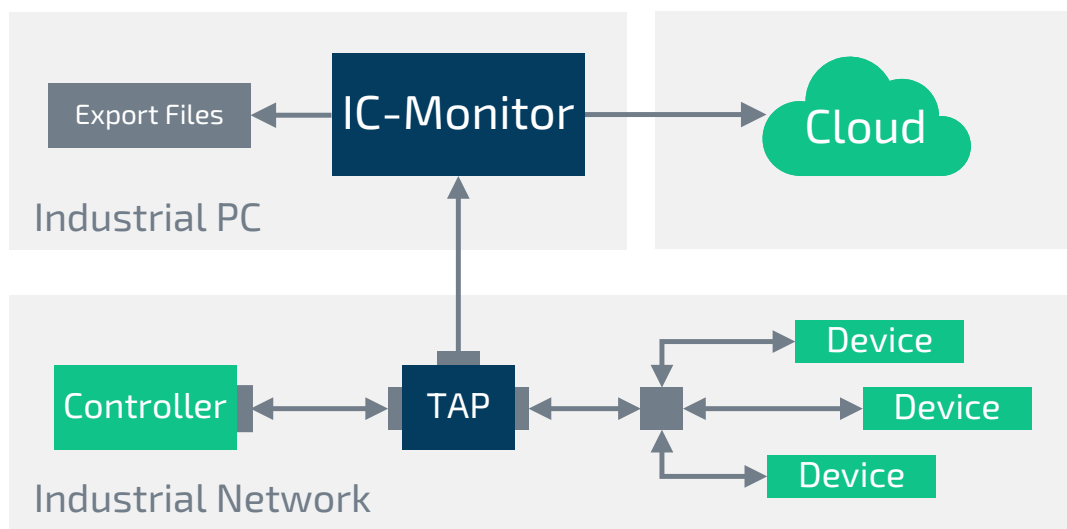
Trigger-packet in the list of captured packets

USE AS IOT-GATEWAY

Use the IC-Monitor as an IoT-Gateway to transmit data from your network in real-time to higher-level systems

During real-time operation the IC-Monitor supports export of packet data in various interfaces formats while applying trigger and filter settings.

With these tools, the IC-Monitor can be used as an IoT-Gateway which makes freely configured parts of the network communication as well as cyclical process-data available for higher-level processes.



IC-Monitor uses as an IoT-Gateway

In addition to common export file formats, such as .csv, .txt, and .tdms, manufacturer-specific export interfaces can be integrated into the IC-Monitor, via which the data can then be transmitted to higher-level systems.

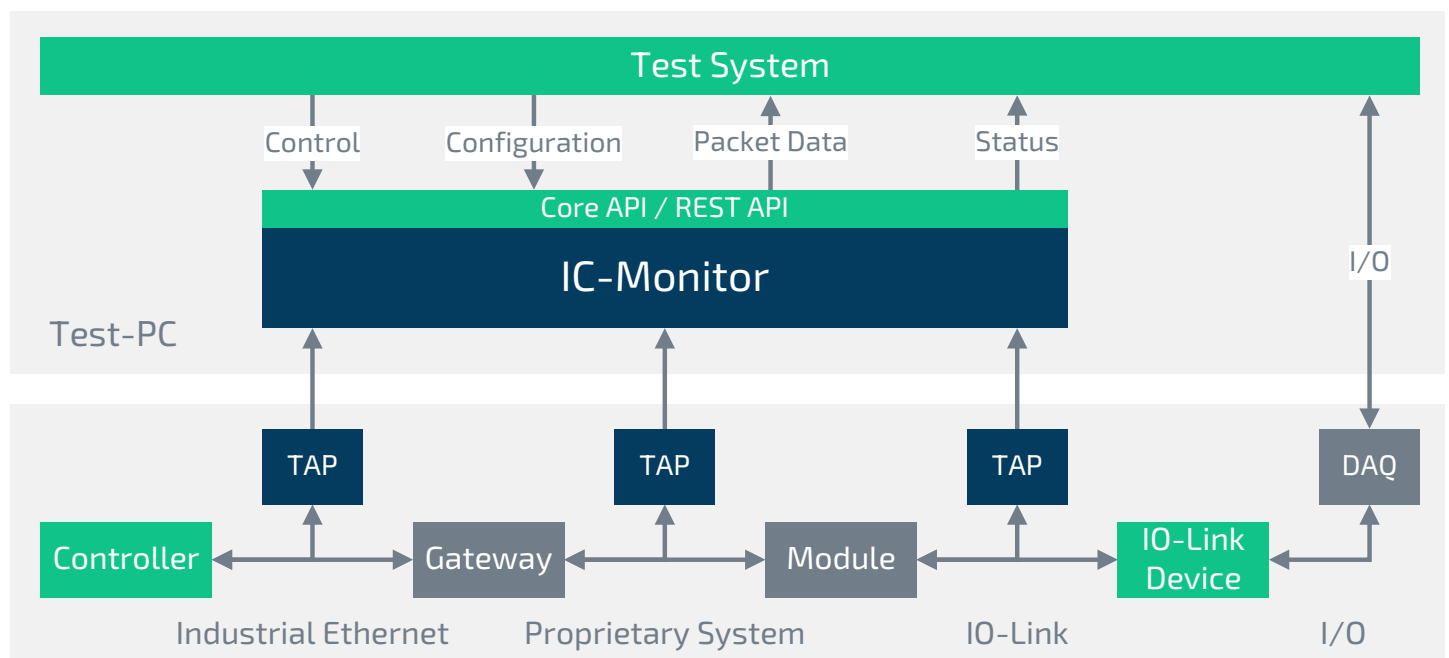
AUTOMATED TESTING

Use the built-in program API in your automated tests to collect and evaluate any protocol and process data

The API-interfaces of the IC-Monitor can be used by test-systems to automatically capture and interpret network communication.

It is possible that automated tests load particular test configurations into the IC-Monitor. After loading a configuration and starting a packet capture via the API of IC-Monitor, the software will then provide the test application with the filtered and processed parts of the network communication and process data to validate the system behavior.

In the case of data being captured between multiple communication systems, it is possible to perform runtime measurements between these systems automatically.



Automated test of cascaded communication systems

TECHNICAL REQUIREMENTS

Operating System:	Windows 10 with .NET Framework / .NET Core (see website)
CPU:	Min. 1 GHz (or faster), min. 2-Core-CPU
RAM:	Min. 2 GB – Depending on recording time/use-case
Hard drive:	Min. 2 GB available hard drive space – Depending on recording time/use-case
Graphics:	Resolution of 1280 x 1024 Pixels

OUR COMPANY

Benefit from our many years of project experience in the field of industrial communication systems.

As a service provider with a broad range of services in software and hardware development, we are happy to support you in the development, qualification and analysis of your products and systems.

We offer training for applications around the IC-Monitor and implement manufacturer-specific extensions, such as support for proprietary protocols and interfaces or TAPs.

We look forward to meeting you!



Steinbeis Embedded Systems Technologies GmbH

Martinstrasse 42-44
73728 Esslingen
GERMANY

☎ +49 711 99596-300
🌐 www.steinbeis-est.de
✉ info@ic-monitor.com



LEARN MORE

Visit us on our website and learn more about the IC-Monitor.

www.ic-monitor.com

OUR DEVELOPMENT PARTNERS

The development of the IC-Monitor has been carried forward by collaboration with strong partners for many years.

Driven by the challenges in the projects of our partners, there is continuous development and expansion of the platform IC-Monitor to match the technological advances in communication today.

The following companies actively support and facilitate development of the platform.

