PROFISHARK 1G

INSTALLATION AND CONFIGURATION MANUAL

PROFITAP

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INSTALLATION

1. UNPACKING

Carefully unpack all the items supplied with the ProfiShark 1G and retain the packaging for later use:

- 1 x ProfiShark 1G main unit
- 1 x Transport pouch
- 1 x Ethernet cat5e cable (2 m)
- 1 x USB 3.0 cable (1.8 m)
- 1 x USB key (Software, Drivers, Documentation)
- Quick Start Guide

► ***NOTE:*** Please contact the supplier if any part is missing or damaged.

2. HARDWARE OVERVIEW

The ProfiShark 1G is an integrated network TAP providing safe access to the network for monitoring purposes. It is a non-intrusive monitoring device, undetectable to the network, leaving the original data traffic unaltered with no extra packets being inserted.

In a gigabit network, the ProfiShark 1G negotiates with both attached devices for the highest common speed. If no common speed can be achieved, or if one of the devices is disconnected, the TAP disconnects the line to the other attached device, allowing a redundant path to be activated in the network route node.

As it is based on USB 3.0 (5 Gbps), the ProfiShark 1G manages full-duplex gigabit capturing at wirespeed, without the bottleneck of an aggregator tap. It also surpasses all standard NICs in capture mode, as it catches any tags and encapsulation without altering the frames.

When the TAP becomes unpowered, it activates its bypass circuits, connecting the two attached devices directly. The ProfiShark 1G integrates a high performance fast failover circuit and a proprietary algorithm, reducing the unavailability of the network path down to approximately 1-2 seconds.

The ProfiShark 1G is powered directly from the USB 3.0 port. A dedicated power adapter can be used to prevent failover when disconnecting the USB 3.0 port. The unit can be managed by the ProfiShark Manager application, found on the supplied USB key or downloadable from the Profitap Resource Center.

FEATURES:

- 10/100/1G monitoring on USB 3.0
- USB 3.0 powered, no adapter required
- Hardware aggregation
- 8 ns hardware timestamping for accurate latency testing
- Real time statistics
- Compatible with all industry standard analyzers
- Fail-safe monitoring
- Low delay, low jitter
- Low level error and bandwidth monitoring
- CRC error capture
- Direct capture to disk
- In-Line and SPAN (Dual NIC) capture modes
- Very low CPU usage
- Invisible to the network
- PoE passthrough

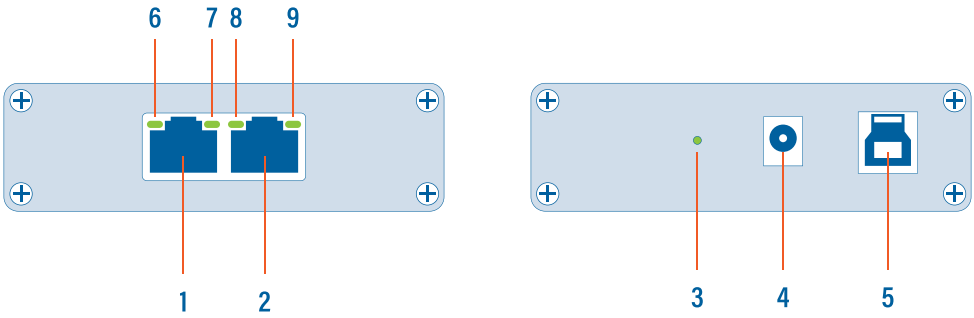
► ***NOTE:*** The fast failover relies on the network setup. In case the fast failover cannot be performed, the devices connected to ports A and B have to renegotiate the link. This operation takes about 2-4 seconds.

2.1 Technical and Electrical Specifications

- Powered from USB 3.0 port
- Optional 5V 1A DC powering for failover prevention
- Active bypass and fast failover circuits

SYSTEM REQUIREMENTS	MAXIMUM NETWORK LATENCY
Dual Core Processor 4 GB memory USB 3.0 port	1 Gbps: 380 ± 8 ns 100 Mbps: 720 ± 24 ns 10 Mbps: 7600 ± 25 ns
LEDS	**POWER CONSUMPTION (FULL TRAFFIC)**
2 x Speed 2 x Link Activity 1 x Power	1 Gbps: 600 mA 100 Mbps: 450 mA 10 Mbps: 520 mA
CONNECTORS	**ACCESSORIES**
2 x RJ45 8 pins 1 x USB 3.0 1 x 5V DC (center positive)	1.8 m USB 3.0 cable 2 m Ethernet cat5e cable USB key, Transport pouch
DIMENSIONS (WxDxH)	**SUPPORTED OS**
69 x 124 x 24 mm 2.72 x 4.88 x 0.94 in	Windows 7 / 8 / 10 (32/64-bit) / 11 Linux, macOS High Sierra
CAPTURE PERFORMANCE	
3.2 Gbps	
WEIGHT	**STORAGE TEMPERATURE**
176g — 0.39 lb	-40 to +80 °C — -40 to 176 °F
RELATIVE HUMIDITY	**OPERATING TEMPERATURE**
10 to 95%, non-condensing	0 to +50 °C — 32 to 122 °F
COMPLIANCE	**ORDER REFERENCE**
RoHS — CE — EN 45545-2	C1AP-1G

2.2 Visual Description



1, 2	RJ45 Ethernet ports A and B
3	Power indicator LED
4	Optional DC power input (5V, 1A, center positive)
5	USB 3.0 port type B
6, 9	Link/Activity LEDs
7, 8	Speed LEDs

2.3 LED Functionality

LED	STATE	MEANING
LED 3	OFF	No USB cable nor power cable are connected
	ON	USB cable and/or power cable are connected
	BLINKING	Constant synchronization between system time and hardware timestamp (blink ON every even second, blink OFF every odd second)
LED 7	ON	ProfiShark 1G is operating at 10 Mbps speed
LED 8	ON	ProfiShark 1G is operating at 100 Mbps speed
LED 7 + LED 8	ON	ProfiShark 1G is operating at 1 Gbps speed
	BLINKING	ProfiShark 1G is not connected or is trying to connect
	ALTERNATING BLINKING	ProfiShark 1G cannot find a common speed between the connected devices
LED 6, LED 9	ON	The port is linked
	BLINKING	The port is linked and has RX/TX activity (traffic is passing through)

3. CONNECTING POWER AND START-UP

In order for the ProfiShark 1G to be ready for analyzing traffic, the following steps have to be taken:

1. Install the ProfiShark Manager.
2. Launch the ProfiShark Manager.
3. Launch the software network analyzer.
4. Tap the line that will be monitored by interconnecting the ProfiShark 1G in between, using Ethernet cables.

- ***NOTE:*** The link must be connected to the **unpowered** ProfiShark 1G at first. Make sure the link is active before powering the ProfiShark 1G.

5. Connect the ProfiShark 1G to a computer, using the supplied USB 3.0 cable.

- ***NOTE:*** Connecting to a USB port of lower specification than USB 3.0 will result in data drops, due to bandwidth limitations.
- ***NOTE:*** Connecting the ProfiShark 1G to a different USB port than the one used during the installation requires a reboot of the computer (with the ProfiShark connected) for automatic driver installation for this USB port, and proper handling of the interface by Windows.

6. Optional: Connect a dedicated power supply to the ProfiShark 1G to ensure maximum fail-safe operation at all times. In the absence of a dedicated power supply, the ProfiShark 1G is powered through the USB 3.0 cable.

To install the ProfiShark Manager on Windows, launch the setup utility located in the "\Windows\Installer\" folder of the USB flash drive. Uninstall any previous version of the ProfiShark Manager before starting the setup utility.

1. Allow the installation to proceed when prompted by Windows User Account Control, and follow the on-screen instructions.
2. When prompted, disconnect and reconnect the ProfiShark 1G.
3. Wait for the installation to complete.
4. Click Launch.

► ***NOTE:*** The setup utility will create a launch icon in your start menu.

To install the ProfiShark Manager on Linux or macOS, follow the instructions in the *Installation.txt* file located on the USB key or in the latest "ProfiShark USB key" release located in the Resource Center at www.profitap.com/resource-center/

4. ANALYZER INSTALLATION

All industry standard analyzers are supported and can be used to perform the analysis.
A comprehensive list of compatible analyzers are listed on the ProfiShark 1G product page at: www.profitap.com

Wireshark is recommended, and can be downloaded at: www.wireshark.org

To start capturing network data, launch the preferred network analyzer and select the new network interface named "ProfiShark 1G Device".

MONITORING GUIDE

1. PROFISHARK MANAGER

ProfiShark Manager is a standalone application designed and developed by Profitap. It provides means for statistical analysis of a network prior to a deeper investigation using an analyzer. It also provides options for port diagnostic, port control, timestamping, and traffic capture.

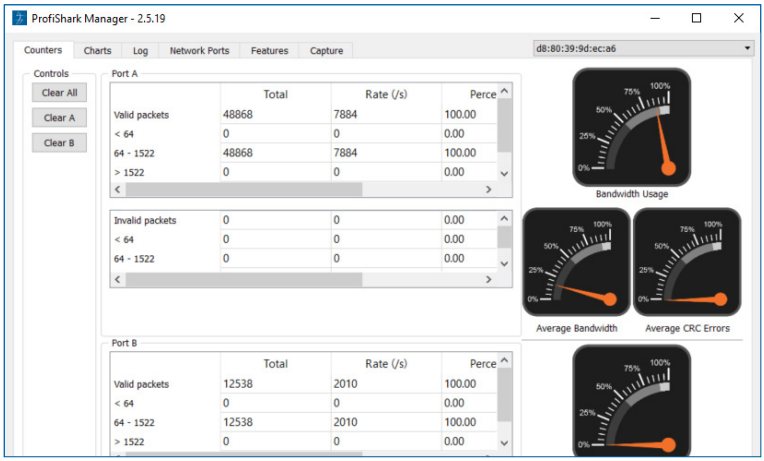
A built-in utility allows flashing the firmware and updating the device online or using a locally stored file. ProfiShark Manager can be used simultaneously with a software network analyzer, without the need to interrupt data capture.

ProfiShark Manager functionalities are grouped in the following tabs:

- Counter Tab
- Charts Tab
- Log Tab
- Network Ports Tab
- Features Tab
- Capture Tab

1.1 Counters Tab

The *Counters* tab displays all the ProfiShark 1G built-in counters for both Ethernet ports. These 64-bit hardware counters are cleared at hardware startup and link reconnection.

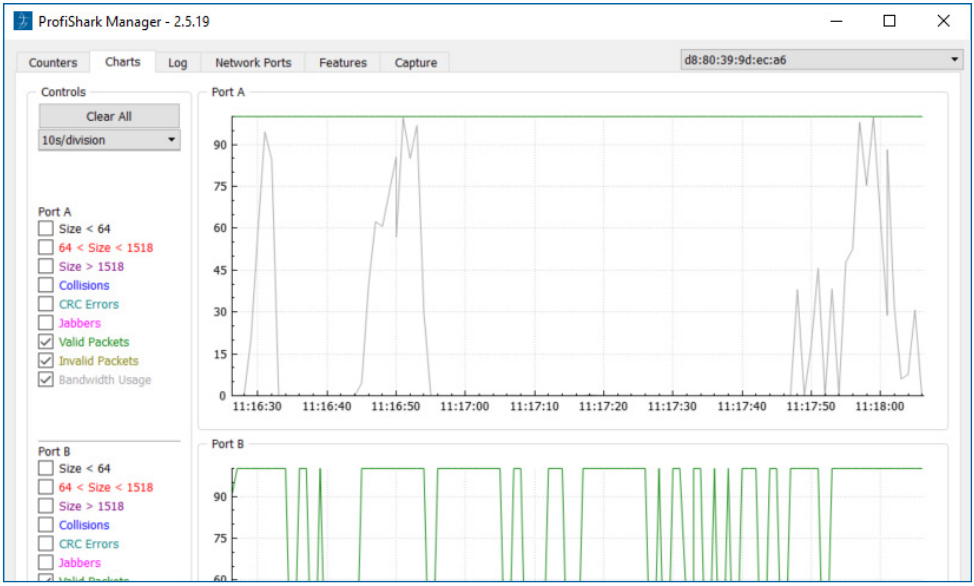


VALID PACKETS	Representing the number of valid packets (of any size) passing through the port.
INVALID PACKETS	Representing the number of CRC error packets (of any size) passing through the port.
< 64	Representing the number of packets (valid/invalid), not exceeding 64 bytes in size.
64 - 1522	Representing the number of jumbo packets, also known as jumbo frames (valid/invalid) with a size between 64-1522 bytes.
> 1522	Representing the number of packets (valid/invalid) exceeding jumbo packet specifications of 1522 bytes in size.

There are also 6 graphical meters (3 for each port), displaying current bandwidth usage, average bandwidth usage, and average CRC error rate for each port.

1.2 Charts Tab

The *Charts* tab offers inspection of the same statistical information as the Counters tab, plotted over time, offering a better overview of the data flow.



Depending on the type of packets or events selected in the left side of the screen, the statistical data is plotted accordingly for either port A or B. Refresh rate can also be selected using the drop-down list on the top left, further tuning the displayed information.

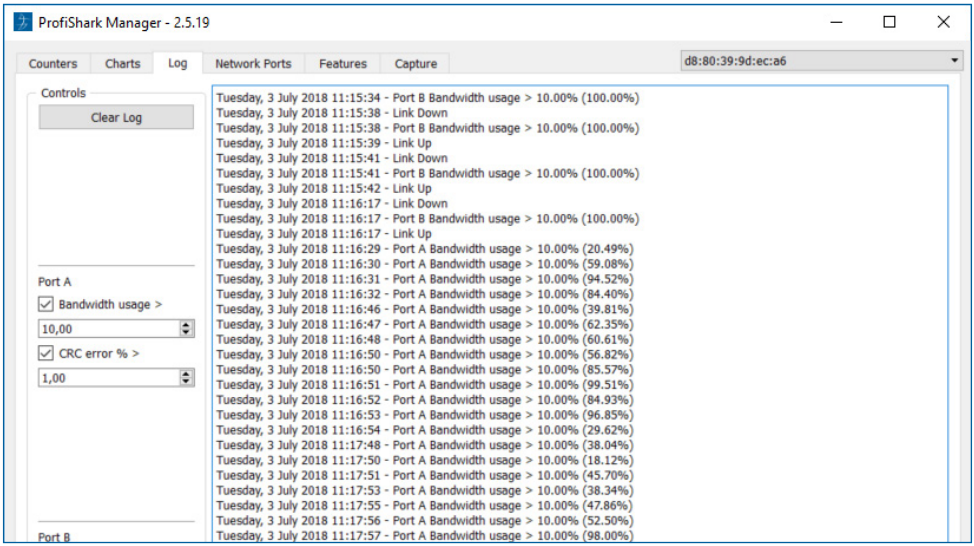
All data can be expressed either in number of packets per second, or in a percentage of the total number of packets:

- By selecting *packets/s*, each data type displays the corresponding number of packets per second, except for the bandwidth usage which is displayed in bytes per second.
- By selecting *percentage*, each data type is displayed as a percentage of the total number of packets, except for the bandwidth usage which is displayed in percentage of the total bandwidth.

The plotted statistical data can be reset by clicking the *Clear All* button.
Disconnecting the ProfiShark 1G also resets the plotted statistical data.

1.3 Log Tab

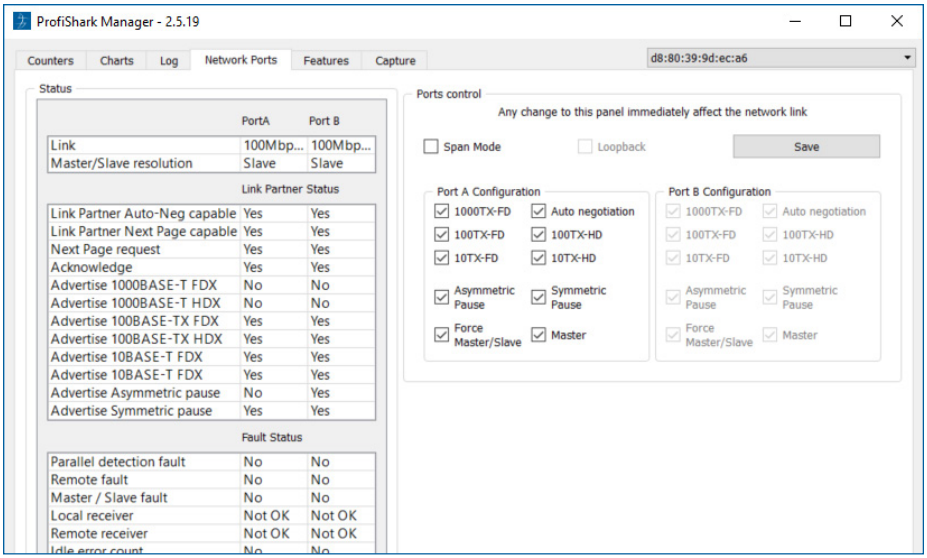
The *Log* tab allows the user to monitor bandwidth usage and CRC error rate on either port A or port B. Every time the threshold is exceeded, a log entry is added, allowing to easily identify the type, date, and port of the event.
A certain degree of filtering can be applied on the logs, only displaying events matching the specified percentage.



BANDWIDTH USAGE: Select this option to only log traffic events exceeding the set value. This value represents a percentage of the total 1 Gbps bandwidth. For instance, a value of 5.5 will result in only logging traffic events exceeding 56.32 Mbps (1024 * 0.055).
CRC ERROR: Select this option to only log CRC error events exceeding the set value. This value represents a percentage of the traffic passing through the port. For instance, a value of 5.5 will result in only logging traffic events with a CRC fault rate exceeding 5.5% of the traffic passing through the port.

1.4 Network Ports Tab

The *Network Ports* tab allows the customization of ports settings for the ProfiShark 1G, and offers an overview of the ports' status and link capabilities.



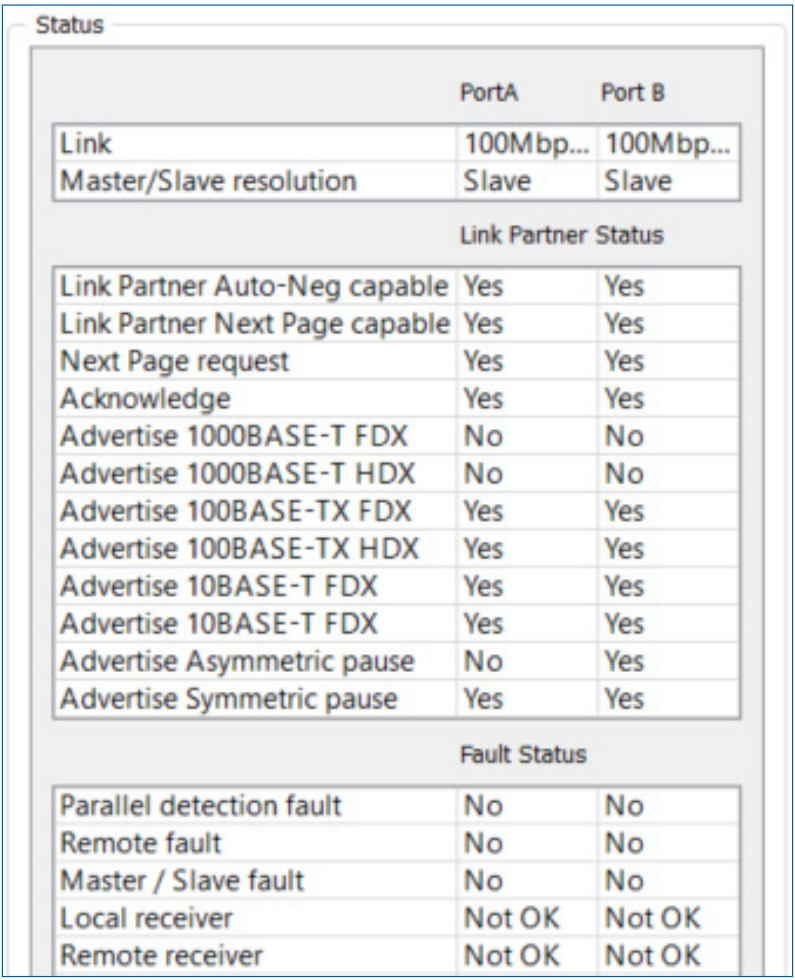
The ProfiShark 1G ports are set to *In-Line Mode* by default (*SPAN Mode* option unchecked), meaning that devices connected through ports A and B can communicate. In this case, both Ethernet ports are controlled at the same time. Enabling *SPAN Mode* tells the ProfiShark 1G to intercept two separate data streams, and the communication between the devices connected to ports A and B is severed. In this case, the Ethernet ports can be controlled independently in terms of speed, duplex mode, and autonegotiation.

PORTS CONTROL VIEW	
SPAN MODE	Checking this option tells the ProfiShark 1G to intercept a separate data stream for each port. Each port can be controlled independently. Unchecking the option sets the ProfiShark to *In-Line Mode*.

LOOPBACK	This feature is only available for ProfiShark 10G.
AUTO NEGOTIATION	This feature tries to link the two network devices on the highest possible speed out of those selected for each port (1000TX-FD, 100TX-FD/HD, 10TX-FD/HD). Enabling this feature also allows to select flow control features (Asymmetric/Symmetric Pause) and establish or force the Slave/Master device. ► Note: This option is required for 1 Gbps speeds.
1000TX-FD/HD, 100TX-FD/HD, 10TX-FD/HD	If the *Auto negotiation* feature is enabled, multiple speeds can be selected in this section (1000, 100 or 10 in Full or Half Duplex mode) and a link will be attempted at the highest possible speed. If the *Auto negotiation* feature is disabled, only one speed can be selected in this section (10/100 in Full or Half Duplex mode) forcing the link to be established at the selected speed. ► Note: If no common speeds are selected for port A and B (only in SPAN Mode) a link cannot be established.
ASYMMETRIC/ SYMMETRIC PAUSE	These features are flow control related, regulating traffic in cases of buffer overflow situations. ► Note: Only available if the *Auto negotiation* feature is enabled.
FORCE MASTER/ SLAVE	Enabling this feature signals to the negotiation process that the network device connected to this port is desired to be the Slave device. ► Note: Only available if the *Auto negotiation* feature is enabled.
MASTER	Enabling this feature signals to the negotiation process that the network device connected to this port is forced to be the Master device. ► Note: Only available if the *Auto negotiation* feature is enabled.

FORCE MASTER/ SLAVE & MASTER	Enabling both features signals to the negotiation process that the network device connected to this port is forced to be the Master device. ► Note: Only available if *Auto negotiation* feature is enabled.

A comprehensive status of network capabilities is displayed on the left side panel, depending on the customization done in Port A Configuration / Port B Configuration.



1.5 Features Tab

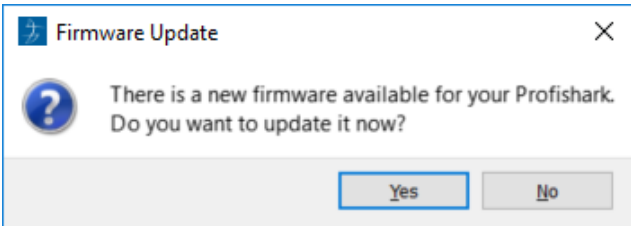
The *Feature* Tab is divided into 3 sections:

- The *Status* section, displaying firmware, hardware and network status for the connected ProfiShark 1G.

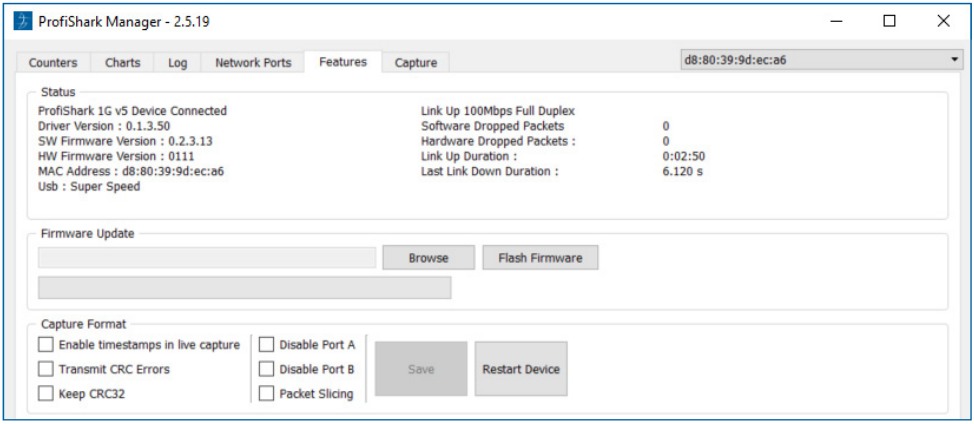
STATUS	
SOFTWARE DROPPED PACKETS	Represents the number of packets dropped by the driver in Live Capture mode.
HARDWARE DROPPED PACKETS	Represents the number of packets dropped due to low USB bandwidth, for example when connecting the ProfiShark 1G to a USB 2.0 port and attempting a 1 Gbps capture.

- The *Firmware Update* section, allowing users to flash the firmware of the connected ProfiShark 1G with a locally stored version. The ProfiShark 1G is unavailable during the firmware update process, which can take up to several minutes to complete. Once finished, the ProfiShark 1G may need to be replugged for the new firmware to take effect. Do not disconnect the USB port or shut the computer down during the update process. The latest firmware can be downloaded from the Resource Center at: www.profitap.com/resource-center/

> ► Note: The ProfiShark Manager will search for a new firmware release online every time it starts, allowing a new revision to be downloaded and installed, without the need of a locally stored update.



- The *Capture Format* section, allowing users to enable or disable capture-related features. Additional customization of the capturing process is available in the *Capture* tab.



CAPTURE FORMAT	
ENABLE TIMESTAMPS IN LIVE CAPTURE	If checked, a Unix formatted timestamp is appended in the header of the packet data. This timestamp can be interpreted by the Profitap Wireshark dissector in *Live Capture* mode. For more information, see page 21.
TRANSMIT CRC ERRORS	If checked, the ProfiShark 1G will include packets with CRC errors in the capture. These packets are usually filtered out by network interfaces.

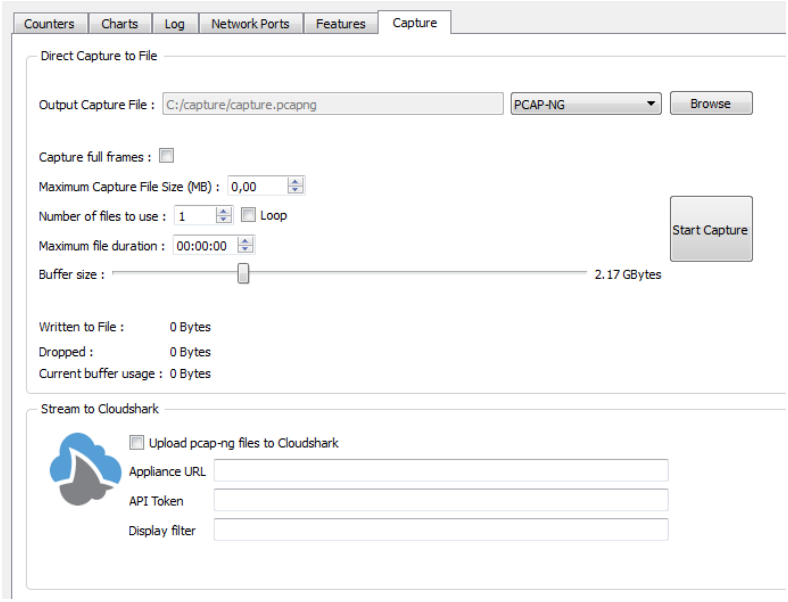
CAPTURE FORMAT	
KEEP CRC32	If checked, the CRC32 information (32-bit Frame Check Sequence) located at the end of the packets will be kept in the capture. FCS can be interpreted in Wireshark (Edit \ Preferences \ Protocols \ Ethernet \ Assume packets have FCS).
DISABLE PORT A	If checked, frames from port A will not be captured.
DISABLE PORT B	If checked, frames from port B will not be captured.
PACKET SLICING	Enabling this feature will result in dropping the payload of every frame captured, keeping only the header information (the first 128 bytes) up to the application layer.

1.6 Capture Tab

1.6.1 Direct Capture Mode

ProfiShark 1G can capture traffic without the need for third-party capture software. This *Direct Capture* is performed at the driver level, prior to all network stacks and frame processing. *Direct Capture* provides the best performance, enabling small packet capture at wire speed.

The *Capture* tab contains the controls for the *Direct Capture* feature. The captured data is saved to a PCAP Next Generation file (.pcapng) with hardware-generated packet timestamps. ProfiShark Manager also provides an option for uploading capture files to Cloudshark.



OUTPUT CAPTURE FILE	Specify the name and location of the capture file. Name extension will be added to the specified name: (_#####_YYYYMMDDHHMMSS).
CAPTURE FULL FRAMES	Enable this option to capture the entire L1 Ethernet frames, which include the preamble (0x55), the SMD, and the CRC. This can be useful for TSN (Time-Sensitive Networking) capture.
MAXIMUM CAPTURE FILE SIZE	Sets the maximum file size allowed for storing the captured data. When the file size reaches this value, the capture either continues in a new file, or stops, depending on the other options.
NUMBER OF FILES TO USE	After reaching the configured maximum duration or file size, the captured traffic will be saved to a new file, until the number of files set here is reached.
MAXIMUM FILE DURATION	Sets the maximum duration for storing the captured data. When this value is reached, the capture either continues in a new file, or stops, depending on the other options.

LOOP	Enabling this option makes the capture overwrite the same file (or files, depending on the "Number of Files to Use" option) after reaching the configured maximum duration or file size.
BUFFER SIZE	In high bandwidth utilization scenarios, a bigger buffer size accommodates more data to be temporarily stored into the computer's memory before being saved to the file, helping to avoid captured data being dropped.
STATISTICS	Written to File - Performance statistics. Displays the amount of data currently written in the output file, helping users determine the best buffer size. Dropped - Dropped bytes. Indicates the amount of data dropped during the capture, due to performance issues or buffer overflow. Current buffer usage - If dropped packets start to appear ("Dropped" statistic), increase the *Buffer Size* value.
UPLOAD PCAP-NG FILES TO CLOUDSHARK	Enable this option to upload capture files to Cloudshark automatically.
APPLIANCE URL	Set the appropriate URL of the Cloudshark server on which to upload the capture files.
API TOKEN	Set the appropriate token for the Cloudshark server set above.
DISPLAY FILTER	Optional display filter for the capture files uploaded to Cloudshark. Regular Cloudshark/Wireshark display filters can be set here. See: https://wiki.wireshark.org/DisplayFilters

► Note: The amount of dropped data depends on the data storage throughput and the amount of allocated memory buffer. Disk arrays or SSDs can drastically improve capture performance.

1.6.2 Live Capture Mode

ProfiShark 1G can also be used to capture network traffic and send it unaltered to a dedicated capture software. The process is transparent for packet size, packet type, and protocol. All tags and encapsulation are preserved (e.g. VLAN, MPLS, GRE).

> ► Note: Capturing traffic at 1G line rate is extremely CPU intensive and can cause software packet drops. For better performance, Direct Capture mode is recommended.

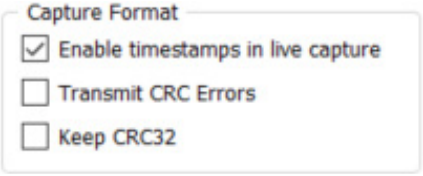
1.6.3 Live Capture Mode with Hardware Timestamping

The hardware timestamping feature can be used in both Live Capture and Direct Capture modes. It enables timestamp accuracy to the nanosecond, as opposed to the microsecond accuracy of software timestamping.

When using this feature in Live Capture mode, the ProfiShark Dissector for Wireshark must be installed for the hardware timestamping information to be properly interpreted by Wireshark.

The dissector files can be found on the provided USB key, or in the Resource Center at www.profitap.com/resource-center/

Hardware timestamping can be enabled from the Features Tab, by selecting "Enable timestamps in live capture".



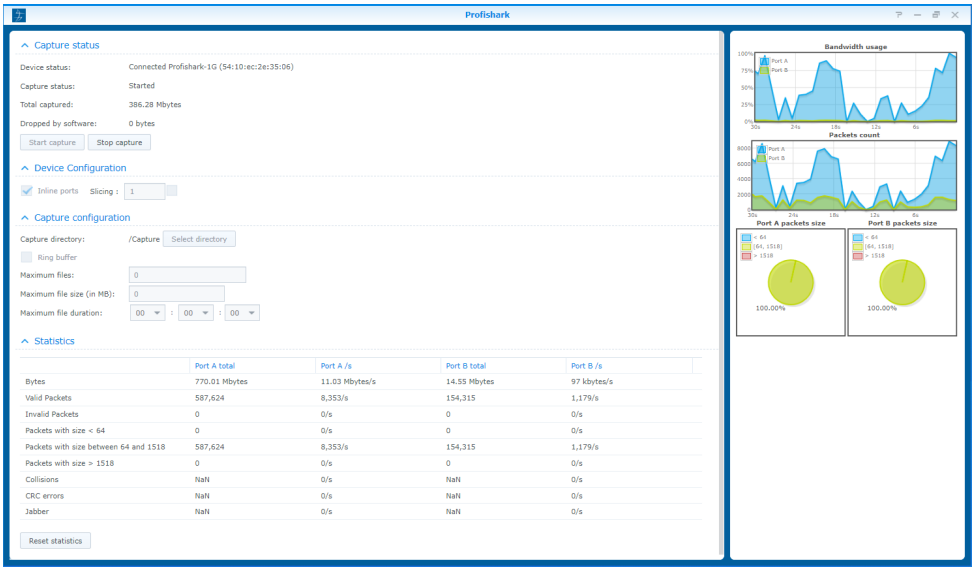
2. LONG TERM CAPTURE

The long-term capture feature expands the number of use cases for ProfiShark 1G. By combining the capture capabitilies of ProfiShark 1G with the storage capabilities of a NAS, it becomes possible to capture traffic for extended periods of time, making it easier to catch intermittent network problems in the act.

The ProfiShark USB key package (included with the product, and also available at profitap.com/resource-center/) provides packages for various Synology architectures.

Install the package corresponding to your Synology NAS. See the image file included in the packages folder for information on the type of CPU used in your Synology NAS.

For optimal capture results, an Intel-equipped Synology NAS is recommended.



DEVICE STATUS	Displays the connected TAP and its MAC address.
CAPTURE STATUS	Specifies whether the capture process is in progress.
TOTAL CAPTURED	Displays the total amount of data captured.
DROPPED BY SOFTWARE	Displays the amount of packets dropped due to performance issues or buffer overflow.
INLINE PORTS	By default, the ProfiShark 1G ports are set to In-Line Mode, meaning that devices connected through ports A and B can communicate. In this case, both ports are controlled at the same time. Unchecking "Inline ports" enables SPAN mode, setting the ProfiShark to intercept two separate data streams. In this case, communication between devices connected to ports A and B is severed, and ports A and B can be controlled independently in terms of speed, duplex mode, and autonegotiation.
CAPTURE DIRECTORY	Allows users to select the destination folder of the capture file.
RING BUFFER	If enabled, overwrites old data, using the circular buffer method of storing new data at the beginning of an existing data file.
MAXIMUM FILES	After reaching the configured maximum file duration or size, the captured traffic will be saved in a new file, until the number of files configured here is reached.
MAXIMUM FILE SIZE	This option sets the maximum file size allowed for storing the captured data. Exceeding this value will result in stopping the capture or storing the capture data in a new file.
MAXIMUM FILE DURATION	This option sets the maximum duration for storing the captured data. Exceeding this value will result in stopping the capture or storing the capture data in a new file.
STATISTICS	Displays ongoing and total traffic data for both port A and port B.

Legal

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