



The Synchronization Experts.

Capture running on USB-GigE-interface. Remote capture via Blue Network. Memory Usage: 256MB/256MB. Scopes: 11, Devices: 21, Instances: 25. All Messages: 23,217,893, Buffered: 1,026,809, Announce Messages: 101,420. PTP Track Hound 2.0.0-beta. Licensed to: Meinberg Funkuhren (Professional). Logged in as: trackhound (me)

### Traffic

23,217,893 Packets, 70.54/s

Total Packet Count				
Total	In Store	PTPv1	PTPv2	
23,217,893	1,026,809	1,330,357	21,887,536	
Announce	Sync	Request	Response	
101,420	202,830	41,221	31,071	

Recent Announce Messages

#	Source	From	VLAN	Version	Domain	Sequence ID
23217874	USB-GigE-interface	172.27.10.63	none	PTPv2	0	49352
23217875	USB-GigE-interface	172.27.10.144	none	PTPv2	15	49352
23217888	USB-GigE-interface	172.27.10.163	none	PTPv2	127	49366
23217889	USB-GigE-interface	172.27.10.144	none	PTPv2	15	49363
23217899	USB-GigE-interface	172.27.10.163	none	PTPv2	127	49367

Total Packets/s				
Total	PTPv1	PTPv2.0		PTPv2.1
70.54/s	5.32/s	65.23/s		0/s
Announce	Sync	Request		Response
10/s	20.0/s	4.17/s		3.09/s

### Events

461 Events, Last: 6.9.2022, 14:40:35

Time (UTC)	Severity	Type	Description	File
2022-09-06T12:46:35.968Z	Info	Grandmaster Quality Changed	PTP instance #9 (cc4670ff9c00105c00007) grandmaster quality changed (CC: 251-19)	-
2022-09-06T12:46:32.325Z	Info	Grandmaster Quality Changed	PTP instance #10 (cc4670ff9c00105c00001) grandmaster quality changed (CC: 251-19)	-
2022-09-06T12:46:28.088Z	Info	Grandmaster Quality Changed	PTP instance #5 (cc4670ff9c00105c00009) grandmaster quality changed (CC: 251-19)	-
2022-09-06T12:46:28.088Z	Info	Local Quality	PTP instance #5 (cc4670ff9c00105c00009) local quality	-

### Scopes

11 Scopes

Scope #4	Scope #9	Scope #8
Version: PTPv1 Domain: _GFLT Protocol: IPv4 VLAN: none Best Master: 172.27.10.103	Version: PTPv1 Domain: test.greg.py Protocol: IPv4 VLAN: none	Version: PTPv1 Domain: test.greg.py/mb Protocol: IPv4 VLAN: none
Scope #5	Scope #2	Scope #6
Version: PTPv2 Domain: 0 Protocol: IPv4 VLAN: none Best Master: 172.27.10.63	Version: PTPv2 Domain: 3 Protocol: IPv4 VLAN: none Best Master: 172.27.19.10	Version: PTPv2 Domain: 11 Protocol: IPv4 VLAN: none
Scope #3	Scope #7	Scope #10
Version: PTPv2 Domain: 19 Protocol: IPv4 VLAN: none Best Master: 172.27.19.58	Version: PTPv2 Domain: 64 Protocol: IPv4 VLAN: none	Version: PTPv2 Domain: 48 Protocol: IPv4 VLAN: none
Scope #1	Scope #10	
Version: PTPv2 Domain: 15 Protocol: IPv4 VLAN: none Best Master: 172.27.10.144	Version: PTPv2 Domain: 127 Protocol: IPv4 VLAN: none Best Master: 172.27.10.163	



# PTP Track Hound v2

## IEEE 1588 / PTP Debugging & Monitoring

The new Leader of the Pack steps forth. PTP Track Hound v2 is the industry-leading solution for the monitoring, diagnosis, and optimization of PTP clock networks, with groundbreaking new features for remote monitoring and management. PTP clocks are smartly grouped into scopes to help easily understand clock relationships, while byte-by-byte analysis, remote notifications, and a comprehensive REST API for management and queries over HTTP and HTTPS provides power users with the power tools they need to maintain absolute control over their PTP infrastructure.

## Get in Touch

Our Sales Team will be glad to assist you.

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# Key Features

## Capture & Analysis of PTP Network Traffic

PTP Track Hound captures PTPv1, PTPv2 and PTPv2.1 network traffic on the configured adapters, using the main memory (RAM) for temporary storage. A limit can be set on the maximum amount of memory used as temporary storage to ensure that the oldest packets are automatically deleted just before the limit is exceeded. It is also possible to dump all captured packets to a persistent capture file, which can then be downloaded via the Web Interface.

The Web Interface provides an overview of all captured packets at a glance, and these can be filtered based on the PTP scope (a group of PTP instances sharing a common domain, PTP version, network protocol, and VLAN tag) and packet type (e.g., Announce messages). Packet types are color-coded in the message list to enable them to be easily recognized.

Detailed statistics on the counted PTP packets captured per second and in total, both for all PTP packets and for individual packet types, provide a general idea at a glance of the load structure of PTP traffic in your network.

#	Source	Packet Type	From	VLAN	Version	Domain	Sequence ID
3189442	USB-GbE-Interface	Follow Up Message	172.27.30.30	none	PTPv2	3	180
3189443	USB-GbE-Interface	Sync Message	172.27.30.153	none	PTPv2	127	18273
3189444	USB-GbE-Interface	Announce Message	172.27.30.153	none	PTPv2	127	41955
3189445	USB-GbE-Interface	Announce Message	172.27.30.144	none	PTPv2	115	50271
3189446	USB-GbE-Interface	Sync Message	172.27.30.144	none	PTPv2	115	35004
3189447	USB-GbE-Interface	Follow Up Message	172.27.30.144	none	PTPv2	115	35004
3189448	USB-GbE-Interface	Peer Delay Request	172.27.30.30	none	PTPv2	3	290
3189449	USB-GbE-Interface	Sync Message	172.27.30.43	none	PTPv2	0	33048
3189450	USB-GbE-Interface	Follow Up Message	172.27.30.43	none	PTPv2	0	33048
3189451	USB-GbE-Interface	Sync Message	172.27.30.153	none	PTPv2	127	58274
3189452	USB-GbE-Interface	Sync Message	172.27.30.144	none	PTPv2	115	35005
3189453	USB-GbE-Interface	Follow Up Message	172.27.30.144	none	PTPv2	115	35005
3189454	USB-GbE-Interface	Announce Message	172.27.30.153	none	PTPv2	127	41956
3189455	USB-GbE-Interface	Sync Message	172.27.30.153	none	PTPv2	127	41956
3189456	USB-GbE-Interface	Announce Message	172.27.30.144	none	PTPv2	115	35272
3189457	USB-GbE-Interface	Sync Message	172.27.30.144	none	PTPv2	115	35006
3189458	USB-GbE-Interface	Follow Up Message	172.27.30.144	none	PTPv2	115	35006
3189459	USB-GbE-Interface	Sync Message	172.27.30.153	none	PTPv1	_SFL1	20855
3189460	USB-GbE-Interface	Follow Up Message	172.27.30.153	none	PTPv1	_SFL1	23629
3189461	USB-GbE-Interface	Sync Message	172.27.30.153	none	PTPv2	127	58276

## Decoding of PTP-Specific Message Data

PTP Track Hound automatically decodes PTP-specific message data and the most commonly used TLVs. It uses this data for internal analysis and evaluation and displays it in human-readable format, providing a detailed insight via the Web Interface into the data in the packets.

When viewing a PTP message in detail, mousing over any parameter in the message will highlight the location at which the raw data is located to enable easy analysis of packet content.

ID	Source	Remote Packet	Capture Time	Processing Time	Type	Protocol	VLAN	Version	Domain	Sequence ID	From	To	Port Identity	Duplicate Packet
31922386	USB-GbE-Interface	Management Message	2022-09-07T07:17:38.918268	2022-09-07T07:17:38.918558	Management Message	IPv4	none	PTPv2	19	0	172.27.300.246	none	0462709F0060C1	false

Type	Length	Management ID	Parent Port Identity	Parent State	Reserved1	Reserved2	Observed Offset Scaled Log Variance	Observed Clock Phase Change Rate	Grandmaster Priority1	Grandmaster Clock Class	Grandmaster Clock Accuracy	Grandmaster Clock Variance	Grandmaster Priority2	Grandmaster Clock ID
Management TLV (0x0001)	34		Parent Data Set (0x0002)	0	100	100	65535	202.483647	128	5	within 100 ns (0x2)	13063	128	0462709F0060C1

0x0000	0x0010	0x0020	0x0030	0x0040	0x0050	0x0060	0x0070
01 00 5e 00 01 81 ec 46 70 c3 18 13 08 00 45 00	00 72 1e 34 40 00 05 11 64 b4 ac 7b 64 16 e0 00	01 81 01 40 01 40 00 00 5e 99 7d 09 02 00 56 13 00	04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	70 1f 1e 03 18 13 00 01 00 00 00 04 71 ec 46 70 29	03 00 0f 24 1f 7f 00 00 02 00 00 01 00 00 22 20 02	ec 46 70 1f 1e 00 60 c1 00 01 00 64 1f 1f 7f 0f	1f 1f 80 06 2f 24 7b 80 ec 46 70 1f 1e 00 60 c1

# Detection of PTP-Capable Devices

PTP Devices in the network are automatically detected and grouped into scopes for easy identification of clock relationships.

## Device

PTP Track Hound detects and identifies each device by its PTP Clock ID. Depending on which PTP instance types are running on the device, PTP Track Hound will form founded assumptions on the type of clock that the device is intended to be - whether that's a Grandmaster, Boundary, or Slave Clock. Each device can have an individual set of metadata defined for it, including a vendor and model name, a hardware, software, and firmware revision, a custom alias, and a location. It is even possible to upload a custom image to represent it.

## Instance

An instance is defined as a singular PTP "session" running on any given device. One device can run multiple instances concurrently, even on a single network port, such that you could run both a PTPv2 instance in Follower state and a PTPv1 instance in Leader state - a constellation not uncommon in applications such as Ravenna-Dante gateways for bridging systems using two incompatible timing standards. Each instance will have its own unique, specific scope that dictates which other clocks in the network can reach it.

## Scope

PTP Track Hound defines the concept of scopes as a unique combination of network segment (an optional index value, see below for more information), PTP version, subdomain (PTPv1) or domain number (PTPv2), networking protocol (IEEE 802.3/IPv4/IPv6) and VLAN ID tag (optional).

## Segment

Each network interface and each remote capture instance can be manually assigned to a custom network segment. This is useful when you have multiple PTP instances with the same combination of PTP version, (sub)domain, networking protocol, and VLAN ID in separate network segments that are accessible to the PTP Track Hound instance. Segment IDs essentially allow scopes to be "broken down" into network segment groups, allowing you to keep captured PTP traffic in one subnet separate from the identically scoped PTP traffic of another. Without defined network segments, all detected devices, instances, and scopes are assumed to be running within the same, singular network.

Detected Slave Clocks, Ordinary Clocks and Boundary Clocks are automatically matched to their Grandmaster Clock to provide an immediate, at-a-glance perspective of the synchronization hierarchy.

The screenshot displays the 'Devices' section of the PTP Track Hound interface. On the left, a network diagram shows a central Grandmaster Clock (Meinberg Funkuhren) connected to three Slave Clocks (Meinberg Funkuhren) via PTPv2, Domain 19, IPv4 connections. On the right, a table lists detected devices:

#	Type	Clock ID	Ports	Instances
0	Grandmaster Clock	ec4670f9e03a9e59	1	1
1	Grandmaster Clock	ec4670f9e00d0f1f	1	1
2	Grandmaster Clock	ec4670f9e00242e	1	1
4	Grandmaster Clock	ec4670f9e0056c1	1	1

Below the table, a detailed view for ID #2-4 is shown, including a photo of the device and its metadata: Model Name: LANTIME M3000, Hardware Revision: v2.12, Firmware Revision: LTO3 7.06.005, Software Revision: v1.14-2f7-p.292f19a6, Alias: Test-1-SW-Development, Location: Bad Pyrmont.

Map Overview & Details of PTP Devices

The screenshot displays the 'Scopes' section of the PTP Track Hound interface. It shows a table of 25 instances in 11 scopes. The current Grandmaster is identified as 172.27.101.103 (ec4670f9e00cfe7). Below the table, a 'Traffic Statistics' section provides a breakdown of traffic by instance.

#	Version	Domain	Protocol	VLAN	Packets	Instances
4	PTPv1	_DFLT	IPv4	none	2,116,242	4

Instance #	PTP Version	Segment	Protocol	VLAN	Announce	Sync	Request	Response
9	PTPv1	test.greg.py	IPv4	none	0	7,623	523	523
8	PTPv1	test.greg.py.mb	IPv4	none	0	0	0	0
5	PTPv2	0	IPv4	none	1,365,306	0	0	0
2	PTPv2	3	IPv4	none	1,809,634	0	0	0
6	PTPv2	11	IPv4	none	54,214	0	0	0
3	PTPv2	19	IPv4	none	5,354,070	0	0	0
7	PTPv2	44	IPv4	none	3,329,307	0	0	0
10	PTPv2	48	IPv4	none	30,911	0	0	0
1	PTPv2	115	IPv4	none	10,702,263	0	0	0

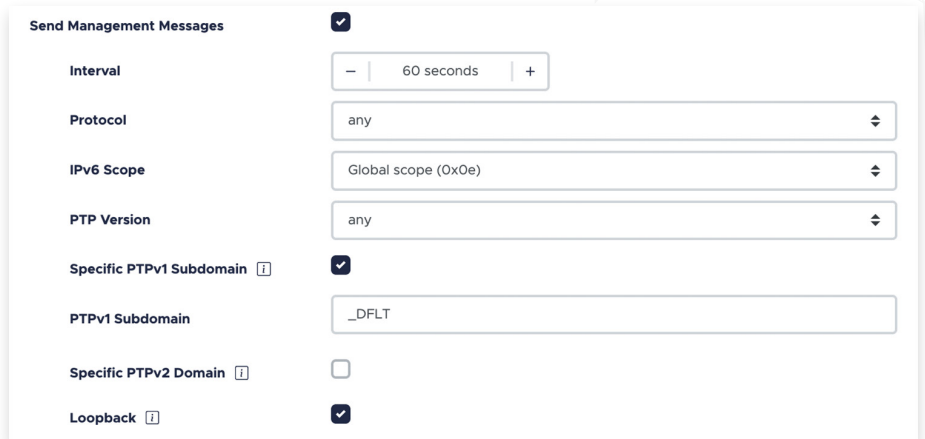
Details of a PTP Scope

# Generation of PTP Management Messages

PTP Track Hound can be configured to periodically send out PTP Management Messages to request common PTP datasets from instances within the monitored network(s). This allows the software to draw reliable conclusions about the synchronization status of the network, devices, and instances in a way that would not be possible by simply passively capturing passing traffic.

Management messages can be sent globally over all networking protocols, PTP versions, and (sub) domains, or you can limit them to a specific networking protocol, a specific PTP version, and/or a specific (sub)domain.

This feature requires a Professional license.

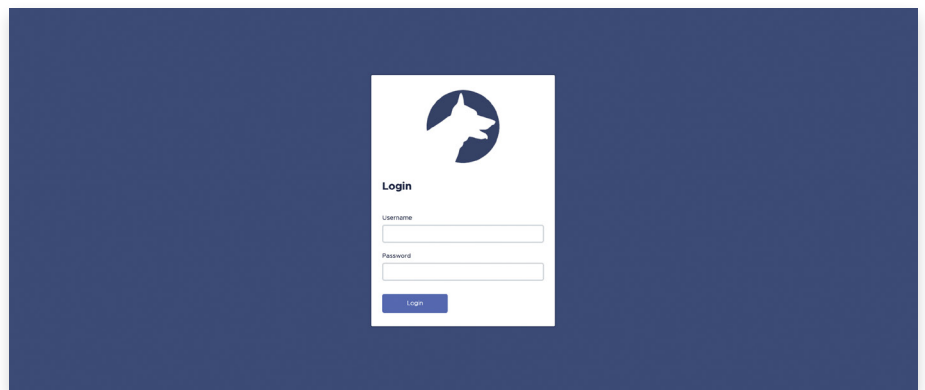


# Modern Web Interface

While PTP Track Hound v1 was a monolithic application that was unable to capture PTP traffic without the graphical user interface running, PTP Track Hound v2 comes with an integrated web server and a modern, feature-rich Web Interface accessible via HTTP or HTTPS that can run independently of the capture service running in the background.

Both HTTP and HTTPS access can be individually configured or completely disabled.

With a Free license, the web server can only be accessed from the local device. Network access requires a Basic or Professional license.



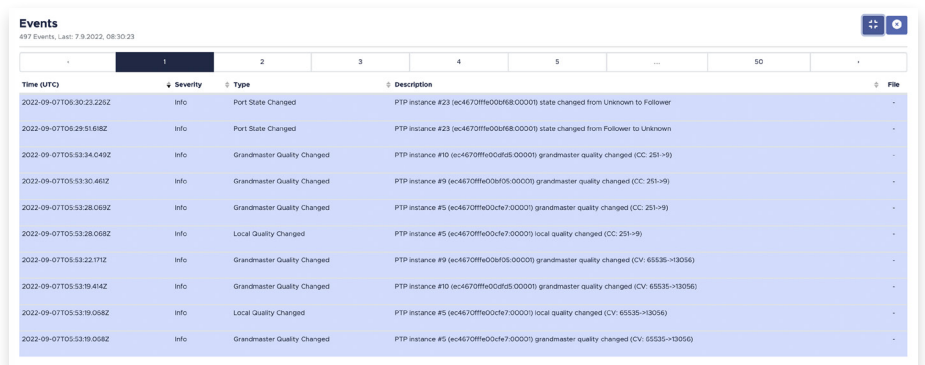
# Event Notifications via SNMP, e-mail or Syslog

PTP Track Hound v2 can send out event notifications as SNMP traps, e-mails (sent via SMTP), or syslog messages when predefined or highly customizable event conditions are triggered. This allows the software to be used as the central monitoring hub for timing-critical infrastructure.

Predefined alarm triggers: Capture Started, Capture Stopped, Scope Detected, Device Detected, Port Detected, Instance Detected, Port State Changed, Local Quality Changed, Grandmaster Quality Changed, Custom Alarm Triggered, Custom Alarm Cleared.

Custom alarms allow you to have PTP Track Hound monitor any parameter that is available via the REST API and generate an alarm as soon as the value of the parameter meets a specific condition, i.e., if the parameter equals/does not equal or is greater than/less than a specific value.

This feature requires a Professional license.



Time (UTC)	Severity	Type	Description	File
2022-09-07T06:30:23.226Z	Info	Port State Changed	PTP instance #23 (ec4670ff60002f68.00000) state changed from Unknown to Follower	-
2022-09-07T06:29:51.682Z	Info	Port State Changed	PTP instance #23 (ec4670ff60002f68.00000) state changed from Follower to Unknown	-
2022-09-07T05:53:34.049Z	Info	Grandmaster Quality Changed	PTP instance #10 (ec4670ff6000d4f5.00000) grandmaster quality changed (CC: 251->9)	-
2022-09-07T05:53:30.460Z	Info	Grandmaster Quality Changed	PTP instance #9 (ec4670ff6000b9f05.00000) grandmaster quality changed (CC: 251->9)	-
2022-09-07T05:53:28.069Z	Info	Grandmaster Quality Changed	PTP instance #5 (ec4670ff6000c47.00000) grandmaster quality changed (CC: 251->9)	-
2022-09-07T05:53:28.069Z	Info	Local Quality Changed	PTP instance #5 (ec4670ff6000c47.00000) local quality changed (CC: 251->9)	-
2022-09-07T05:53:22.072Z	Info	Grandmaster Quality Changed	PTP instance #9 (ec4670ff6000b9f05.00000) grandmaster quality changed (CV: 65535->13056)	-
2022-09-07T05:53:19.414Z	Info	Grandmaster Quality Changed	PTP instance #10 (ec4670ff6000d4f5.00000) grandmaster quality changed (CV: 65535->13056)	-
2022-09-07T05:53:19.058Z	Info	Local Quality Changed	PTP instance #5 (ec4670ff6000c47.00000) local quality changed (CV: 65535->13056)	-
2022-09-07T05:53:19.058Z	Info	Grandmaster Quality Changed	PTP instance #5 (ec4670ff6000c47.00000) grandmaster quality changed (CV: 65535->13056)	-

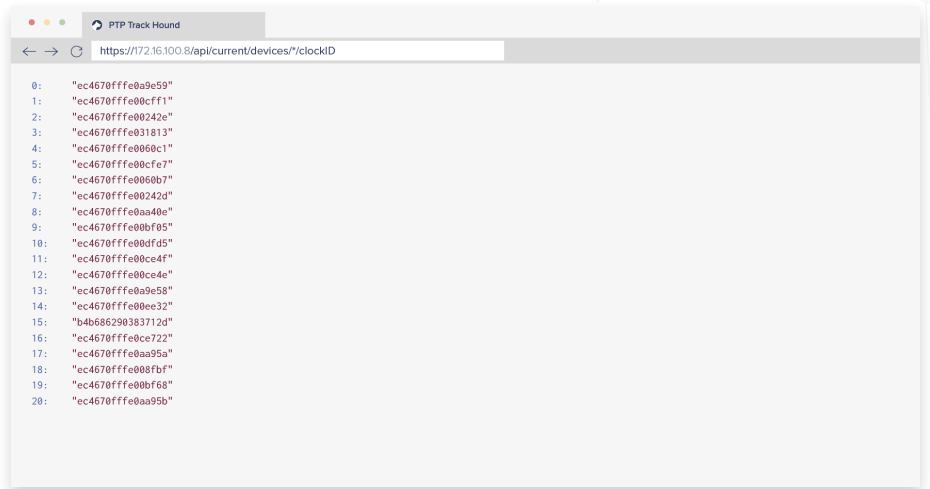
## Comprehensive REST API

For advanced infrastructure monitoring, PTP Track Hound v2 offers a comprehensive REST API that allows practically every parameter shown in the Web Interface - and even some not available via the WebUI - to be returned in JSON format by means of HTTP or HTTPS calls.

Sending a request to a wildcard path such as “/api/current/devices/\*clockID” or “/api/current/instances/\*address” will provide a response containing an array of results, such that a single request is often sufficient to obtain all the data of interest.

The REST API can be used not only to fetch data, but also modify the configuration and control the capture service.

This feature requires a Professional license.



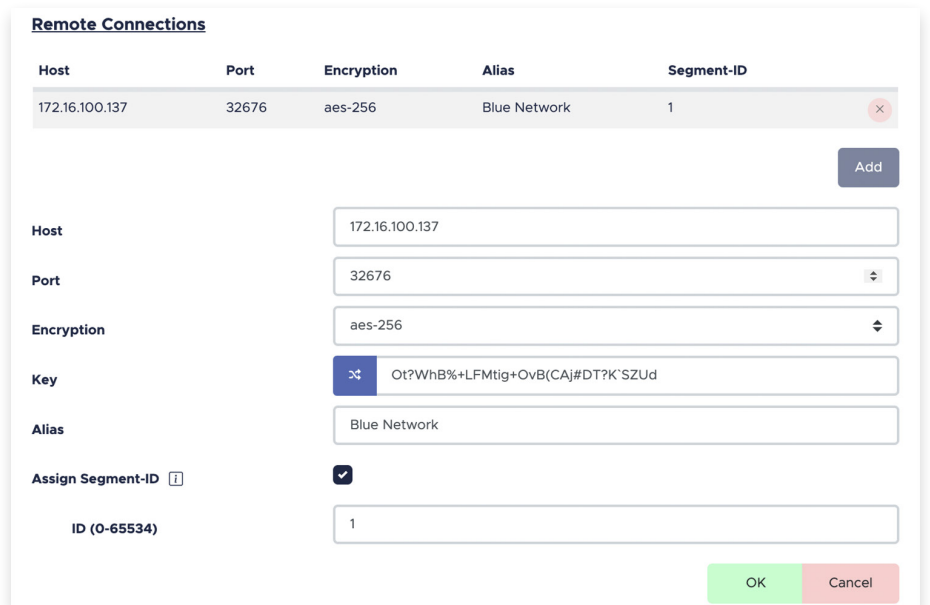
## Continuous Multi-Site Monitoring

PTP Track Hound v2 enables multiple independent capture services to be run concurrently in different networks or different segments of a network, and to forward captured sync traffic to one or more data collection instances. Such data collection instances will then capture and analyze the forwarded traffic as if it had been captured on one of its own network interfaces. Communication between the remote capture service and the data collection instance can be encrypted using pre-shared keys. It is also possible to limit access to a list of allowed IP addresses (from the perspective of the PTP Track Hound instance).

If a PTP Track Hound instance is only to be used for traffic forwarding, it is possible to completely disable the evaluation of incoming traffic.

Traffic forwarding requires a Basic license.

Central data collection instances require a Professional license.



# Licensing

PTP Track Hound v2 will be available with three different single-user license levels: **Free**, **Basic** and **Professional**.

Check the table below to find out which features are available in PTP Track Hound v1 and which extra features PTP Track Hound v2 provides at each license level.

	v1	Free	Basic	Professional
<b>Available for Windows, Linux and macOS</b> PTP Track Hound is available for the three most commonly used operating systems	✓	✓	✓	✓
<b>Dedicated Capture Service</b> Continuous sync packet capture which can be set up to run automatically in the background on system startup	✗	✓	✓	✓
<b>Integration into Native Service Management of OS</b> Can be installed to and managed by the service manager of the operating system	✗	✓	✓	✓
<b>Modern Web Interface</b> Configuration and operation via modern Web Interface (HTTP/HTTPS)	✗	✓ (access from local device only)	✓	✓
<b>Network Segmentation Support</b> Each network interface and each remote capture instance can be assigned to separate segments, allowing for per-segment capture analysis	✗	✓	✓	✓
<b>User-defined Terminology</b> Use terms like Leader and Follower, or any other terms you prefer, instead of the default PTP port state notations	✗	✓	✓	✓
<b>Dashcam Mode</b> Automated event-driven recording of PTP traffic allowing analysis of problems at any given moment in time	✗	✓	✓	✓
<b>Multi-site Monitoring</b> Run PTP Track Hound at multiple locations and forward captured sync traffic to one or more central PTP Track Hound Professional instance(s)	✗	✗	✓ (traffic forwarding only)	✓
<b>PTP Management Messages</b> Periodically send out PTP management messages to request common PTP datasets from PTP capable devices within the monitored network(s)	✗	✗	✗	✓
<b>Extensive Event Notifications</b> Send out notifications via SNMP traps, e-mail (SMTP) or syslog messages when predefined or highly customizable event conditions are triggered	✗	✗	✗	✓
<b>REST API</b> Acquire all of the data provided in the Web Interface via REST API (HTTP/HTTPS)	✗	✗	✗	✓