



The Synchronization Experts.



PTP Track Hound v2

IEEE 1588 / PTP Debugging & Monitoring

The screenshot displays the PTP Track Hound v2 interface with the following sections:

- Traffic:** Shows a total packet count of 23,217,893. A table lists statistics for In Store, PTPv1, and PTPv2, including Announce, Sync, Request, and Response counts.
- Recent Announce Messages:** A table listing message details such as Source, From, VLAN, Version, Domain, and Sequence ID.
- Total Packets/s:** A summary table showing rates for PTPv1, PTPv2.0, and PTPv2.1.
- Events:** A log of system events with columns for Time (UTC), Severity, Type, and Description.
- Scopes:** A grid of 10 scopes, each representing a different PTP clock or domain, with details on version, domain, protocol, and VLAN.

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.

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
3098443	USB-GbE interface	Follow Up Message	192.27.00.00	none	PTPv2	3	883
3098443	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv2	127	88373
3098444	USB-GbE interface	Announce Message	192.27.00.83	none	PTPv2	127	89966
3098445	USB-GbE interface	Announce Message	192.27.00.144	none	PTPv2	126	80271
3098446	USB-GbE interface	Sync Message	192.27.00.144	none	PTPv2	126	35004
3098447	USB-GbE interface	Follow Up Message	192.27.00.144	none	PTPv2	126	35004
3098448	USB-GbE interface	Peer Delay Request	192.27.00.00	none	PTPv2	3	290
3098449	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv2	0	33018
3098450	USB-GbE interface	Follow Up Message	192.27.00.83	none	PTPv2	0	33018
3098451	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv2	127	88274
3098452	USB-GbE interface	Sync Message	192.27.00.144	none	PTPv2	126	35005
3098453	USB-GbE interface	Follow Up Message	192.27.00.144	none	PTPv2	126	35005
3098454	USB-GbE interface	Announce Message	192.27.00.83	none	PTPv2	127	89966
3098455	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv2	127	88375
3098456	USB-GbE interface	Announce Message	192.27.00.144	none	PTPv2	126	80272
3098457	USB-GbE interface	Sync Message	192.27.00.144	none	PTPv2	126	35006
3098458	USB-GbE interface	Follow Up Message	192.27.00.144	none	PTPv2	126	35006
3098459	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv1	_DPLT	25865
3098460	USB-GbE interface	Follow Up Message	192.27.00.83	none	PTPv1	_DPLT	25829
3098461	USB-GbE interface	Sync Message	192.27.00.83	none	PTPv2	127	88376

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.

Management Message

192.27.00.246 none PTPv2 126 0

ID: PTPv22881

Source: USB-GbE interface

Remote Packet: false

Capture Time: 2022-09-07T10:17:38.916238

Processing Time: 2022-09-07T10:17:38.937628

Type: Management Message

Protocol: PTPv2

VLAN: none

Version: PTPv2

Domain: 126

Sequence ID: 0

From: 192.27.000.246

To: 294.01.029

Port Identity: e483709b039193.00001

Duplicate Packet: false

Management TLV

Type: Management TLV (0x0001)

Length: 24

Management ID: PTPv2 Data Set (0x0002)

Parent Port Identity: e483709b039193.00001

State: 0

Reserved: 150

Observed Offset Scaled Log Variance: 012232

Observed Clock Phase Change Rate: 2142.803647

Grandmaster Priority: 128

Grandmaster Clock Class: 6

Grandmaster Clock Accuracy: within 100 ns (0x2)

Grandmaster Clock Variance: 15923

Grandmaster Priority2: 128

Grandmaster Clock ID: e483709b039193

0x0000 01 00 5a 00 01 81 4c 46 70 03 18 13 08 00 45 00

0x0070 00 72 7e 34 80 00 05 7f 64 54 8c 7b 64 76 89 00

0x0080 0f 0f 0f 4d 0f 4d 0f 4d 0f 4d 0f 4d 0f 4d 0f 4d 0f

0x0090 04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

0x00a0 70 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f 7f

0x00b0 03 00 0f 24 0f 7f 00 00 02 00 00 00 01 00 22 20 02

0x00c0 4c 46 70 7f 7f 00 80 c1 00 01 00 64 7f 7f 7f 7f 7f

0x00d0 7f 7f 80 04 21 34 7f 80 4c 46 70 7f 7f 00 60 c1 01

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.

The screenshot displays the 'Devices' section of the PTP Track Hound interface. On the left, a network diagram shows a central 'Grandmaster Clock' (Meinberg LANTIME M3000) connected to three 'Slave Clock' devices (Meinberg M3000) via PTPv2 domains. On the right, a detailed view of a selected device is shown, including its PTP ID (4), type (Grandmaster Clock), clock ID (ec4670ff0c06c7), and various metadata fields like Model Name, Hardware Revision, and Vendor. Below this, a table lists all instances for this device, showing their port IDs, states, addresses, and scopes.

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).

The screenshot shows the 'Scopes' section of the PTP Track Hound interface. It features a table with columns for #, Version, Domain, Protocol, VLAN, Packets, and Instances. The current Grandmaster is identified as 172.27.101.103 (ec4670ff0c06c7). Below the table, there are sections for 'State' (Grandmaster, Follower, Not Evaluated) and 'Traffic Statistics' (Announce, Sync, Request, Response). A detailed view of a specific instance (Priority 1, 128) is also shown, including its clock class, accuracy, and variance.

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.

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 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.

Send Management Messages		<input checked="" type="checkbox"/>
Interval	<input type="text" value="60 seconds"/>	
Protocol	<input type="text" value="any"/>	
IPv6 Scope	<input type="text" value="Global scope (0x0e)"/>	
PTP Version	<input type="text" value="any"/>	
Specific PTPv1 Subdomain <small>?</small>	<input checked="" type="checkbox"/>	
PTPv1 Subdomain	<input type="text" value="_DFLT"/>	
Specific PTPv2 Domain <small>?</small>	<input type="checkbox"/>	
Loopback <small>?</small>	<input checked="" type="checkbox"/>	

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
2022-09-07T05:30:23.286Z	Info	Port State Changed	PTP Instance #23 (ec467011c0c18680000) state changed from Unknown to Follower	-
2022-09-07T05:29:51.016Z	Info	Port State Changed	PTP Instance #23 (ec467011c0c18680000) state changed from Follower to Unknown	-
2022-09-07T05:53:34.049Z	Info	Grandmaster Quality Changed	PTP Instance #10 (ec467011c0c18680000) grandmaster quality changed (CC: 251-19)	-
2022-09-07T05:53:30.461Z	Info	Grandmaster Quality Changed	PTP Instance #9 (ec467011c0c18680000) grandmaster quality changed (CC: 251-19)	-
2022-09-07T05:53:28.069Z	Info	Grandmaster Quality Changed	PTP Instance #5 (ec467011c0c18680000) grandmaster quality changed (CC: 251-19)	-
2022-09-07T05:53:28.068Z	Info	Local Quality Changed	PTP Instance #5 (ec467011c0c18680000) local quality changed (CC: 251-19)	-
2022-09-07T05:53:22.717Z	Info	Grandmaster Quality Changed	PTP Instance #9 (ec467011c0c18680000) grandmaster quality changed (CV: 65535-13056)	-
2022-09-07T05:53:19.414Z	Info	Grandmaster Quality Changed	PTP Instance #10 (ec467011c0c18680000) grandmaster quality changed (CV: 65535-13056)	-
2022-09-07T05:53:19.068Z	Info	Local Quality Changed	PTP Instance #5 (ec467011c0c18680000) local quality changed (CV: 65535-13056)	-
2022-09-07T05:53:19.068Z	Info	Grandmaster Quality Changed	PTP Instance #5 (ec467011c0c18680000) grandmaster quality changed (CV: 65535-13056)	-

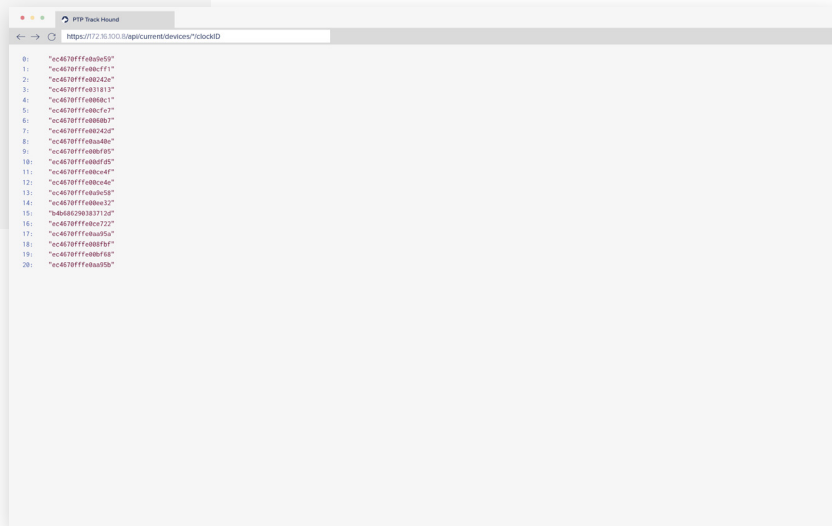
Comprehensive REST API

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.



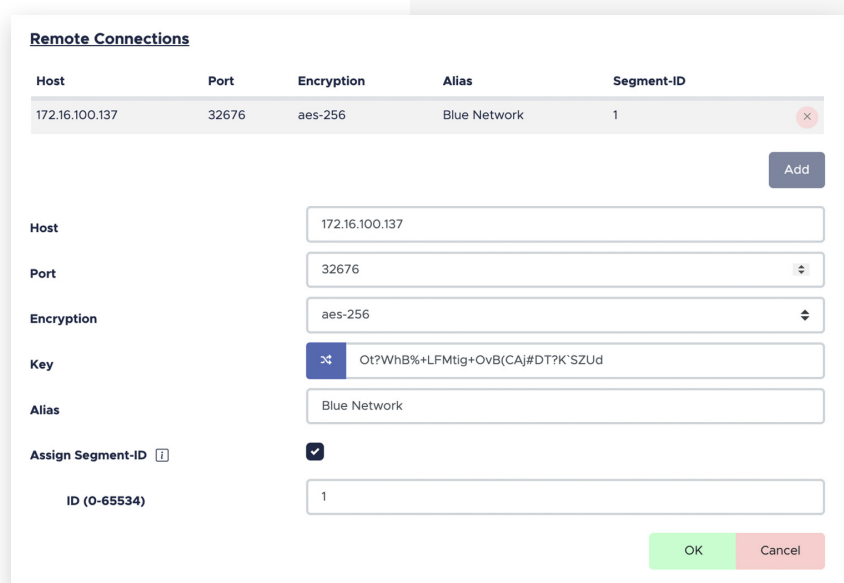
Continuous Multi-Site Monitoring

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.



License Comparison

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

Get in Touch

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The Synchronization Experts.

A foremost innovator of the synchronization industry with longstanding roots in Bad Pyrmont, Germany, Meinberg is a family-owned company with over four decades of world-leading expertise in developing and manufacturing a range of high-end synchronization technology, including high-end PTP & NTP servers, receiver technology for satellite & radio synchronization signals, time code generators & readers, and an array of related accessories such as antennas, converters, and signal distribution systems.

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