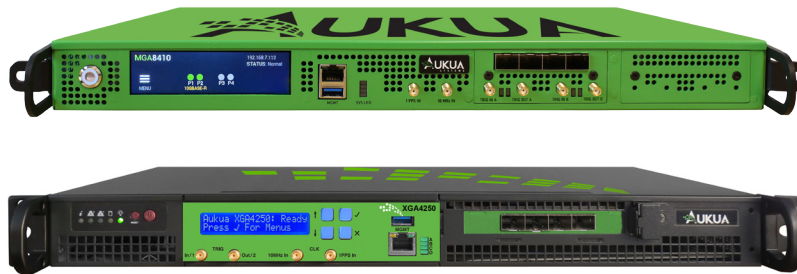


Comprehensive PTP Testing with Aukua's 3-in-1 Solution

Overview

Aukua supports all PTP (Precision Timing Protocol) or IEEE 1588 profiles, including TSN's 802.3AS (gPTP) as well as those used in Automotive, Audio/Video, Industrial, and 5G O-RAN applications. With a unified 3-in-1 platform combining inline capture and analysis, traffic generation, and network impairment emulation, users can perform robust testing, validation, and troubleshooting of PTP implementations.



Industry's only 3-in-1 testing solution for PTP and TSN

Inline Capture Analyzer

Aukua's Inline Capture Analyzer allows you to capture PTP packets with the industry's most precise, hardware-based, 1ns timestamp information and troubleshoot with complete visibility.

Key Capabilities:

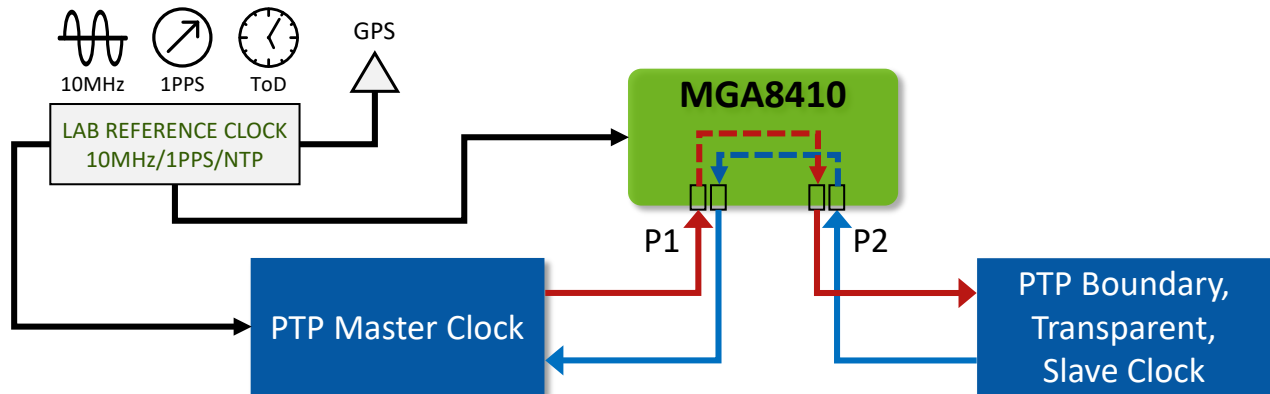
- 1ns hardware timestamp precision for all captured packets.
- Advanced filtering and triggering functions that allow verification of protocol conformance and the ability to troubleshoot interoperability problems.
- **Unique to Aukua:** Simultaneous capture of PTP, SyncE messages, and events (including 1PPS rising and falling edge signal events) all time-correlated in a single capture file.
- Transparent operation supporting Synchronous Ethernet.

Use Cases:

- **Protocol Conformance and Interoperability Testing**
Capture PTP packets and verify compliance with IEEE 1588 specifications. Place the Aukua test platform inline with transparent operation to enable better visibility and faster troubleshooting.

- **PDV (Packet Delay Variation) Measurement**

Extract very precise PDV or packet jitter characteristics for analysis and performance validation. Capture all or only the packets of interest, such as PTPv2 Sync Messages.



Aukua's Inline Capture Analyzer connected inline for analysis, visibility, and advanced troubleshooting

Network Impairment Emulator

The Aukua Network Emulator provides real-world performance testing, negative testing, and functional testing of PTP.

Key Capabilities:

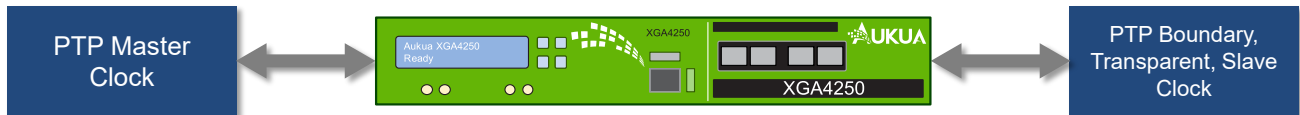
- Simulate delay, loss, asymmetry, and congestion to evaluate system limits.
- Drop or corrupt targeted PTP messages (e.g., Sync, Follow_Up) to assess error handling.
- Create link stability issues and verify Ethernet OAM failover mechanisms.
- Repeatable test scenarios for both pre-deployment and post-deployment environments.

Use Cases:

- **Performance Characterization**
Determine the max allowable PDV, delay, or asymmetry that still yields acceptable PTP performance.
- **Negative Testing**
Introduce impairments to specific protocol elements and evaluate the resilience of the system. Example: Target specific protocol messages for impairment.
- **Application Tuning**
Provides information that allows you to tune and optimize the protocol stack and hardware for real-world deployments.

- **Post-deployment troubleshooting**

Reproduce end-customer issues by adding realism in the lab and reduce risk by verifying those fixes against production network conditions before releasing.



*Aukua's **Network Impairment Emulator** connects inline to inject impairments for real-world performance testing*

Traffic Generator/ Analyzer

Aukua's Traffic Generator includes a powerful PCAP Player for generating PTP message streams.

Key Capabilities:

- Playback any series of 1588 PTP packet sequences with full control.
- Trigger-based start enables synchronization with external events or other systems.
- 802.3br MAC preemption support.
- Automation ready, making it ideal for regression and batch testing.

Support for Time-Sensitive Networking (TSN):

Aukua offers industry-unique capabilities for testing TSN environments including:

- Capability to conduct performance testing and troubleshooting of 802.1AS as described.
- MAC Preemption testing with IEEE 802.1Qbu and 802.3br support.
- Ability to help verify IEEE 802.1CB Frame Replication and Elimination functions.
- 3-in-1 integration (Inline Analyzer, Network Emulator, Traffic Generator) in a single system!
- Full test automation support.
- Extensive interface support featuring optical fiber, automotive, and industrial interfaces (BASE-R, BASE-X, BASE-T, BASE-T1, BASE-T1S).

Conclusion

By leveraging Aukua's integrated platform, users can fully implement and validate PTP across a wide range of real-world conditions. Whether it's verifying IEEE 1588 compliance, simulating impairment scenarios, or optimizing synchronization under TSN constraints, Aukua provides unmatched precision, flexibility, and insight.