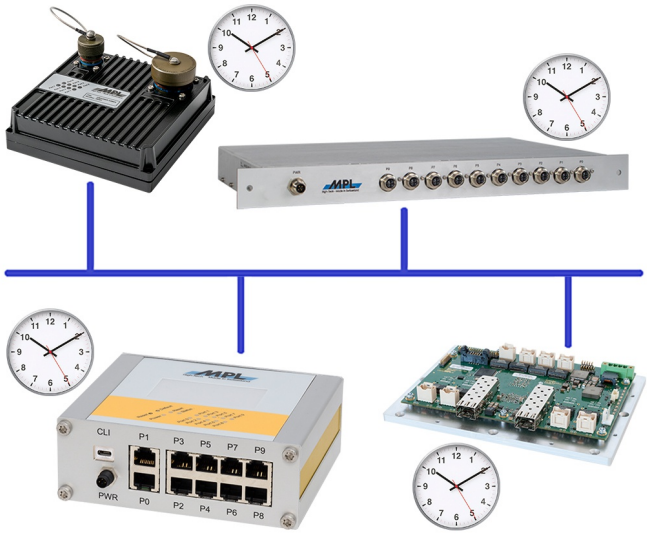
Precise time synchronization at hardware level:
gPTP (Generalized Precision Time Protocol)
TSN profile : 802.1AS



MPL AG - developer and manufacturer of embedded boards, industrial computers, as well as firewalls, routers, switches and media converters in the industrial temperature range (-40°C to 85°C), announces the support of its switches with the TSN protocol 802.1AS (gPTP). The gPTP support is included for the first time in firmware version V0.5.5. For already delivered Switches, the function can be added with a firmware update.

TSN (Time Sensitive Networking) is an extension of standard Ethernet and adds real-time capability. TSN is also a profile of the IEEE 1588 standards for fast hardware time synchronization. In the IIoT, where the OPC UA protocol dominates, there will also be TSN support in the future, as a uniform real-time communication standard is essential for interoperability. It is being promoted by well-known companies in the field of industrial automation systems. This extends to the addition of 5G networks to industrial Ethernet networks.

With gPTP (Generalized Precision Time Protocol) it is possible to precisely synchronize distributed systems in time and safety critical applications. This is done through the high-precision, fast synchronization of the timers of all network participants in a distributed system. In contrast to software synchronization via the Internet NTP (Network Time Protocol), where the maximum deviation is in the millisecond range, computer synchronization in the sub-microsecond range is possible with gPTP, which is a prerequisite for real-time Ethernet.

The high precision of the gPTP profile is achieved through peer-to-peer communication that only takes place on layer 2 (MAC layer) of the ISO/OSI reference model. Since all information is transmitted with the MAC address reserved by the IEEE Standards Association (IEEE SA), these PDUs (Protocol Data Units) are able to tunnel through ports that are blocked by the Spanning Tree Protocol. This enables the BCMA (Best Clock Master Algorithm) to form its own "Spanning Tree" with the shortest route to the "Grand Master". The "Grand Master" exists only once in the domain and periodically initializes the synchronization of the clocks via the master port.

The peer-to-peer communication optimizes the time convergence in the event of a failed "Grand Master". The gPTP therefore requires that all nodes in the domain have the same time. In this way, the respective jitter and time synchronization requirements for time-critical applications are met. The same time base also simplifies maintenance / troubleshooting.

Applications can be found in the infotainment area with audio and video transmission, as well as in robotics and in the automotive area for synchronizing different networks at the field level, which requires compatibility with the automotive Ethernet. In contrast to IEEE 1588v2, which supports up to 127 domains, IEEE 802.1AS only uses one gPTP domain (domain 0).

IEEE 1588 was specified 3 years before IEEE 802.1AS, which is why special profiles have already been developed, such as for the energy market (IEC 61850). TSN and 1588 networks are not directly compatible and require bridging with compatible hardware. However, TSN always requires gPTP compliant switches.

The MPL switches offer the option of upgrading via firmware and are therefore a safe choice for future use in your industrial networks. MPL AG currently supports gPTP with the switches of the MAGBES, µMAGBES and MAXBES Families, as well as their "Open Frame variant" for easy integration into distributed embedded systems.

Detailed information can be found in the "Managed Switch Family - Technical Reference Manual" (https://www.mpl.ch/t28712.html)

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