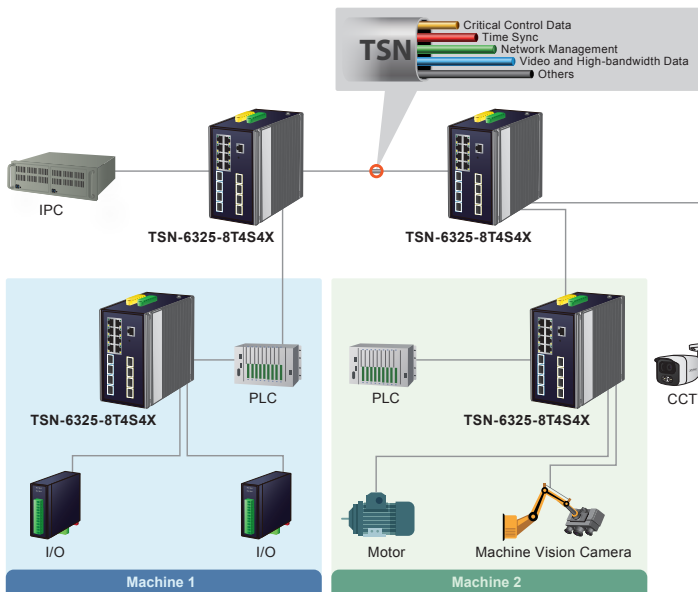


The TSN-6325-8T4S4X supports TSN IEEE standards needed for a complete real-time communication solution. These include IEEE 802.1AS-REV profile for time synchronization, IEEE **802.1Qbv** Enhancements for Scheduled Traffic, IEEE 802.1Qbu Frame Preemption, IEEE 802.3br Interspersing Express Traffic (IET), IEEE **802.1Qci** for per-stream filtering and policing (**PSFP**) and IEEE **802.1CB** frame replication and elimination for reliability (FRER) for seamless redundancy.

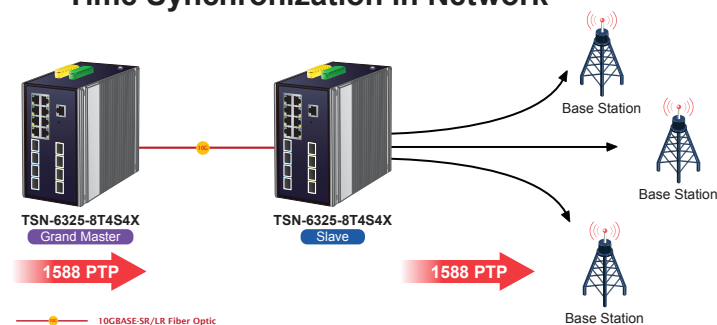
The TSN-6325-8T4S4X eliminates the need for separating information technology (IT) and operational technology (OT) Ethernet networks, providing a more ubiquitous approach to synchronization and precision timing for today's industrial automation systems.



1588 Time Protocol for Industrial Computing Networks

The TSN-6325-8T4S4X features IEEE 1588v2 PTP (Precision Time Protocol) with hardware-based time stamping for precise time synchronization of networks, and support for **Boundary Clock**, **End to End** and **Peer to Peer Transparent Clock** modes. It is ideal for telecom and carrier Ethernet applications, supporting MEF service delivery and timing over packet solutions for IEEE 1588 and synchronous Ethernet.

Time Synchronization in Network



10GBASE-X SFP+ High-bandwidth Interfaces for Diversified Bandwidth Applications

The TSN-6325-8T4S4X has the capability to reach a high speed of 10Gbps over fiber-optic cabling which helps to accelerate the performance of large data transmission.

• Delay Reduction

- IEEE 802.1Qbu Frame Preemption
- IEEE 802.3br Interspersing Express Traffic (IET)

Layer 3 IP Routing Features

- IPv4 dynamic routing protocol supports RIPv2 and OSPFv2 and IPv6 OSPFv3
- IPv6 dynamic routing protocol supports OSPFv3
- IPv4/IPv6 hardware static routing
- Routing interface provides per VLAN routing mode

Layer 2 Features

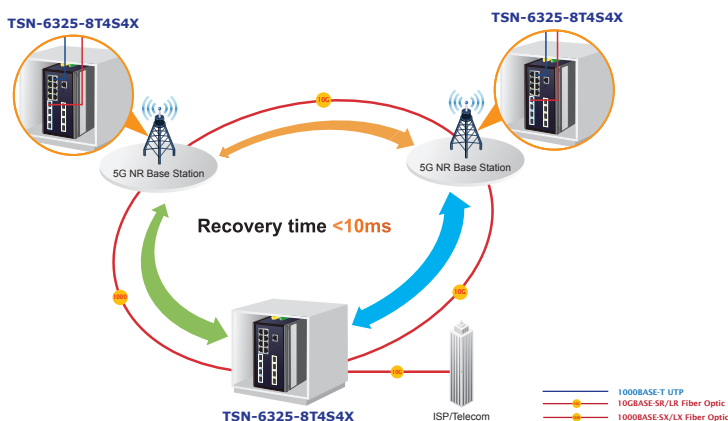
- High performance of Store-and-Forward architecture, and runt/CRC filtering eliminates erroneous packets to optimize the network bandwidth
- Storm control support
 - Broadcast/Multicast/Unknown unicast
- Supports **VLAN**
 - IEEE 802.1Q tagged VLAN
 - Supports provider bridging (VLAN Q-in-Q IEEE 802.1ad)
 - Private VLAN Edge (PVE)
 - Protocol-based VLAN
 - MAC-based VLAN
 - Voice VLAN
 - GVRP (GARP VLAN Registration Protocol)
- Supports **Spanning Tree Protocol**
 - IEEE 802.1D Spanning Tree Protocol (STP)
 - IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
 - IEEE 802.1s Multiple Spanning Tree Protocol (MSTP), spanning tree by VLAN
 - BPDU Guard
- Supports **Link Aggregation**
 - 802.3ad Link Aggregation Control Protocol (LACP)
 - Cisco ether-channel (static trunk)
 - Maximum 8 trunk groups, with 16 ports for each trunk
- Provides port mirror (many-to-1)
- Port mirroring to monitor the incoming or outgoing traffic on a particular port
- Loop protection to avoid broadcast loops
- Link Layer Discovery Protocol (LLDP)
- Compatible with Cisco uni-directional link detection(UDLD) that monitors a link between two switches and blocks the ports on both ends of the link if the link fails at any point between the two devices

The fiber-optic 10GBASE-X SFP+ interfaces support triple speeds, 10GBASE-SR/LR, 2500BASE-X and 1000BASE-SX/LX, meaning the administrator now can flexibly choose the suitable SFP/SFP+ transceiver according to the transmission distance or the transmission speed required to extend the network efficiently. The TSN-6325-8T4S4X provides broad bandwidth and powerful processing capacity.

Redundant Ring, Fast Recovery for Critical Network Applications

The TSN-6325-8T4S4X supports redundant ring technology and features strong, rapid self-recovery capability to prevent interruptions and external intrusions. It incorporates advanced **ITU-T G.8032 ERPS (Ethernet Ring Protection Switching)** technology, Spanning Tree Protocol (802.1s MSTP), and **redundant power** input system into customer's industrial automation network to enhance system reliability and uptime in harsh factory environments. In a simple ring network, the recovery time of data link can be as fast as 10ms.

ERPS Ring for Data Transmission Redundancy



Layer 3 Routing Support

The TSN-6325-8T4S4X enables the administrator to conveniently boost network efficiency by configuring Layer 3 IPv4/IPv6 VLAN static routing manually, the **RIP** (Routing Information Protocol) or **OSPF** (Open Shortest Path First) settings automatically.

The RIP can employ the hop count as a routing metric and prevent routing loops by implementing a limit on the number of hops allowed in a path from the source to a destination.

The OSPF is an interior dynamic routing protocol for autonomous system based on link state. The protocol creates a database for link state by exchanging link states among Layer 3 switches, and then uses the Shortest Path First algorithm to generate a route table based on that database.

Robust Layer 2 Features

The TSN-6325-8T4S4X can be programmed for advanced Layer 2 switch management functions such as dynamic port link aggregation, 802.1Q tagged VLAN, Q-in-Q VLAN, private VLAN, Multiple Spanning Tree Protocol (MSTP), Layer 2 to Layer 4 QoS, bandwidth control, IGMP snooping and MLD snooping. Via the aggregation of supporting ports, the TSN-6325-8T4S4X allows the operation of a high-speed trunk group that comes with multiple ports and supports fail-over as well.

- Supports G.8032 ERPS (Ethernet Ring Protection Switching)
- IEEE 1588v2 PTP (Precision Time Protocol)
- Features IEEE 802.1AS Time Synchronization, IEEE 802.1Qbu Frame Preemption, IEEE 802.1Qbv Enhancements for Scheduled Traffic and IEEE 802.1CB Seamless Redundancy

Quality of Service

- Ingress shaper and egress rate limit per port bandwidth control
- 8 priority queues on all switch ports
- Traffic classification
 - IEEE 802.1p CoS
 - ToS/DSCP/IP Precedence of IPv4/IPv6 packets
 - IP TCP/UDP port number
 - Typical network application
- Strict priority and Weighted Round Robin (WRR) CoS policies
- Supports QoS and In/Out bandwidth control on each port
- Traffic-policing on the switch port
- DSCP remarking
- Voice VLAN

Multicast

- Supports IPv4 IGMP snooping v1, v2 and v3
- Supports IPv6 MLD snooping v1 and v2
- Querier mode support
- IPv4 IGMP snooping port filtering
- IPv6 MLD snooping port filtering
- MVR (Multicast VLAN Registration)

Security

- Authentication
 - IEEE 802.1x port-based/MAC-based network access authentication
 - IEEE 802.1x authentication with guest VLAN
 - Built-in RADIUS client to cooperate with the RADIUS servers
 - RADIUS/TACACS+ users access authentication
 - Guest VLAN assigns clients to a restricted VLAN with limited services