

IEEE802.1DP TSN Profile for Aerospace Onboard Ethernet Communications

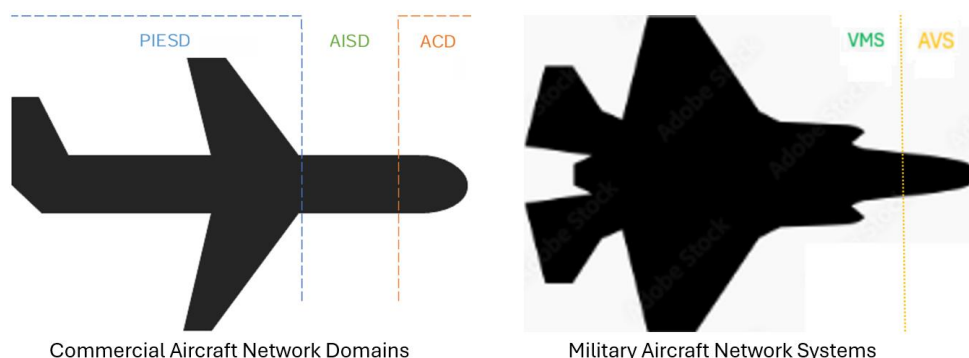
Time-Sensitive Networking (TSN) is a set of IEEE standards that provide real-time, reliable, and synchronized communication across networks – is optimized for Latency – it moves reliance on CPUs to the network's hardware.

Aerospace/Defense avionics systems must perform flawlessly and deliver data on time. TSN ensures the reliable network performance needed for critical onboard ethernet functions.

TSN will eventually replace most MIL-STD-1553 and ARINC664 Avionic network installations going forward. As TSN enhances today's speed from 1GbE to 10GbE/25GbE, this will provide even better latency and higher bandwidth.

IEEE802.1DP TSN supports a broad range of **Avionics** onboard applications including those requiring security, high availability and reliability, maintainability, and bounded latency.

Aircraft Type	Function	Determinism	Latency
Passenger Aircraft	ACD – Flight Control	High	Low
	Aircraft Control Domain (ACD) consists of systems and networks that ensure the flight is safe. This includes all flight control systems such as instruments, engine control, autopilot, warning systems for the crew, and much more. This domain has high demands on determinism, as many of these systems require strict synchronization via the network; however, the bandwidth requirement is rather low.		
	AISD – Flight and Aircraft Information Service	Medium	Medium
	Airline Information Service Domain (AISD), which covers data that is not directly necessary for the safe monitoring and control of the aircraft. This domain has medium requirements regarding determinism, as although no safety-critical data is processed, safety-relevant information must still be provided. This includes, for example, safety instructions for passengers, but also functions such as aircraft monitoring and diagnostics and communication with the ground station to transmit weather information and other flight data.		
	PIESD – Passenger Entertainment and Services	Low	High
	Passenger Entertainment and Network Services Domain (PIESD), which basically handles network and entertainment services for passenger services. This includes audio and video transmission, passenger Wi-Fi, light and temperature control, and much more. This domain is characterized by a low requirement for determinism and higher bandwidth requirements.		
Military Aircraft	AVS Flight Control and VMS Mission Control	High	High
	Aircraft used for military purposes are usually divided into two domains, there designations can vary depending on the type of aircraft. ► The domain that covers the data areas necessary for the safe control and monitoring of the aircraft, similar to the ACD for passenger aircraft, is referred to as the Air Vehicle System (AVS). ► The second domain, called the Vehicle Mission System (VMS), is used for applications such as weapon systems, video radar, and various other sensor systems through mission planning. This domain places high demands on determinism and bandwidth.		



Spirent M1 Test Center Appliance is leading the way for testing Ethernet and TSN found onboard both Automotive and Avionics communication networks. This new space-saving platform with its built-in flexibility is designed to help accelerate time to market and ensure successful deployments of new technologies, while also improving product quality and ensuring reliable, high-quality user experience. The M1 Appliance also enables users to easily distribute test systems among multiple locations as opposed to installing them in a dedicated lab space, increasing availability and the number of end points that can be tested simultaneously.

Fully supports Avionics TSN applications up to 10GbE today



Operating Condition	Supported for 41° to 86° F (5° to 30° C) ambient temperature. 20% to 80% relative humidity
AC Input Range	100-240VAC (Autosensing)
Max Power Draw	Maximum of 2000W
Product Weight	Unit installed weight: 32 lb. (14.5 kg) Shipping weight: 42 lb. (19 kg)
Product Dimensions	2U rackmount height 20" (D) x 17.5" (W) x 3.5" (H) or 50.80cm x 44.45cm x 8.89cm

Spirent M1 Test Center performs these types of TSN tests:

- In Avionics there cannot be a single point of failure, as there are lives and the mission at risk
- Spirent M1 Test Center fully defines TSN across OSI Layers 2-3 using *realistic traffic*
- **Determinism** where the network has a sense of time and scheduling shared between network elements
- **Time Synchronization** ensuring that all network elements have a common time reference
 - **Latency Measurement Resolution** – 2.5 ns Tx timestamp resolution
- **Redundancy** where the network has multiple paths to ensure that critical data always communicates
- **Fault detection** down to the packets
 - What happens when there is babbling or silence over the network
 - What happens when there are damaged or unexpected packets over the network
- **Quality of Service (QoS)** to validate performance and compliance to latest IEEE802.1DP TSN standard, ensures repeatable results, smart fault isolation, and actionable analytics

Want to learn more and schedule a Demo...



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