Industrial Internet Consortium IoT Connectivity Stack

RELY-DDS-TSN-KIT

TSN (Time-Sensitive Networking) and DDS™ (Data Distribution Service) are the perfect combination for providing determinism, reliability, scalability and availability in critical systems.

DDS covers the needs of these systems at the databus level, while TSN is responsible of guaranteeing determinism at the networking level.

In time-sensitive applications, when both standards are merged, it results in significant savings in terms of equipment, maintenance, seamless integration of analysis services and vendor dependency.

That is why DDS together with TSN is set to become the perfect solution for approaching these requirements in the fields of autonomous vehicles, defense, healthcare, automation, aerospace, etc.

In order to allow an effective approach to **TSN combined with DDS**, RELYUM has launched the first TSN kit based on **RTI Connext® DDS**, that allows users to evaluate:

- The importance of a common sense of time based on *IEEE 1588 AS synchronization*.

- The deterministic delivery of real-time traffic thanks to the *Time Aware Shaper.*

- The benefit of bandwidth distribution and reservation between traffic classes through a *Credit Based Shaper*

- The high-availability redundancy that provides *Frame Replication and Elimination for Reliability* standard.

Specifications

RELY–DDS–TSN–KIT includes the following components used for evaluating a combination of DDS and TSN technology.

RELY–TSN–PCIe

Being the first out–of–the–box solution for TSN, it allows seamless implementation of deterministic Ethernet networks and abstracts user equipment and applications from its technical complexities.

This device combines in a single equipment *TSN Endpoint and TSN Bridge* functionalities offering 2 external fiber or copper tri–speed Ethernet ports.

As an Endpoint, it provides TSN capabilities in the device where it is hosted, enabling a *seamless integration* in a deterministic and time aware network.

The TSN standards supported by the device are:

- » Centralized Network Configuration – IEEE 802.1Qcc
- » Time Aware Shaper (TAS) – IEEE 802.1Qbv
- » Credit Based Shaper (CBS) – IEEE 802.1Qav
- » IEEE 802.1AS Synchronization
- » Frame Replication and Elimination for Reliability – IEEE 802.1CB
- » Preemption – IEEE 802.1Qbu & IEEE 802.1Br

RELY–TSN–BRIDGE

RELY–TSN–BRIDGE is a fully functional TSN switch, that supports the same TSN mechanisms as RELY–TSN–PCIe NIC.

Additionally, it contains the following parts:

- • TSN Talker: transmits two video streams to the TSN network.
- • TSN Demo webservice: provides a friendly GUI interface for:
  - » Configuring TSN parameters in the RELY–TSN–PCIe card and in the Evaluation board itself.
  - » Launching the different test contained in the demo.

For testing the performance of both TSN and DDS, the demo supports a *Connext® DDS* based application consisting on two video streams sent through different DDS domains, with different PCP values.

To do so, RELY–TSN–BRIDGE runs 2 video publishers. On the other side, the live OS supplied together with the kit runs the corresponding video subscribers for receiving the video images.

RELY–TRAF–GEN

Creates congestion scenarios for TSN validation.

ISO image for host PC

The RELY–DDS– TSN–KIT includes an ISO image containing a full O.S. with the required dependencies for running the TSN demo together with DDS in the host PC where the PCIe card has been installed.

The ISO image provides a video player and graphical tools for evaluating TSN advantages in an application using *Connext® DDS* at databus level, with no need of any specific configuration in the PC.

RELY–TSN–PCIe

RELY–TRAF–GEN

RELY–TSN–BRIDFE

ISO image for host PC

ISO

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