Time Sensitive Networking
Expertise Brief

Expert Industrial Communication needed!

Time Sensitive Networking (TSN) is an extension to traditional Ethernet networks. Today, Ethernet applications must cope with corner cases such as packet loss, delay and reordering. TSN provides deterministic latency and prevents packet loss under congestion, allowing critical and non-critical traffic to be converged in the same network.
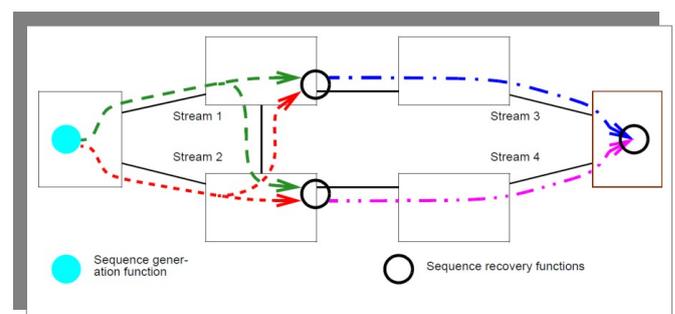
TSN enables time critical applications in many domains e.g. industrial automation, automotive networks, mobile networks, power utility, and audio video market.

TSN Main Features

Bounded Latency: this is one of the main features of a TSN-enabled network. Several IEEE 802.1 standards have been defined to enable queuing management, gating, policing and traffic shaping to ensure time-critical packets receive priority as they are being forwarded through the network.

Frame Preemption: provides low bounded latency while increasing the efficiency of the network. Very much like a green wave traffic control system in the urban domain restricted to emergency vehicles only.

Reliability: bounded latency performance must often be delivered with very high reliability. The TSN-enabled network must ensure that every packet is delivered within a given latency bound without packet loss and delay due to congestion. In addition, to account for device failure or media errors, packet replication and elimination capabilities were also defined to enable redundant links and paths.

Resource Management: configuring the TSN capabilities and managing the network and device resources is fundamental to assure end-to-end performance for time-critical traffic across the network in presence of other flows. By managing the resources in each node, the availability of buffers and timing of transmission can be guaranteed.

AimValley TSN Expertise

It is quite obvious that not only sophisticated and reliable software and TSN capable hardware is required, but also a good understanding and experience in design and realization of networking solutions. This is exactly what AimValley offers, given its long history in design and realization of connectity solutions for telecom and packet networks.

AimValley provides a wide range of expertise regarding Time Sensitive Networking:

- Synchronization expertise, interpretation and knowledge of synchronization standards, such as 802.1AS-REV, IEEE1588, and ITU-T G.82xx frequency and Time of Day synchronization.
- Consultancy and architectural support for; a.o selection of key synchronization components. Including FPGA and PCB design and testing, considering signal integrity, PLL bandwidth and hold-over performance
- Customized low and high speed hardware design including Single Pair Ethernet (SPE) variants, Power over Ether, Power-over-Data-Line (PoDL)
- Software and firmware designs for reliable and resilient solutions including TSN frame replication and elimination.

A more detailed overview of AimValley's expertise on synchronization is described in expertise brief: AimValley Synchronization.

AimValley Proven Track Record

Our expertise is successfully deployed in various product designs across many industry sectors. From telecom operators to the transport sector (Railway/Aviation) our design services include software design, test and integration; drivers, communication stacks, OS independent services and security solutions. Our TSN expertise has been incorporated in the design of NXP evaluation boards, types SJA1105 and SJA1110.

The design is based on switch silicon from various vendors to create TSN enabled packet switch product designs:
- Network Demarcation Devices
- Custom Railway Switches
- In-flight Entertainment Systems
- Mobile Fronthaul Solutions

AimValley's product development can include system verification and robustness testing and solutions can be delivered as prototype or for mass production.

Why AimValley?

AimValley is a reliable provider of timing solutions since 2003, delivering products for:
- High speed data processing applications
- Complex FPGA-based accelerated systems
- High speed, low power hardware equipment
- Robust embedded software
- Early adopter of Acceleration Technology

Delivering Solutions for a Connected World

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AimValley understands the full complexities as well as the subtle nuances of designing great edge solutions. We excel in building complex systems that are part of your product in the fields of Industry 4.0, Big Data, Healthcare and Transportation markets. Our combined skills represent all the important aspects required for the development of end-to-end systems.

Our customers enjoy the benefits of working with a strong team with more than 2 000 years engineering experience. AimValley is a trusted partner of Tier 1 customers in Telecom and Industrial markets and has shipped more than 100 000 products.

Quality Focus
- Outstanding track record of on-time delivery
- Best in Class Designs – Time, Budget & Quality
- ISO9001, ISO140001, Ecovadis Platinum CSR

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