CAST NEWS

CAST Releases TSN Ethernet Subsystem for Automotive and Industrial Applications

TSN Reference Design also available was used in
live demonstrations of Ethernet Time-Sensitive Networking at DAC

DESIGN AUTOMATION CONFERENCE—SAN FRANCISCO, CALIFORNIA, USA—June 29, 2018— Semiconductor intellectual property provider CAST, Inc. concluded Design Automation Conference (DAC) week by announcing the only available IP subsystem implementing the latest IEEE standards for Time Sensitive Networking (TSN) over Ethernet.

Editor John Blyler and CAST CEO Nikos Zervas discuss Automotive TSN Ethernet with the demo system at DAC.

TSN Ethernet has emerged as the preferred new bus for automotive and similarly challenging industrial applications. The new TSN_CTRL Ethernet Subsystem enables system designers to manage the ultra-low-latency communication and quality of service (QoS) attributes required for today's increasingly sophisticated vehicles. It can, for example, ensure that a signal from obstacle avoidance sensors is given immediate processing with higher priority over competing signals from tire pressure sensors or the infotainment system, all without disturbing the critical network traffic related to engine or braking control.

The new TSN_CTRL Subsystem combines three essential IP cores to enable the high-precision timing synchronization and flexible yet accurate traffic scheduling needed to implement TSN Ethernet endpoints, bridges and switches:

- a Time Synchronizer implements IEEE 802.1AS, automatically synchronizing the local time to the system's (Grandmaster's) time and generating timestamps and alerts needed for the development of time-aware nodes and applications;
- a Traffic Shaper implements IEEE 802.1Qav and 802.1Qbv, providing bandwidth allocation and time multiplexing for up to eight traffic classes to ensure sufficiently low latency (delay) and minimum jitter as required; and

— *more* —

- a specially-designed Ethernet MAC with ultra-low latency (delay) provides standards-based Ethernet functionality that works well with the Time Sensitive Networking.

The configurable TSN_CTRL IP implements a hardware subsystem that operates without software assistance once programmed. It communicates timing information to the system, and allows the system to define and tune in real time the traffic shaping parameters according to an application's requirements.

The TSN_CTRL Subsystem uses standard AMBA® or Avalon® interfaces for straightforward system integration. Its configuration and status registers are accessible via a 32-bit-wide AXI4-Lite or Avalon-MM bus, and packet data are input and output via AXI-Streaming or Avalon ST interfaces with 8-bit data buses.

A complete TSN Reference Design is available for evaluation or to jumpstart system design. It implements a network bridge receiving three types of traffic:

a) a video stream captured from an HDMI port, compressed with the CAST H.264 low-latency encoder core and streamed over RTP and UDP,

b) a "sensor" signaling every 100msec, and

c) a programmable "other traffic" generator emulating other types of traffic on the backbone.

Without TSN traffic shaping, the three sources compete for bandwidth, resulting in packet loss, dropped video frames, and considerable sensor signal jitter. But with TSN traffic shaping, bandwidth can be reserved per traffic source, and specific time slots can be assigned for the delivery of each traffic source. This allows, for example, the video to be delivered at its full bit rate and hence without any frames loss, and the sensor signals to be delivered with minimum latency and no jitter.

The TSN_CTRL Ethernet Subsystem is sourced from Fraunhofer IPMS. It is available now, in synthesizable RTL or as a targeted FPGA netlist.

About CAST

In addition to the TSN Ethernet Subsystem and other leading automotive interface cores, CAST offers a range of compression solutions and image processing functions; 8051 microcontrollers and extreme-low-power 32-bit BA2X™ processors; and a variety of peripherals, interfaces, security, and other IP cores. CAST IP features easy integration and reuse, straightforward licensing, and availability for ASICs or FPGAs from all leading silicon providers. Learn more by visiting www.cast-inc.com, emailing info@cast-inc.com, or calling +1 201.391.8300.

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