Arion IP Evaluation Platform
Automotive Ethernet Switch IP for Advanced Automotive Architectures

Key Benefits

- Demonstrates automotive Ethernet switch IP core technology with advanced IEEE TSN implementation for efficient design and integration of domain/zonal architectures
- Enables evaluation of complete hardware and software package with pre-installed switch configuration GUI tool
- Enables soft-time and real-time mixed operation and capabilities of different Ethernet services integrated on one device
- Availability: Q2 / 2021

TTTech’s Arion IP Evaluation Platform is an Ethernet switch IP core technology demonstrator based on our proven automotive Ethernet switch IP designed for advanced integrated applications in the automotive sector. This IP enables efficient design and integration of future automotive E/E architectures at lower BOM costs and with higher maximum network bandwidth utilization. Arion IP is designed to allow OEMs and Tier 1s to integrate more functions at lower backbone communication line speed and supports robust integration without interferences. It supports scalable packet inspection and future advanced protocol extensions. The Arion IP enables full compliance with OpenTC11 and IEEE TSN protocols (802.1Qci, 802.1CB, 802.1Qbv, 802.1AS) to support mixed soft-time, real-time and hard real-time traffic. A flexible and user-friendly switch configuration tool is included.

IEEE 802.1AS and IEEE 1588 v2 Time Synch
Profile of IEEE 1588 v2 for synchronization of clocks in the network. Supports timing requirements for scheduled TSN networks with gPTP / 802.1AS, and TC P2P.

IEEE 802.1Qci Filtering and Policing
Protects against faulty and/or malicious endpoints and switches. Isolates faults to specific regions in the network. MEF 10.3 three-color policing and time-window policing for fast control loops and non-interference.

IEEE 802.1Qbv Enhancements for Scheduled Traffic
Enables accurate timing control and design of deterministic embedded applications.

IEEE 802.1CB Seamless Redundancy
Enables seamless redundancy for increased network availability. Allows for multi-path and network redundancy for individual TSN streams.

Deep Packet Inspection
Enables scalable packet content inspection and integration and design of security solutions.

Statistics and Extended Monitoring Options
Simplifies integration and verification of network integration.

Fields
- Automotive
- Special / Off-Highway Vehicle

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## Arion IP Features

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<th>Feature</th>
<th>Description</th>
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<td><strong>Ports</strong></td>
<td>Max. 11 ports with 10/100/1000 Mbit/s or 1-2.5 Gb/s; max. 2x 2.5 Gb/s</td>
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<td><strong>IP interfaces</strong></td>
<td>MII, GMII, RMII, RGMII, SGMII, gPTP Pulse-Driven Synchronization</td>
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| **TSN**                                      | IEEE 802.1AS Time Synchronization supported in IP  
IEEE 802.1Qbv Scheduled Traffic  
IEEE 802.1Qci Filtering and Policing  
IEEE 802.1CB Frame Replication and Elimination  
Low-Jitter 802.1Qbv implementation                                                                 |
| **AVB**                                      | IEEE 802.1AS Time Synchronization for Time-Sensitive Applications (gPTP) supported in IP  
IEEE 802.1Qav Forwarding and Queuing for Time-Sensitive Streams (FQTSS)  
IEEE 802.1Qat supported in IP                                                                 |
| **Partitioned best-effort traffic (design-in non-interference)** | Legacy endpoint traffic can be configured as full TSN-like quality of service with total isolation and non-interference |
| **Open TC11**                                | Open TC 11 Automotive Compliance                                                                                                     |
| **IEEE 802.1Q**                              | Port-based VLANs and VLAN tagging  
Prioritization of packets on egress ports  
Tagging/Untagging of VLAN frames on ingress/egress ports  
Line Speed Retagging                                                                 |
| **Clock synchronization**                    | IEEE 802.1AS support  
SAE AS6802 synchronization  
IEEE 1588-2008 layer 2 one-step P2P TC transparent clock support                                                                 |
| **Switching engine**                         | Store and forward architecture with full cross-sectional non-blocking bandwidth of 8 Gb/s  
256 kB frame buffer  
IPv4/IPv6 routing supported in ASIC variant (based on 128 Byte entries)  
4096 VLANs  
Up to 1024 entry MAC address hash/CAM (FPGA) or TCAM (ASIC)-based learning table  
Up to 4096 stream/flow policers per switch  
Up to 1024 MAC address filters  
80 asynchronous traffic shapers (CBS) per switch  
Red, Yellow, Green traffic classes MEF 10.3 (QCI)  
Static and dynamic configuration of MAC addresses  
Flow identification-based MAC addresses  
Ingress rate-limiting on a per-port and per-MAC unicast, multicast, and broadcast traffic (supported on two ports in the Evaluation Platform FPGA)  
VLAN Mirroring  
Virtual Switch Management (2-4 switches can be configured to operate as one switch)                                                                 |
| **FPGA limitations**                         | The Evaluation Platform Arion IP is hosted on a FPGA board; compared to the full Arion IP capabilities listed above, it has the following limitations:  
- xMII, ext. interfaces are RMII only, 4 ports (100/1000Mb/s) supported in the evaluation platform  
- 64 MAC addresses  
- 32 CBS shapers for AVB  
- Packet Inspection TCAM entries are limited to 32 entries and 16Byte depth  
- Max. 1 Gb/s line bandwidth                                                                 |
| **Software**                                 | Ethernet Switch Configuration Tool                                                                                                 |
| **Product number**                           | 13744                                                                                                                                    |