Profile Building-Blocks

IEEE P802.1DG
Automotive TSN Profile
Modular Profile Overview

- TAS
- XOR
- eMAC
- Basic TSN
- Time Sync

Incremental connections between modules.
Time Sync Automotive.1AS Profile

• Bridge: support at least 2 Domains (IDs configurable, same “accuracy”)
  • CMLDS (one way)
• End Station (time receiver): Single Domain required only (ID configurable)
• Try to align with Aerospace/Autosar
  • one way pDelay
  • continued Sync from Bridge after lost input
  • no BMCA - external Port Configuration only
  • no Announce
  • default message rates (Sync: 125ms, pDelay: 31.25ms)
  • Exclude Signalling Messages
• No requirements on the GM (ARB or TAI)
• Exclude ASdm - Redundancy
• Exclude ASds - 10BASE-T1S
Basic TSN Profile Extension - Page 1

- **Strict Priority Queuing**
  - Minimum Number of Queues (TCs) per egress Port: 8
  - Default mapping of PCP to TC Priority (.1Qci interaction?)
- **Policing using .1Qci** (max. Frame Size, max. Frame Rate - i.e. per Observation interval, ...)
- **Assume VLAN Global ARL** (not per VLAN ID)
- **Enable .1Qci Queue selection per ingress Port** (for SPQ, CBS, and ATS!)
  - Minimum number of Destination MAC and VLAN (“Null Stream”) Ident.: 128 (define wildcards!)
  - Minimum number of Source MAC and VLAN Stream Ident.: 64
  - Minimum number of IP Stream Ident.: 128 (need to define ARP and VLAN wildcards!)
  - Minimum number of Mask-and-match Stream identification: 0
  - Minimum number of Active Destination MAC and VLAN Stream identification: 0
Basic TSN Profile Extension - Page 2

- **Credit Based Shaper (CBS)**
  - Minimum number of CBS enabled Queues (TCs): 2
  - Default Priority Setting as per AVB (.1Qci interaction)
  - Configuration via OperIdleSlope (not Observation Interval) - min. granularity per Line Rate?

- **Asynchronous Traffic Shaper (ATS)**
  - Minimum number of ATS enabled Queues (TCs) per egress Port: 2
  - Minimum number of Shapers per number of ingress Ports per Queue (TC): 8
  - Minimum number of Shaper Groups (TC) per egress Port: 8
Applicability to Talkers (vs. Bridges)

- All “egress features” for a single egress Port apply
- “Ingress Ports” equate to “Applications”?
- Policing via .1Qci mandatory
Profile Extension TAS

• Add Time Aware Shaper (TAS):
  • Minimum timing accuracy per Line Rate (10MB, 100MB, 1G, 2.5G) and Mode
  • Number of Entries per Control List per Mode
  • Require continuous GateOpenTimes (per Gate OperCycleTime, i.e. allow integer multiplexing)

• Support of Phased Mode (CQF and Bus supported):
  • Minimum Number of Entries per Control List per TC per egress Port: 32

• Support of Bus Mode (CQF supported):
  • Minimum Number of Entries per Control List per TC per egress Port: 8

• Support of CQF Mode (only!):
  • Minimum Number of Queues per Port: 2

• Allow with eMAC Extension? No
• Point out dependencies on ARP, PTP, ...
• Give Latency and Configuration restrictions
Profile Extension eMAC

• Preemption
  • Minimum Number of Queues Supported for express-MAC: 1
  • Require Policing via .1Qci:
    • Frame Size
    • Frame Rate
• No shaping in eMAC queues
• Describe latency impact
• Allow with TAS Extension? No
In NONE of the Profile Blocks for Version 1

The following features are currently not mandatory for compliance with any profile extension:

• Security
• Any run-time configuration via any communication protocol (LLDP, LLRP, MAAP, NetConf, SRP, MRP, RAP, SOME/IP, UDS, ...)
• No Requirement to implement YANG or MIB DBs - Configuration parameters are “abstract”
• Enhanced Transmission Selection not required
• Frame-Replication and Frame-Recovery (“Redundancy”)