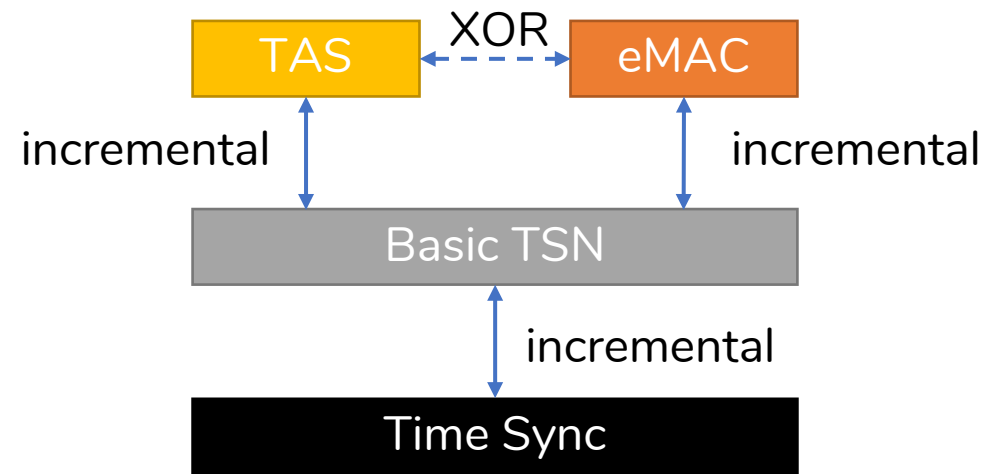




Profile Building-Blocks

IEEE P802.1DG
Automotive TSN Profile

Modular Profile Overview



Time Sync Automotive .1AS Profile







Time Sync

- 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

Basic TSN

Time Sync

- 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

Basic TSN

Time Sync

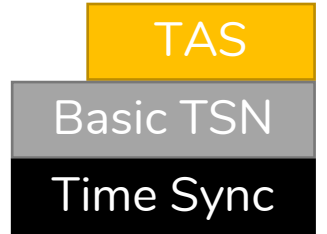
- Credit Based Shaper (CBS)
 - Minimum number of CBS enabled Queues (TCs): 2
 - Default Priority Setting as per AVB (.1Qci interaction)
 - Configuration via OperIdleSlope (not Observation Interval) - min. granularity per Line Rate?
- Asynchronous Traffic Shaper (ATS)
 - Minimum number of ATS enabled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

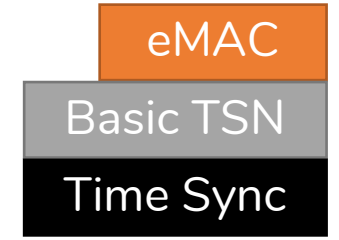
Profile Extension TAS

- 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”)



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THANK YOU

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VIRTUALIZING VEHICLE COMMUNICATION