Ethernet TSN and Security IEEE 802.1 Automotive Specification Profiles

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Purpose

What is the Problem:

The Automotive segment does not currently have a defined standards-based Roadmap or profile to define a subset of the new TSN standards. This makes an OEM definition of requirements to Tier 1&2 suppliers and implementation more difficult and costly.

Proposed Solution:

Gain IEEE 802.1 WG support and participation for the creation of a TSN Profile for Automotive Automation PAR (including both IEEE 802.1 traffic shaping, policing, and a Security profile)

Current Objective:

Gain a consensus and approval vote to start the IEEE 802.1 work toward a PAR approval

Support

Supporting IEEE 802 Attendees (short list):

Automotive OEMs:

- Dr. Kirsten Matheus – BMW
- James Lawlis – Ford
- Hideki Goto – Toyota
- Olaf Krieger – VW
- Christoph Wechsler – Audi
- Werner Winter – Daimler
- Natalie Wienckowski – General Motors
- Michael Potts – General Motors

OEM Tier1 & 2 Suppliers

- Jens Bierschenk – Bosch
- Thomas Hogenmueller – Bosch
- Helge Zinner – Continental
- Christian Boiger – b-plus
- Don Pannell – NXP

Other Supporting Organizations

- AVNu
- AUTOSAR (from WPA-2 Group & North American User Group)

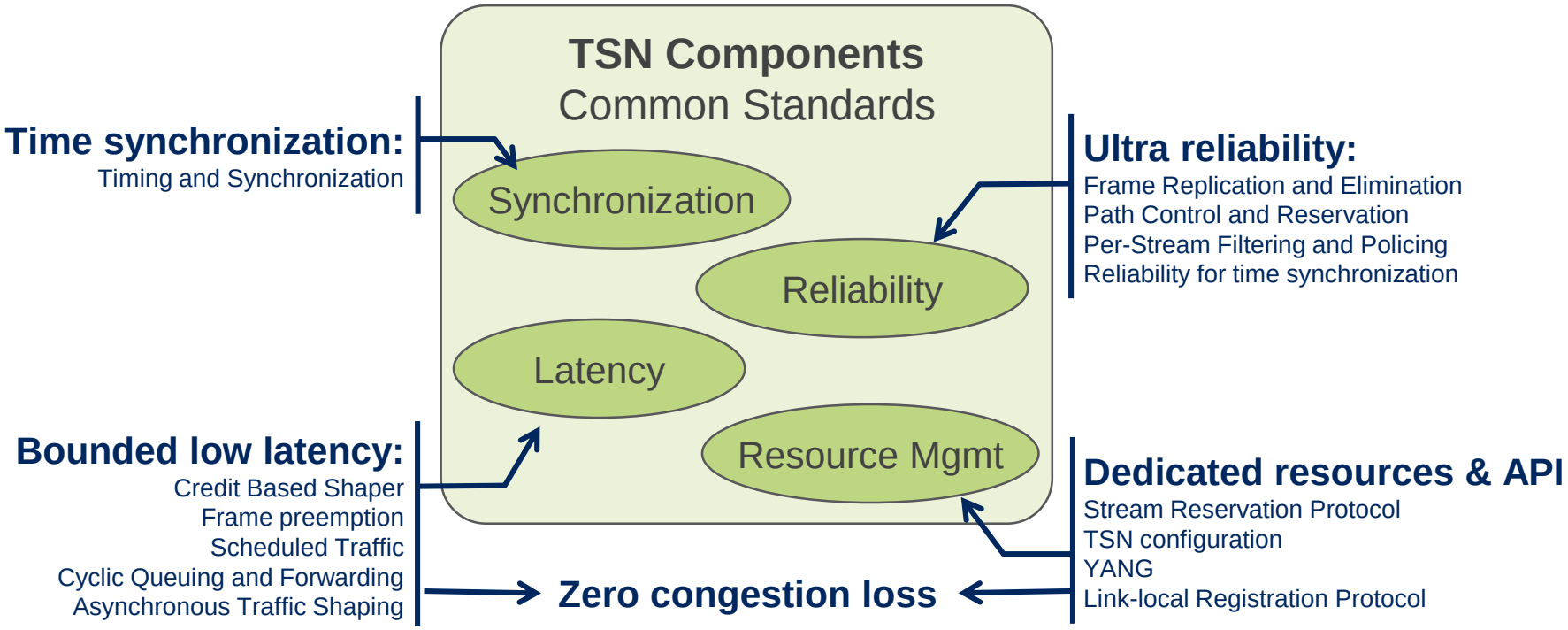
Audio Video Bridging (AVB) -> Time-Sensitive Networking (TSN)

1. IEEE 802.1 TSN standards will address automotive needs of precise time synchronization, latency guarantees and predictability, ultra-low latencies, fault tolerance, and dependability

2. IEEE 802.1 Security standards provides a foundation for:
   a) Enrollment, authentication, authorization
      Knowing what is/what is being attached to the network
   b) Data Authenticity and Integrity
      Knowing received data was transmitted by the apparent source & applying filters/policers/shapers operate only on trustworthy information

3. TSN features will enable substantial simplification of the challenging implementation of safety-critical automated driving systems
      802.1CB Seamless Network Redundancy & frame replication and Elimination

Time-Sensitive Networking (TSN)



Guaranteed data transport with bounded low latency, low delay variation, and extremely low loss

IEEE Already Has Done it – A Revisit

IEEE 802.1BA – "IEEE Standard for Local and Metropolitan Area Networks---Audio Video Bridging (AVB) Systems"

- This standard defines profiles that select features, options, configurations, defaults, protocols and procedures of bridges, stations and LANs that are necessary to build networks that are capable of transporting time sensitive audio and/or video data streams.

- The purpose of this standard is to specify defaults and profiles that manufacturers of LAN equipment can use to develop AVB-compatible LAN components, and to enable a person not skilled in networking to build a network, using those components, that does not require configuration to provide working Audio and/or Video services.

- The performance requirements of Audio Video Bridging (AVB) over various media prevents the use of some portions of other standards, and requires the selection of default operating parameters; these must be defined in order to meet the needs of the users of components built to those standards.

IEEE Already Has Done it – A Revisit

IEEE 802.1CM – "Time Sensitive Networking for Fronthaul"

- This standard defines profiles that select features, options, configurations, defaults, protocols and procedures of bridges, stations and LANs that are necessary to build networks that are capable of transporting fronthaul streams, which are time sensitive.

- The purpose of this standard is to enable the transport of time sensitive fronthaul streams in Ethernet bridged networks.

- A mobile operator's radio equipment and radio equipment controller are often separated and the connection between them has very stringent requirements… Therefore, the use and the configurations of functions defined in the IEEE 802 standards have to be specified by standard profiles for bridged fronthaul networks.

IEEE Already is Currently Doing it

IEC – IEEE 60802– "TSN Profiles for Industrial Automation"

- This is a joint project of IEC SC65C/MT9 and IEEE 802 to define TSN profiles for industrial automation. This joint work will provide a jointly developed standard that is both an IEC and an IEEE standard, i.e., a dual logo standard
- This standard defines time-sensitive networking profiles for industrial automation. The profiles select features, options, configurations, defaults, protocols, and procedures of bridges, end stations, and LANs to build industrial automation networks.

IEEE 802 Timeline & Methodology

- ~~*Presentation to TSNa in Berlin to gain consensus and participation – July 2017*~~
- ~~*Presentation to IEEE Plenary to gain Consensus – Nov 2017*~~
- ~~*Preliminary Work on project, update status – May 2018*~~
- *Presentation to 802.1 plenary – July 2018*
- *Vote to Authorize PAR development & CSD – July 2018*
- *PAR development and precirculation – Sept 2018*
- *Presentation/motion at IEEE 802 Plenary to approve PAR – Nov 2018*
- *Editor Work on project*
  - *Presentations and Contributions will be reviewed on Conference Calls*
  - *PAR Use Case inclusion will be included and discussed during Conf. calls and F2F*
- *Sponsor ballot - approximately Nov 2019*

Conclusions

- The IEEE 802.1 Standards Working Group has previously done this level of work (802.1BA and 802.1CM, IEC-IEEE 60802 Joint Project)
- The IEEE 802.1 Working Group should continue to provide this type of work to reflect the 802.1 TSN and Security work that has been recently completed.
- The IEEE 802.1 Standards Working Group should reflect the 802.1TSN and Security work in both an Automotive and Industrial profile