Title: Response to *LS S2-2007821 on TSN support in 3GPP Release-16*
From: IEEE 802.1
For: Information
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Dear colleagues,

Thank you for taking into account our comments and for the detailed explanation in your recent liaison statement S2-2007821 about the way they have been addressed.

Please find our answers to your questions below.

S2-2007821 asked:

> *Is it possible to identify the ingress and egress ports of a TSN bridge for a particular TSN Stream, e.g., from management information?*

By default, a Stream is defined by its VLAN ID and Destination MAC Address without reference to the Source MAC address. It is possible to retrieve the egress bridge port for a given Destination MAC and VLAN ID pair from the FDB. Static filtering entries are used for Streams; therefore, the FDB is populated with egress port(s) for a given Destination MAC and VLAN ID pair. It is mandatory for any manageable bridge to support static filtering entries and the corresponding management parameters.

There are no mandatory means of tracking the ingress port of a Stream defined by its VLAN ID and Destination MAC Address. Optional IEEE Std 802.1CB-2017 Stream identification functions provide counters on ingress and egress ports for specific Streams. There are optional features that can limit the ports from which a Stream can be forwarded, e.g., Per-Stream Filtering and Forwarding.

S2-2007821 asked:

> *If yes, then please provide the details on the following:*
>
> - *Does the CNC configure these management parameters for each TSN Stream? What are the corresponding YANG parameters?*

The CNC configures static filtering entries for each Stream. Therefore, the corresponding management information for egress ports is available. As there are no mandatory features corresponding to ingress ports; there is no corresponding management information available for each Stream.

The YANG parameters for the egress port(s) for the static filtering entries are in the static-filtering-entries in ieee802-dot1qbridge:bridges:bridge:component:filtering-database specified by IEEE Std 802.1Qcp-2018.

IEEE Std 802.1Qcp-2018 does not specify YANG parameters for ingress port(s), i.e., there are no YANG parameters corresponding to ieee8021QBridgeStaticUnicastReceivePort and ieee8021QBridgeStaticMulticastReceivePort. The YANG parameters for IEEE Std 802.1CB are being defined in the ongoing IEEE P802.1CBcv project; the YANG parameters for PSFP are being defined in the ongoing IEEE P802.1Qcw project and the recently completed IEEE Std 802.1Qcr-2020.

S2-2007821 asked:
- *Is it possible to identify the ingress port of the 5GS bridge for a particular TSN stream? e.g. using*
  - *Information element ieee8021QBridgeStaticMulticastReceivePort, or*
  - *Information element ieee8021QBridgeStaticUnicastReceivePort, or*
  - *Information Element in the 802.1CB clause 9.1 Stream identity table, or*
  - *Other management information?*

Although the ieee8021QBridgeStaticUnicastReceivePort and ieee8021QBridgeStaticMulticastReceivePort MIB parameters can be used, they are *optional* and are not tied to the Port Map (specified by subclause 8.8 in IEEE Std 802.1Q-2018) that does not include ingress ports. Note that IEEE Std 802.1Q-2018 does not specify how the MIB parameters are used. If supported, these MIB parameters can be configured by a CNC. However, frame forwarding does not depend on these optional MIB parameters; therefore, it cannot be assumed that a CNC configures them even if they are supported.

The Stream identity table specified in IEEE Std 802.1CB-2017 is only for stream identification but not for frame forwarding; therefore, it is not suitable for determining the egress (or ingress) ports of a Stream.

S2-2007821 asked:

- *Is it possible to identify the egress port of the 5GS bridge for a particular TSN stream? e.g. using*
  - *Only the PSFP information provided by CNC. Or*
  - *The PSFP information together with the static filtering entry from the CNC, or*
  - *Other management information?*

It is not possible to identify the egress port of a Stream from PSFP management information as the latter is per bridge component, not per port. Furthermore, PSFP is not about the selection of an egress port for frame forwarding. As explained above, static filtering entries (without PSFP) are suitable to retrieve the egress port for a Stream. Note that PSFP does not define stream identification but uses stream identification as specified by IEEE Std 802.1CB-2017.

Note that PSFP is optional for each device type and conformance class in the IEC/IEEE 60802 draft standard. Therefore, in a given industrial automation deployment, it cannot be assumed that PSFP will be used and that the CNC will provide PSFP related configuration information. Note that the content of the IEC/IEEE 60802 draft standard is subject to change as the work is ongoing.

S2-2007821 asked:

Furthermore, additional information of a TSN Stream at the ingress bridge port is also required for the 5G System (5GS) for its internal resource management when the 5GS acts as a virtual TSN bridge, such as the time of the arrival of the traffic burst, the periodicity, the priority used for the TSN stream, and burst size. Is it possible to retrieve this information, e.g.,

from management information?

The CNC does not provide the time characteristics of Streams to the bridges as the bridges do not require such information. Therefore, it is not possible to retrieve Stream time characteristics such as the time of the arrival of the traffic burst and periodicity from bridge management information.

However, if stream gates of optional PSFP are supported, then stream gate timing related information may be retrieved from management information corresponding to the Stream gate instance table (subclause 8.6.5.1.2 in IEEE Std 802.1Q-2018): see subclause 12.31.3 for the corresponding management information and subclause 17.7.24 for the corresponding MIB definition; the YANG parameters for PSFP are being defined in the ongoing IEEE P802.1Qcw project and the recently completed IEEE Std 802.1Qcr-2020. In certain scenarios, depending on their actual usage, e.g., including the use of a separate stream gate for each individual constant bit rate periodic stream, the stream gate timing information may provide some basis to derive some timing information for a corresponding stream.

The priority used for a Stream is carried in the PCP field of the VLAN tag. However, there is no management information configured in bridges from which the PCP of a given Stream can be retrieved.

One way to retrieve burst size related information for a Stream may be from the management parameters corresponding to the Flow meter instance table (see Committed burst size (CBS) and Excess burst size (EBS) in subclause 8.6.5.1.3 in IEEE Std 802.1Q-2018) if PSFP applies a separate Flow meter instance table for each Stream:
- See subclause 12.31.4 for the corresponding management information;
- See the ieee8021PSFPFlowMeterCBS and ieee8021PSFPFlowMeterEBS MIB parameters in subclause 17.7.24 in IEEE Std 802.1Q-2018; and
- See committed-burst-size and excess-burst-size parameters in the YANG data model being specified by the P802.1Qcw project. The content of the P802.1Qcw draft specification is subject to change as the work is ongoing.

Overall, we would like to note that the TSN features used in a given deployment depend on the actual deployment. Consequently, the configuration information provided by the CNC also depends on the actual deployment. Furthermore, we suggest considering the use of YANG instead of a MIB as YANG is the state-of-the-art technology for network management.

Note that the IEEE 802 work is open and contribution-driven. Participation is on an individual basis and technical discussion can be conducted based on individual contributions. New work can be started based on individual contributions. We welcome the participation of your participants.

We look forward to maintaining the dialogue and cooperation between our organizations. The TSN Task Group holds regular electronic meetings; details are available via the TSN Task Group page http://www.ieee802.org/1/tsn. Participation in IEEE 802.1 is on an individual basis.

Respectfully submitted,
Glenn Parsons
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