**SA WG2 Meeting #S2-140E S2-200xxxx**

**19 August - 2 September, 2020, Electronic (revision of S2-20xxxxx)**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** |  | **rev** | **-** | **Current version:** | **16.5.1** |  |
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| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at  http://www.3gpp.org/Change-Requests.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | PSFP clarifications | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson, NTT DOCOMO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Vertical\_LAN | | | | |  | ***Date:*** | | | 2020-07-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP TR 21.900. | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The contribution addresses a number of issues that are highlighted by the LS from IEEE TSN. In the LS it is indicated that the intention regarding the 5GS’s support of PSFP is not clear. The current specification is not clear to what extent PSFP is supported, and how is the PSFP information used.  In the current 23.501 text it is assumed that the support for PSFP is optional for the DS-TT and NW-TT ports. However, 802.1Q assumes support for PSFP on a per bridge level. It is currently not clear how the TSN AF gets information about PSFP support concerning the individual DS-TT and NW-TT ports, and how the TSN AF can report PSFP support on the per 5GS bridge level to the CNC. Besides, the maximum number of supported filtering, gating etc. instances for a port needs to be known so that the per bridge level supported values can be determined by the TSN AF.  Furthermore, current text in 23.501 is not clear about determining the ingress and egress ports for a TSN stream. The stream identification in PSFP can be given using a number of different options (as defined in clause 6 of IEEE 802.1cb-2017, and current text is not clear how the ingress and egress ports are derived, as it is also indicated by in the IEEE TSN LS. Note also that traffic forwarding information is also not currently available in the TSN AF, except for uplink traffic in case of multiple NW-TT ports. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * The stream parameters are reported to the TSN AF not only in the BMIC but also in the PMIC from the DS-TT and NW-TT ports, which indicates the support of PSFP. * The TSN AF reports support for PSFP if supported at all ports. This is achieved by reporting the lowest maximum values of the stream parameters. * Clarify that local configuration is used in TSN AF to derive the ingress and egress ports for a TSN stream. * Clarify that current specification only supports configuration for uplink traffic forwarding information. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | PSFP related information remains unclear. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.27.2, 5.28.2, 5.28.3.1, Annex I. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**\* \* \* \* Start of Change \* \* \* \***

### 5.27.2 TSC Assistance Information (TSCAI)

TSC assistance information describes TSC traffic characteristics for use in the 5G System. The knowledge of TSN traffic pattern is useful for the gNB to allow it to more efficiently schedule periodic, deterministic traffic flows either via Configured Grants, Semi-Persistent Scheduling or with dynamic grants. TSC assistance information, as defined in Table 5.27.2-1, is provided from SMF to 5G-AN, e.g. upon QoS Flow establishment. The TSCAI parameters are set according to corresponding parameters obtained from the TSN AF. The TSN AF identifies the PDU session as described in clause 5.28.2.

The TSN AF interfaces towards the CNC the PSFP (IEEE 802.1Q [98]) managed objects that correspond to the PSFP functionality implemented by the DS-TT and the NW-TT. Thus, the TSN AF may extract relevant parameters from the PSFP configuration information provided by the CNC. The TSN AF calculates traffic pattern parameters (such as burst arrival time with reference to the ingress port and periodicity). TSN AF also obtains the flow direction based on ingress or egress port (as specified in clause 5.28.2). TSN AF is responsible for forwarding these parameters in TSC Assistance Container to the SMF (via PCF). TSN AF may enable aggregation of TSN streams if the TSN streams belong to the same traffic class, terminate in the same egress port and have the same periodicity and compatible Burst arrival time. One set of parameters and one container are calculated by the TSN AF for multiple TSN streams to enable aggregation of TSN streams to the same QoS Flow.

Annex I describe how the traffic pattern information is determined.

NOTE 1: Further details of aggregation of TSN streams (including determination of burst arrival times that are compatible so that TSN streams can be aggregated) are left for implementation.

In this case, TSN AF creates one TSC Assistance Container for the aggregated TSN streams. The SMF will bind PCC rules with a TSC Assistance Container as described in clause 6.1.3.2.4 of TS 23.503 [45]. The SMF derives TSCAI on a per QoS Flow basis and sends it to 5G-AN. The Burst Arrival Time and Periodicity component of the TSCAI that the SMF signals to the 5G-AN are specified with respect to the 5G clock. The SMF is responsible for mapping the Burst Arrival Time and Periodicity from a TSN clock to the 5G clock based on the time offset and cumulative rateRatio between TSN time and 5GS time as measured and reported by the UPF.

The TSCAI parameter determination in SMF is done as follows:

- For traffic in downlink direction, the SMF corrects the Burst Arrival Time in the TSN Assistance Container based on the latest received time offset measurement from the UPF and sets the TSCAI Burst Arrival Time as the sum of the corrected value and CN PDB as described in clause 5.7.3.4.

- For traffic in uplink direction, the SMF corrects the Burst Arrival Time in the TSN Assistance Container based on the latest received time offset measurement from the UPF and sets the TSCAI Burst Arrival Time as the sum of the corrected value and UE-DS-TT Residence Time.

- The SMF corrects the Periodicity in the TSN Assistance Container by the previously received cumulative rateRatio from the UPF and sets the TSCAI Periodicity as the corrected value.

- The SMF sets the TSCAI Flow Direction as the Flow Direction in the TSN Assistance Container.

NOTE 2: In order for the TSN AF to get Burst Arrival Time, Periodicity on a per TSN stream basis, support for IEEE 802.1Q [98] (as stated in clause 4.4.8.2) Per-Stream Filtering and Policing (PSFP) with stream gate operation is a prerequisite.

In the case of drift between TSN time and 5G time, the UPF updates the offset to SMF using the N4 Report Procedure as defined in TS 23.502 [3] clause 4.4.3.4. In the case of change of cumulative rateRatio between TSN time and 5G time, the UPF updates the cumulative rateRatio to SMF using the N4 Report Procedure as defined in TS 23.502 [3] clause 4.4.3.4. The SMF may then trigger a PDU Session Modification as defined in TS 23.502 [3] clause 4.3.3 in order to update the TSCAI parameter to the NG-RAN without requiring AN or N1 specific signalling exchange with the UE.

NOTE 3: In order to prevent frequent updates from the UPF, the UPF sends the offset or the cumulative rateRatio only when the difference between the current measurement and the previously reported measurement is larger than a threshold as described in TS 23.502 [3] clause 4.4.3.4.

Table 5.27.2-1: TSC Assistance Information

|  |  |
| --- | --- |
| Assistance Information | Description |
| Flow Direction | The direction of the TSC flow (uplink or downlink). |
| Periodicity | It refers to the time period between start of two bursts. |
| Burst Arrival time | The arrival time of the data burst at either the ingress of the RAN (downlink flow direction) or egress interface of the UE (uplink flow direction). |

**\* \* \* \* Next Change \* \* \* \***

### 5.28.2 5GS Bridge configuration

In order to schedule TSN traffic over 5GS Bridge, the configuration information of 5GS Bridge is mapped to 5GS QoS within the corresponding PDU Session. The QoS parameters mapping for TSN is described in TS 23.503 [45] clause 6.1.3.23.

The configuration information of 5GS Bridge as defined in IEEE 802.1Q [98], includes the following:

- Bridge ID of 5GS Bridge.

- Configuration information of scheduled traffic on ports of DS-TT and NW-TT:

- Egress ports of 5GS Bridge, e.g., ports on DS-TT and NW-TT;

- Traffic classes and their priorities.

NOTE 1: In this Release of the specification, only support simplified IEEE 802.1Q [98], Annex Q.2 for 5GS.

The configuration information of 5GS Bridge as defined in IEEE 802.1Q [98], includes the following:

- Chassis ID of 5GS Bridge;

- Traffic forwarding information as defined in IEEE 802.1Q [98] clause 8.8.1:

- Destination MAC address and VLAN ID of TSN stream;

- Port number in the Port MAP as defined in IEEE 802.1Q [98] clause 8.8.1.

NOTE 2: In this Release of the specification, the 5GS bridge only supports configuration for uplink traffic forwarding information.

- Configuration information per stream according to IEEE 802.1Q [98] clause 8.6.5.1 including:

- Stream filters;

- Stream gates.

NOTE 3: In order to support IEEE 802.1Q [98] clause 8.6.5.1, it is required to support the Stream Identification function as specified by IEEE 802.1CB-2017 [83].

The SMF report the MAC address of the DS-TT port of the related PDU Session to TSN AF via PCF. The association between the DS-TT MAC address, 5GS Bridge ID and port number on DS-TT is maintained at TSN AF and further used to assist to bind the TSN traffic with the UE's PDU session.

The TSN AF uses local configuration to map the PSFP information to the ingress and egress port(s) of a TSN Stream, anddetermines the DS-TT MAC address identifying the corresponding PDU session(s) carrying this stream. Flow direction of a TSN stream is determined as follows: if the ingress port is a DS-TT port, then the Flow direction is UL; otherwise if the egress port(s) is (are) DS-TT port, the Flow direction is DL. Flow direction is part of the TSCAI as defined in clause 5.27.2.

The TSN AF requests the PCF to reserve resources for an AF session with support for Time Sensitive Networking (TSN) as defined in clause 6.1.3.23 in TS 23.503 [45].

The TSN AF uses the stream filter instances in PSFP information as defined in IEEE 802.1Q [98] clause 8.6.5.1, and additionally traffic class information as defined in IEEE 802.1Q [98] clause 8.6.8.4, to derive the service data flow for TSN streams. The TSN AF uses the Priority values in the stream filter instances in PSFP information (if available) as defined in IEEE 802.1Q [98] clause 8.6.5.1, and may additionally use scheduled traffic information as defined in IEEE 802.1Q [98] clause 8.6.8.4, to derive the TSN QoS information for a given TSN stream or flow of aggregated TSN streams. The TSN AF determines the TSC Assistance Container as described in clause 5.27.2. The TSN AF associates the TSN QoS information and TSC Assistance Container with the corresponding service data flow description and provides to the PCF and the SMF as defined in TS 23.503 [45] clause 6.1.3.23.

NOTE 4: When the TSN stream priority information from PSFP is not available (priority value in stream filters is set to wild card) Scheduled traffic information IEEE 802.1Q [98] clause 8.6.8.4 can be used in combination with PSFP IEEE 802.1Q [98] clause 8.6.5.1 to obtain a priority value.

**\* \* \* \* Next Change \* \* \* \***

### 5.28.3 Port and bridge management information exchange in 5GS

#### 5.28.3.1 General

Port and bridge management information is exchanged between CNC and TSN AF. The port management information, is related to Ethernet ports located in DS-TT or NW-TT.

5GS shall support transfer of standardized and deployment-specific port management information transparently between TSN AF and DS-TT or NW-TT, respectively inside a Port Management Information Container. NW-TT may support one or more ports. In this case, each port uses separate Port Management Information Container. 5GS shall also support transfer of standardized and deployment-specific bridge management information transparently between TSN AF and NW-TT, respectively inside a Bridge Management Information Container. Table 5.28.3.1-1 and Table 5.28.3.1-2 list standardized port management information and bridge management information, respectively.

Table 5.28.3.1-1: Standardized port management information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Port management information | Applicability (see Note 6) | | Supported operations by TSN AF (see Note 1) | Reference |
| DS-TT | NW-TT |
| **General** |  |  |  |  |
| Port management capabilities (see Note 2) | X | X | R |  |
| **Bridge delay related information** |  |  |  |  |
| txPropagationDelay | X | X | R | IEEE 802.1Qcc [95] clause 12.32.2.1 |
| **Traffic class related information** |  |  |  |  |
| Traffic class table | X | X | RW | IEEE 802.1Q [98] clause 12.6.3 and clause 8.6.6. |
| **Gate control information** |  |  |  |  |
| GateEnabled | X | X | RW | IEEE 802.1Q [98] Table 12-29 |
| AdminBaseTime | X | X | RW | IEEE 802.1Q [98] Table 12-29 |
| AdminControlList | X | X | RW | IEEE 802.1Q [98] Table 12-29 |
| AdminCycleTime (see Note 3) | X | X | RW | IEEE 802.1Q [98] Table 12-29 |
| AdminControlListLength (see Note 3) | X | X | RW | IEEE 802.1Q [98] Table 12-28 |
| Tick granularity | X | X | R | IEEE 802.1Q [98] Table 12-29 |
|  |  |  |  |  |
|  |  |  |  |  |
| **General Neighbor discovery configuration**  **(NOTE 4)** |  |  |  |  |
| adminStatus | D | X | RW | IEEE 802.1AB [97] clause 9.2.5.1 |
| lldpV2LocChassisIdSubtype | D | X | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2LocChassisId | D | X | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2MessageTxInterval | D | X | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2MessageTxHoldMultiplier | D | X | RW | IEEE 802.1AB [97] Table 11-2 |
| **NW-TT port neighbor discovery configuration** |  |  |  |  |
| lldpV2LocPortIdSubtype |  | X | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2LocPortId |  | X | RW | IEEE 802.1AB [97] Table 11-2 |
| **DS-TT port neighbor discovery configuration** |  |  |  |  |
| lldpV2LocPortIdSubtype | D |  | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2LocPortId | D |  | RW | IEEE 802.1AB [97] Table 11-2 |
| **Neighbor discovery information for each discovered neighbor of NW-TT** |  |  |  |  |
| lldpV2RemChassisIdSubtype |  | X | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemChassisId |  | X | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemPortIdSubtype |  | X | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemPortId |  | X | R | IEEE 802.1AB [97] Table 11-2 |
| TTL |  | X | R | IEEE 802.1AB [97] clause 8.5.4 |
| **Neighbor discovery information for each discovered neighbor of DS-TT**  **(NOTE 5)** |  |  |  |  |
| lldpV2RemChassisIdSubtype | D |  | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemChassisId | D |  | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemPortIdSubtype | D |  | R | IEEE 802.1AB [97] Table 11-2 |
| lldpV2RemPortId | D |  | R | IEEE 802.1AB [97] Table 11-2 |
| TTL | D |  | R | IEEE 802.1AB [97] clause 8.5.4.1 |
| **Stream Parameters**  (NOTE 11) |  |  |  |  |
| MaxStreamFilterInstances | X |  | R | IEEE 802.1Q [98]  clause 12.31.1.1 |
| MaxStreamGateInstances | X |  | R | IEEE 802.1Q [98] clause 12.31.1.2 |
| MaxFlowMeterInstances | X |  | R | IEEE 802.1Q [98] clause 12.31.1.3 |
| SupportedListMax | X |  | R | IEEE 802.1Q [98] clause 12.31.1.4 |
| **Per-Stream Filtering and Policing information**  (NOTE 10) |  |  |  |  |
| Stream Filter Instance Table  (NOTE 8) |  |  |  | IEEE 802.1Q [98] Table 12-32 |
| StreamHandleSpec | X | X | RW | IEEE 802.1Q [98] Table 12-32 |
| PrioritySpec | X | X | RW | IEEE 802.1Q [98] Table 12-32 |
| StreamGateInstanceID | X | X | RW | IEEE 802.1Q [98] Table 12-32 |
| Stream Gate Instance Table  (NOTE 9) |  |  |  | IEEE 802.1Q [98] Table 12-33 |
| StreamGateInstance | X | X | R | IEEE 802.1Q [98] Table 12-33 |
| PSFPAdminBaseTime | X | X | RW | IEEE 802.1Q [98] Table 12-33 |
| PSFPAdminControlList | X | X | RW | IEEE 802.1Q [98] Table 12-33 |
| PSFPAdminCycleTime | X | X | RW | IEEE 802.1Q [98] Table 12-33 |
| PSFPTickGranularity | X | X | R | IEEE 802.1Q [98] Table 12-33 |
| NOTE 1: R = Read only access; RW = Read/Write access.  NOTE 2: Indicates which standardized and deployment-specific port management information is supported by DS-TT or NW-TT.  NOTE 3: AdminCycleTime and AdminControlListLength are optional for gate control information.  NOTE 4: If DS-TT supports neighbor discovery, then TSN AF sends the general neighbor discovery configuration for DS-TT Ethernet ports to DS-TT. If DS-TT does not support neighbor discovery, then TSN AF sends the general neighbor discovery configuration for DS-TT Ethernet ports to NW-TT using the Bridge Management Information Container (refer to Table 5.28.3.1-2) and NW-TT performs neighbor discovery on behalf on DS-TT.  NOTE 5: If DS-TT supports neighbor discovery, then TSN AF retrieves neighbor discovery information for DS-TT Ethernet ports from DS-TT. If DS-TT does not support neighbor discovery, then TSN AF retrieves neighbor discovery information for DS-TT Ethernet ports from NW-TT, using the Bridge Management Information Container (refer to Table 5.28.3.1-2), the NW-TT performing neighbor discovery on behalf on DS-TT.  NOTE 6: X = applicable; D = applicable when validation and generation of LLDP frames is processed at the DS-TT.  NOTE 7: Void.  NOTE 8: There is a Stream Filter Instance Table per Stream.  NOTE 9: There is a Stream Gate Instance Table per Gate.  NOTE 10: TSN AF indicates the support for PSFP to the CNC only if each DS-TT and NW-TT of the 5GS bridge support PSFP. The support of PSFP at the DS-TT and NW-TT ports is expressed by setting higher than zero values for MaxStreamFilterInstances, MaxStreamGateInstances, MaxFlowMeterInstances, SupportedListMax parameters. TSN AF uses the PSFP information for determination of the traffic pattern information as described in Annex I. The PSFP information can be used at the DS-TT (if supported) and at the NW-TT (if supported) for the purpose of per-stream filtering and policing as defined in IEEE 802.1Q [98] clause 8.6.5.1.  NOTE 11: TSN AF composes a Stream Parameter Table towards the CNC, that contains the lowest numerical value as received from DS-TT and NW-TT port(s) and for the bridge for each individual parameter. | | | | |

Table 5.28.3.1-2: Standardized bridge management information

|  |  |  |
| --- | --- | --- |
| Bridge management information | Supported operations by TSN AF  (see NOTE 1) | Reference |
|
| **Information for 5GS Bridge** |  |  |
| Bridge Address | R |  |
| Bridge Name | R |  |
| Bridge ID | R |  |
| **Topology of 5GS Bridge** |  |  |
| Chassis ID subtype and Chassis ID of the 5GS Bridge | R | IEEE 802.1AB [97] |
| **Traffic forwarding information** |  |  |
| Static Filtering Entry (NOTE 3) | RW | IEEE 802.1Q [98] clause 8.8.1 |
| **General Neighbor discovery configuration**  **(NOTE 2)** |  |  |
| adminStatus | RW | IEEE 802.1AB [97] clause 9.2.5.1 |
| lldpV2LocChassisIdSubtype | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2LocChassisId | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2MessageTxInterval | RW | IEEE 802.1AB [97] Table 11-2 |
| lldpV2MessageTxHoldMultiplier | RW | IEEE 802.1AB [97] Table 11-2 |
| **DS-TT port neighbor discovery configuration for DS-TT ports (NOTE 4)** |  |  |
| **>DS-TT port neighbor discovery configuration for each DS-TT port** |  |  |
| >> DS-TT port number | RW |  |
| >> lldpV2LocPortIdSubtype | RW | IEEE 802.1AB [97] Table 11-2 |
| >> lldpV2LocPortId | RW | IEEE 802.1AB [97] Table 11-2 |
| **Discovered neighbor information for DS-TT ports**  **(NOTE 4)** |  |  |
| **>Discovered neighbor information for each DS-TT port**  **(NOTE 4)** |  |  |
| >> DS-TT port number | R |  |
| >> lldpV2RemChassisIdSubtype | R | IEEE 802.1AB [97] Table 11-2 |
| >> lldpV2RemChassisId | R | IEEE 802.1AB [97] Table 11-2 |
| >> lldpV2RemPortIdSubtype | R | IEEE 802.1AB [97] Table 11-2 |
| >> lldpV2RemPortId | R | IEEE 802.1AB [97] Table 11-2 |
| >> TTL | R | IEEE 802.1AB [97] clause 8.5.4.1 |
| **Stream Parameters (NOTE 5)** |  |  |
| MaxStreamFilterInstances | R | IEEE 802.1Q [98]  clause 12.31.1.1 |
| MaxStreamGateInstances | R | IEEE 802.1Q [98] clause 12.31.1.2 |
| MaxFlowMeterInstances | R | IEEE 802.1Q [98] clause 12.31.1.3 |
| SupportedListMax |  | IEEE 802.1Q [98] clause 12.31.1.4 |
| NOTE 1: R = Read only access; RW = Read/Write access.  NOTE 2: General neighbor discovery information is included only when NW-TT performs neighbor discovery on behalf of DS-TT.  NOTE 3: If the Static Filtering Entry information is present, NW-TT uses Static Filtering Entry information to determine the NW-TT egress port for forwarding UL TSC traffic. If the Static Filtering Entry information is not present, then the forwarding information as in clause 5.8.2.5.3 applies.  NOTE 4: DS-TT discovery configuration and DS-TT discovery information are used only when DS-TT does not support LLDP and NW-TT performs neighbor discovery on behalf of DS-TT. These IEs are deliverered via the procedures for the PDU session for the DS-TT port, while the other IEs of the table are deliverered via the procedures for any of the PDU sessions of the 5GS TSN bridge.  NOTE 5: See NOTE 11 for Table 5.28.3.1-1: standardized port management information | | |

Exchange of port and bridge management information between TSN AF and NW-TT or DS-TT allows TSN AF to:

1) retrieve port management information for a DS-TT or NW-TT Ethernet port or bridge management information for a 5GS TSN bridge;

2) send port management information for a DS-TT or NW-TT Ethernet port or bridge management information for a 5GS TSN bridge;

3) subscribe to and receive notifications if specific port management information for a DS-TT or NW-TT Ethernet port changes or bridge management information changes.

Exchange of port management information between TSN AF and NW-TT or DS-TT is initiated by DS-TT or NW-TT to:

- notify TSN AF if port management information has changed that TSN AF has subscribed for.

Exchange of bridge management information between TSN AF and NW-TT is initiated by NW-TT to:

- notify TSN AF if bridge management information has changed that TSN AF has subscribed for.

Exchange of port management information is initiated by DS-TT to:

- provide port management capabilities, i.e. provide information indicating which standardized and deployment-specific port management information is supported by DS-TT.

TSN AF indicates inside the Port Management Information Container or Bridge Management Information Container whether it wants to retrieve or send port or bridge management information or intends to (un-)subscribe for notifications.

**\* \* \* \* Next Change \* \* \* \***

Annex I (normative):  
TSN usage guidelines

# I.1 Determination of traffic pattern information

As described in clause 5.27.2, the calculation of the TSCAI relies upon mapping of information for the TSN stream(s) based upon certain IEEE standard information.

Additional traffic pattern parameters such as maximum burst size and maximum flow bitrate can be mapped to MDBV and GFBR.

The traffic pattern parameter determination based on PSFP (IEEE P802.1Q [98]) is as follows:

- Periodicity of a TSN stream is set equal to PSFPAdminCycleTime if there is only one PSFPGateControlEntry with a PSFPgateStatesValue set to Open in the PSFPAdminControlList. If there is more than one PSFPGateControlEntry with a PSFPgateStatesValue set to Open in the PSFPAdminControlList, then the Periodicity of the TSN Stream is set equal to sum of the timeIntervalValues from the first gate open instance to a next gate open instance in the PSFPAdminControlList. For aggregated TSN streams with same periodicity and compatible Burst Arrival Times, the periodicity of the aggregated flow of these TSN Streams is set equal to PSFPAdminCycleTime received from CNC for one of the TSN streams that are aggregated.

NOTE: Given that only TSN streams that have the same periodicity and compatible Burst Arrival Time can be aggregated, the PSFPAdminCycleTime for those TSN streams is assumed to be the same.

- Burst Arrival time of a TSN stream at the ingress port is determined based on the following conditions:

- The Burst Arrival Time of a TSN Stream should be set to PSFPAdminBaseTime plus the sum of the timeIntervalValues for which the PSFPgateStatesValue is Closed in the PSFP AdminControlList until the first gate open time (i.e. until PSFPgateStatesValue set to Open is found). If the PSFPgateStatesValue is Open for the first timeIntervalValue, then the Burst Arrival time is set to PSFPAdminBaseTime. For aggregated TSN streams, the arrival time is calculated similarly, but using the time interval to the first PSFPgateStatesValue that is Open from the aggregated TSN streams.

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- Burst Size of a TSN stream at the ingress port (which is useful to map to MDBV) is determined based on the following conditions:

- The Burst Size may be determined from TSN Stream gate control operations in the PSFPAdminControlList. If in the PSFPAdminControlList, IntervalOctetMax is provided for a PSFPGateControlEntry with an "open" PSFPgateStatesValue, the Burst Size is set to the IntervalOctetMax for that control list entry. If IntervalOctetMax is not provided, the Burst Size is set to the timeIntervalValue (converted from ns to s) of the PSFPGateControlEntry with an "open" PSFPgateStatesValue multiplied by the port bitrate.

- When multiple compatible TSN Streams are aggregated, the Burst Size is set to the sum of the Burst Sizes for each TSN stream as determined above.

- Maximum Flow Bitrate of a TSN stream (which is useful to map to GFBR) is determined as follows:

- The Maximum Flow Bitrate of a TSN Stream is equal to the summation of all timeIntervalValue (converted from ns to s) with PSFPgateStatesValue = Open, multiplied by the bitrate of the corresponding port, and divided by PSFPAdminCycleTime. For aggregated TSN streams, the same calculation is performed over the burst of aggregated streams (calculated using superposition, i.e., timeIntervalValue with PSFPgateStatesValue = Open of every stream is summed up, as they are assumed to have same periodicity, compatible Burst arrival time, and same traffic class if they are to be aggregated.

**\* \* \* \* End of Change \* \* \* \***