**3GPP TSG-CT WG1 Meeting #129-eC1-21aaaa**

**Electronic meeting, 19-23 April 2021 *was* C1-212982**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.519** | **CR** | **0027** | **rev** | **3** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Correction on DS-TT/NW-TT Ethernet port and replacement of "bridge" with "user plane node" | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE, Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IIoT | | | | |  | ***Date:*** | | | 2021-05-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) ... Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In Rel-17, the IIoT support both Ethernet PDU session and IP PDU session. So it proposes using DS-TT/NW-TT port rather than DS-TT/NW-TT ethernent port.  In addition, based on agreed S2-2103017, "bridge" needs to be replaced by "user plane node" as there is no bridge concept for the case of IP PDU session. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Replace "ethernet port" with "port" throughout this specification. * Clarify management of the port used at the DS-TT is for a PDU session of "Ethernet" PDU session type, "IPv4" PDU session type, "IPv6" PDU session type or "IPv4v6" PDU session type. * Replace "bridge" with "user plane node" throughout this specification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incorrect description. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 4, 5.1, 5.2.1, 5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.1.4, 5.2.1.5, 5.2.2, 5.2.2.1, 5.2.2.2, 5.2.2.3, 5.2.2.4, 5.2.2.5, 5.2.2.6, 5.2.3, 5.2.3.1, 5.2.3.2, 6.1, 6.2, 6.2.1, 6.2.1.1, 6.2.1.2, 6.2.1.3, 6.2.1.4, 6.2.1.5, 6.2.2, 6.2.2.1, 6.2.2.2, 6.2.2.3, 6.2.2.4, 6.2.2.5, 6.3, 6.3.1, 6.3.1.1, 6.3.1.2, 6.3.1.3, 6.3.1.4, 6.3.1.5, 6.3.2, 6.3.2.1, 6.3.2.2, 6.3.2.3, 6.3.2.4, 6.3.2.5, 7, 7.1, 7.2.2, 7.3, 7.4, 7.6.3, 8.1, 8.1.1, 8.2, 8.2.1, 8.2.2, 8.2.3, 8.2.4, 8.3, 8.3.1, 8.4, 8.4.1, 8.5, 8.5.1, 8.6, 8.6.1, 8.7, 8.7.1, 8.8, 8.8.1, 8.8.2, 8.8.3, 8.8.4, 8.9, 8.9.1, 8.10, 8.10.1, 9.1, 9.2, 9.3, 9.4, 9.5, 9.5A, 9.5B, 9.5C, 9.5D, 9.5E, 9.14, 10 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS 29.244 CR 0548 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev#1 (CT1#129e)   * Ethernet port   Rev#2 (CT1#130e)   * Replacement of "bridge" with "user plane node" | | | | | | | | |

\* \* \* Start of Changes \* \* \* \*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GS 5G System

AF Application function

UMS User plane node Management Service

CNC Centralized Network Configuration

DS-TT Device-Side TSN Translator

PMS Port management service

NW-TT Network-Side TSN Translator

TSC Time Sensitive Communication

TSN Time-Sensitive Networking

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

# 4 General

For time sensitive communication (TSC), a 5G system (5GS) can be integrated as a bridge in a time-sensitive networking (TSN) network (i.e. a TSN bridge).

The device-side TSN translator (DS-TT) is deployed at the UE-side edge and the network-side TSN translator (NW-TT) is deployed at the network-side edge in order to interface with a TSN network while achieving transparency (see 3GPP TS 23.501 [2]). In addition, the TSN application function (TSN AF) is deployed to exchange TSN bridge information with the centralized network configuration (CNC) as defined in IEEE Std 802.1Qcc-2018 [9]. The TSN bridge information includes port management information and bridge management information. Port management information is related to ports located in the DS-TT and NW-TT. Bridge management information is related to the NW-TT.

In order to support TSN bridge information exchange between TSN AF and CNC, the DS-TT, NW-TT, and TSN AF support procedures for port management and Bridge management. Clause 5 describes details of the elementary procedures between TSN AF and DS-TT for port management. Clause 6 describes details of the elementary procedures between TSN AF and NW-TT for port management (clause 6.2) and Bridge management (clause 6.3).

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

## 5.1 General

The UE and the network may support transfer of standardized and deployment-specific port management information between a time-sensitive networking (TSN) AF and the DS-TT at the UE, to manage the port used at the DS-TT for a PDU session of "Ethernet" PDU session type, "IPv4" PDU session type, "IPv6" PDU session type or "IPv4v6" PDU session type. The port management messages are included in a Port management information container IE and transported using the UE-requested PDU session establishment procedure, the network-requested PDU session modification procedure or the UE-requested PDU session modification procedure as specified in 3GPP TS 24.501 [5] subclauses 6.4.1.2, 6.3.2 and 6.4.2.

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

### 5.2.1 Network-requested port management procedure

#### 5.2.1.1 General

The purpose of the network-requested port management procedure is to enable the TSN AF to:

a) obtain the list of port management parameters supported by the DS-TT;

b) obtain the current values of port management parameters at the DS-TT port;

c) set the values of port management parameters at the DS-TT port;

d) subscribe to be notified by the DS-TT if the values of certain port management parameters change at the DS-TT port; or

e) unsubscribe to be notified by the DS-TT for one or more port management parameters.

#### 5.2.1.2 Network-requested port management procedure initiation

In order to initiate the network-requested port management procedure, the TSN AF shall:

a) encode the information about the port management parameters values to be read, the port management parameters values to be set, the port management parameters changes to (un)subscribe to and whether the TSN AF requests the list of port management parameters supported by the DS-TT in a port management list IE as specified in clause 9.2 and include it in a MANAGE PORT COMMAND message;

c) send the MANAGE PORT COMMAND message to the UE via the PCF and the SMF as specified in 3GPP TS 23.502 [3]; and

d) start timer T100 (see example in figure 5.2.1.2.1).



Figure 5.2.1.2.1: Network-requested port management procedure

#### 5.2.1.3 Network-requested port management procedure completion

Upon receipt of the MANAGE PORT COMMAND message, for each operation included in the port management list IE, the DS-TT shall:

a) if the operation code is "get capabilities", include the list of port management parameters supported by the DS-TT in the port management capability IE of the MANAGE PORT COMPLETE message;

b) if the operation code is "read parameter", attempt to read the value of the parameter at the DS-TT port, and:

1) if the value of the parameter at the DS-TT port is read successfully, include the parameter and its current value in the port status IE of the MANAGE PORT COMPLETE message; and

2) if the value of the parameter at the DS-TT port was not read successfully, include the parameter and associated port management service cause value in the port status IE of the MANAGE PORT COMPLETE message;

c) if the operation code is "set parameter", attempt to set the value of the parameter at the DS-TT port to the value specified in the operation, and:

1) if the value of the parameter at the DS-TT port is set successfully, include the parameter and its current value in the port update result IE of the MANAGE PORT COMPLETE message; and

2) if the value of the parameter at the DS-TT port was not set successfully, include the parameter and associated port management service cause value in the port update result IE of the MANAGE PORT COMPLETE message;

d) if the operation code is "subscribe-notify for parameter", store the request from the TSN AF to be notified of changes in the value of the corresponding parameter;

e) if the operation code is "unsubscribe for parameter", delete the stored request from the TSN AF to be notified of changes in the value of the corresponding parameter, if any; and

f) send the MANAGE PORT COMPLETE to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].

#### 5.2.1.4 Abnormal cases on the network side

The following abnormal cases can be identified:

a) T100 expired.

The TSN AF shall, on the first expiry of the timer T100, retransmit the MANAGE PORT COMMAND message and shall reset and start timer T100. This retransmission is repeated four times, i.e. on the fifth expiry of timer T100, the TSN AF shall abort the procedure.

#### 5.2.1.5 Abnormal cases in the DS-TT

The following abnormal cases can be identified:

a) Transmission failure of the MANAGE PORT COMPLETE message indication from lower layers.

The DS-TT shall not diagnose an error and consider the network-initiated port management procedure complete.

NOTE: Considering the network-initiated port management procedure complete as a result of this abnormal case does not cause the DS-TT to revert the execution of the operations included in the MANAGE PORT COMMAND message.

### 5.2.2 DS-TT-initiated port management procedure

#### 5.2.2.1 General

The purpose of the DS-TT-initiated port management procedure is to notify the TSN AF of one or more changes in the value of port management parameters for which the TSN AF had requested to be notified of changes via the network-initiated port management procedure.

#### 5.2.2.2 DS-TT-initiated port management procedure initiation

In order to initiate the DS-TT-initiated port management procedure, the DS-TT shall create a PORT MANAGEMENT NOTIFY message and shall:

a) include the port management parameters to be reported to the TSN AF with their current value in the port status IE of the PORT MANAGEMENT NOTIFY message;

b) start timer T200; and

c) send the PORT MANAGEMENT NOTIFY message to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].



Figure 5.2.2.2.1: DS-TT-initiated port management procedure

#### 5.2.2.3 DS-TT-initiated port management procedure accepted by the TSN AF

Upon receipt of the PORT MANAGEMENT NOTIFY message, the TSN AF shall:

a) create a MANAGE PORT MANAGEMENT NOTIFY ACK message; and

b) send the MANAGE PORT MANAGEMENT NOTIFY ACK message to the UE via the PCF and the SMF as specified in 3GPP TS 23.502 [3].

#### 5.2.2.4 DS-TT-initiated port management procedure completion

Upon receipt of the PORT MANAGEMENT NOTIFY ACK message, the DS-TT shall:

a) stop timer T200;

b) create a PORT MANAGEMENT NOTIFY COMPLETE message; and

c) send the PORT MANAGEMENT NOTIFY COMPLETE message to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].

#### 5.2.2.5 Abnormal cases on the network side

The following abnormal cases can be identified:

a) Transmission failure of the PORT MANAGEMENT NOTIFY ACK indication from lower layers.

The TSN AF shall not diagnose an error and consider the DS-TT-initiated port management procedure complete.

#### 5.2.2.6 Abnormal cases in the DS-TT

The following abnormal cases can be identified:

a) T200 expired.

The DS-TT shall, on the first expiry of the timer T200, retransmit the PORT MANAGEMENT NOTIFY message and shall reset and start timer T200. This retransmission is repeated four times, i.e. on the fifth expiry of timer T200, the DS-TT shall abort the procedure.

b) Transmission failure of the PORT MANAGEMENT NOTIFY COMPLETE message indication from lower layers.

The DS-TT shall not diagnose an error and consider the DS-TT-initiated port management procedure complete.

### 5.2.3 DS-TT-initiated port management capability procedure

#### 5.2.3.1 General

The purpose of the DS-TT-initiated port management capability procedure is to provide the DS-TT supported port management capabilities to the TSN AF during PDU session establishment as specified in 3GPP TS 23.502 [3].

#### 5.2.3.2 DS-TT-initiated port management capability procedure

In order to initiate the DS-TT-initiated port management capability procedure, the DS-TT shall create a PORT MANAGEMENT CAPABILITY message and shall:

a) include the DS-TT port management capabilities in the port management capability IE of the PORT MANAGEMENT CAPABILITY message; and

b) send the PORT MANAGEMENT CAPABILITY message to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].



Figure 5.2.3.2.1: DS-TT-initiated port management capability procedure

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

## 6.1 General

The TSN AF and NW-TT supports transfer of standardized and deployment-specific port management information, to manage the port used at the NW-TT. The TSN AF and NW-TT supports transfer of standardized and deployment-specific User plane node management information, to manage the NW-TT. The port management messages are included in the "PortManagementContainer" data type (as specified in 3GPP TS 29.512 [5B]) and the Port Management Information Container IE (as specified in 3GPP TS 29.244 [5A]) and the User plane node management messages are included in the "BridgeManagementContainer" data type (as specified in 3GPP TS 29.512 [5B]) and the User Plane Node Management Information Container IE (as specified in 3GPP TS 29.244 [5A]). Both the port management messages and the User plane node management messages are transported using the N4 Session Level Reporting Procedure and the SM policy association modification procedure as specified in 3GPP TS 23.502 [3].

## 6.2 Procedures for port management service

### 6.2.1 TSN AF-requested port management procedure

#### 6.2.1.1 General

The purpose of the TSN AF-requested port management procedure is to enable the TSN AF to:

a) obtain the list of port management parameters supported by the NW-TT;

b) obtain the current values of port management parameters at the NW-TT port;

c) set the values of port management parameters at the NW-TT port; or

d) subscribe to be notified by the NW-TT if the values of certain port management parameters change at the NW-TT port; or

e) unsubscribe to be notified by the NW-TT for one or more port management parameters.

#### 6.2.1.2 TSN AF-requested port management procedure initiation

In order to initiate the TSN AF-requested port management procedure, the TSN AF shall:

a) encode the information about the port management parameters values to be read, the port management parameters values to be set, the port management parameters changes to (un)subscribe to and whether the TSN AF requests the list of port management parameters supported by the NW-TT in a port management list IE as specified in clause 9.2 and include it in a MANAGE PORT COMMAND message;

b) send the MANAGE PORT COMMAND message to the NW-TT via the PCF and the SMF as specified in 3GPP TS 23.502 [3]; and

c) start timer T100 (see example in figure 6.2.1.2.1).



Figure 6.2.1.2.1: TSN AF-requested port management procedure

#### 6.2.1.3 TSN AF-requested port management procedure completion

Upon receipt of the MANAGE PORT COMMAND message, for each operation included in the port management list IE, the NW-TT shall:

a) if the operation code is "get capabilities", include the list of port management parameters supported by the NW-TT in the port management capability IE of the MANAGE PORT COMPLETE message;

b) if the operation code is "read parameter", attempt to read the value of the parameter at the NW-TT port, and:

1) if the value of the parameter at the NW-TT port is read successfully, include the parameter and its current value in the port status IE of the MANAGE PORT COMPLETE message; and

2) if the value of the parameter at the NW-TT port was not read successfully, include the parameter and associated port management service cause value in the port status IE of the MANAGE PORT COMPLETE message;

c) if the operation code is "set parameter", attempt to set the value of the parameter at the NW-TT port to the value specified in the operation, and:

1) if the value of the parameter at the NW-TT port is set successfully, include the parameter and its current value in the port update result IE of the MANAGE PORT COMPLETE message; and

2) if the value of the parameter at the NW-TT port was not set successfully, include the parameter and associated port management service cause value in the port update result IE of the MANAGE PORT COMPLETE message;

d) if the operation code is "subscribe-notify for parameter", store the request from the TSN AF to be notified of changes in the value of the corresponding parameter;

e) if the operation code is "unsubscribe for parameter", delete the stored request from the TSN AF to be notified of changes in the value of the corresponding parameter, if any; and

f) send the MANAGE PORT COMPLETE to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].

#### 6.2.1.4 Abnormal cases in the TSN AF

The following abnormal cases can be identified:

a) T100 expired.

The TSN AF shall, on the first expiry of the timer T100, retransmit the MANAGE PORT COMMAND message and shall reset and start timer T100. This retransmission is repeated four times, i.e. on the fifth expiry of timer T35xx, the TSN AF shall abort the procedure.

#### 6.2.1.5 Abnormal cases in the NW-TT

The following abnormal cases can be identified:

a) Transmission failure of the MANAGE PORT COMPLETE message indication from lower layers.

The NW-TT shall not diagnose an error and consider the TSN AF-initiated port management procedure complete.

NOTE: Considering that the TSN AF-initiated port management procedure complete as a result of this abnormal case does not cause the NW-TT to revert the execution of the operations included in the MANAGE PORT COMMAND message.

### 6.2.2 NW-TT-initiated port management procedure

#### 6.2.2.1 General

The purpose of the NW-TT-initiated port management procedure is to notify the TSN AF of one or more changes in the value of port management parameters for which the TSN AF had requested to be notified of changes via the TSN AF-initiated port management procedure.

#### 6.2.2.2 NW-TT-initiated port management procedure initiation

In order to initiate the NW-TT-initiated port management procedure, the NW-TT shall create a PORT MANAGEMENT NOTIFY message and shall:

a) include the port management parameters to be reported to the TSN AF with their current value in the port status IE of the PORT MANAGEMENT NOTIFY message;

b) start timer T300; and

c) send the PORT MANAGEMENT NOTIFY message to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].



Figure 6.2.2.2.1: NW-TT-initiated port management procedure

#### 6.2.2.3 NW-TT-initiated port management procedure completion

Upon receipt of the PORT MANAGEMENT NOTIFY message, the TSN AF shall:

a) create a PORT MANAGEMENT NOTIFY ACK message; and

b) send the PORT MANAGEMENT NOTIFY ACK message to the NW-TT via the PCF and the SMF as specified in 3GPP TS 23.502 [3].

Upon receipt of the PORT MANAGEMENT NOTIFY ACK message, the NW-TT shall stop timer T300.

#### 6.2.2.4 Abnormal cases in the TSN AF

The following abnormal cases can be identified:

a) Transmission failure of the PORT MANAGEMENT NOTIFY ACK indication from lower layers.

The TSN AF shall not diagnose an error and consider the NW-TT-initiated port management procedure complete.

#### 6.2.2.5 Abnormal cases in the NW-TT

The following abnormal cases can be identified:

a) T300 expired.

The NW-TT shall, on the first expiry of the timer T300, retransmit the PORT MANAGEMENT NOTIFY message and shall reset and start timer T300. This retransmission is repeated four times, i.e. on the fifth expiry of timer T300, the NW-TT shall abort the procedure.

## 6.3 Procedures for User plane node management service

### 6.3.1 TSN AF-requested User plane node management procedure

#### 6.3.1.1 General

The purpose of the TSN AF-requested User plane node management procedure is to enable the TSN AF to:

a) obtain the list of user plane node management parameters supported at the NW-TT;

b) obtain the current values of user plane node management parameters at the NW-TT;

c) set the values of user plane node management parameters at the NW-TT; or

d) subscribe to be notified by the NW-TT if the values of certain user plane node management parameters change at the NW-TT; or

e) unsubscribe to be notified by the NW-TT for one or more user plane node management parameters.

#### 6.3.1.2 TSN AF-requested User plane node management procedure initiation

In order to initiate the TSN AF-requested User plane node management procedure, the TSN AF shall:

a) encode the information about the user plane node management parameters values to be read, the user plane node management parameters values to be set, the user plane node management parameters changes to (un)subscribe to and whether the TSN AF requests the list of user plane node management parameters supported by the NW-TT in an User plane node management list IE as specified in clause 9.5B and include it in a MANAGE USER PLANE NODE COMMAND message;

b) send the MANAGE USER PLANE NODE COMMAND message to the NW-TT via the PCF and the SMF as specified in 3GPP TS 23.502 [3]; and

c) start timer T150 (see example in figure 6.3.1.2.1).

Figure 6.3.1.2.1: TSN AF-requested User plane node management procedure

#### 6.3.1.3 TSN AF-requested User plane node management procedure completion

Upon receipt of the MANAGE USER PLANE NODE COMMAND message, for each operation included in the User plane node management list IE, the NW-TT shall:

a) if the operation code is "get capabilities", include the list of User plane node management parameters supported by the NW-TT in the User plane node management capability IE of the MANAGE USER PLANE NODE COMPLETE message;

b) if the operation code is "read parameter", attempt to read the value of the user plane node management parameter at the NW-TT, and:

1) if the value of the parameter at the NW-TT is read successfully, include the parameter and its current value in the User plane node status IE of the MANAGE USER PLANE NODE COMPLETE message; and

2) if the value of the parameter at the NW-TT was not read successfully, include the parameter and associated User plane node management service cause value in the User plane node status IE of the MANAGE USER PLANE NODE COMPLETE message;

c) if the operation code is "set parameter", attempt to set the value of the user plane node management parameter at the NW-TT to the value specified in the operation, and:

1) if the value of the parameter at the NW-TT is set successfully, include the parameter and its current value in the User plane node update result IE of the MANAGE USER PLANE NODE COMPLETE message; and

2) if the value of the parameter at the NW-TT was not set successfully, include the parameter and associated User plane node management service cause value in the User plane node update result IE of the MANAGE USER PLANE NODE COMPLETE message;

d) if the operation code is "subscribe-notify for parameter", store the request from the TSN AF to be notified of changes in the value of the corresponding user plane node management parameter;

e) if the operation code is "unsubscribe for parameter", delete the stored request from the TSN AF to be notified of changes in the value of the corresponding user plane node management parameter, if any; and

f) send the MANAGE USER PLANE NODE COMPLETE to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].

#### 6.3.1.4 Abnormal cases in the TSN AF

The following abnormal cases can be identified:

a) T150 expired.

The TSN AF shall, on the first expiry of the timer T150, retransmit the MANAGE USER PLANE NODE COMMAND message and shall reset and start timer T150. This retransmission is repeated four times, i.e. on the fifth expiry of timer T150, the TSN AF shall abort the procedure.

#### 6.3.1.5 Abnormal cases in the NW-TT

The following abnormal cases can be identified:

a) Transmission failure of the MANAGE USER PLANE NODE COMPLETE message indication from lower layers.

The NW-TT shall not diagnose an error and consider the TSN AF-initiated User plane node management procedure complete.

NOTE: Considering that the TSN AF-initiated User plane node management procedure complete as a result of this abnormal case does not cause the NW-TT to revert the execution of the operations included in the MANAGE USER PLANE NODE COMMAND message.

### 6.3.2 NW-TT-initiated User plane node management procedure

#### 6.3.2.1 General

The purpose of the NW-TT-initiated User plane node management procedure is to notify the TSN AF of one or more changes in the value of User plane node management parameters for which the TSN AF had requested to be notified of changes via the TSN AF-initiated User plane node management procedure.

#### 6.3.2.2 NW-TT-initiated User plane node management procedure initiation

In order to initiate the NW-TT-initiated User plane node management procedure, the NW-TT shall create a USER PLANE NODE MANAGEMENT NOTIFY message and shall:

a) include the User plane node management parameters to be reported to the TSN AF with their current value in the User plane node status IE of the USER PLANE NODE MANAGEMENT NOTIFY message;

b) start timer T350; and

c) send the USER PLANE NODE MANAGEMENT NOTIFY message to the TSN AF via the SMF and the PCF as specified in 3GPP TS 23.502 [3].

Figure 6.3.2.2.1: NW-TT-initiated User plane node management procedure

#### 6.3.2.3 NW-TT-initiated User plane node management procedure completion

Upon receipt of the USER PLANE NODE MANAGEMENT NOTIFY message, the TSN AF shall:

a) create a MANAGE USER PLANE NODE MANAGEMENT NOTIFY ACK message; and

b) send the MANAGE USER PLANE NODE MANAGEMENT NOTIFY ACK message to the NW-TT via the PCF and the SMF as specified in 3GPP TS 23.502 [3].

Upon receipt of the USER PLANE NODE MANAGEMENT NOTIFY ACK message, the NW-TT shall stop timer T350.

#### 6.3.2.4 Abnormal cases in the TSN AF

The following abnormal cases can be identified:

a) Transmission failure of the USER PLANE NODE MANAGEMENT NOTIFY ACK indication from lower layers.

The TSN AF shall not diagnose an error and consider the NW-TT-initiated User plane node management procedure complete.

#### 6.3.2.5 Abnormal cases in the NW-TT

The following abnormal cases can be identified:

a) T350 expired.

The NW-TT shall, on the first expiry of the timer T350, retransmit the USER PLANE NODE MANAGEMENT NOTIFY message and shall reset and start timer T350. This retransmission is repeated four times, i.e. on the fifth expiry of timer T350, the NW-TT shall abort the procedure.

b) Transmission failure of the USER PLANE NODE MANAGEMENT NOTIFY COMPLETE message indication from lower layers.

The NW-TT shall not diagnose an error and consider the NW-TT-initiated User plane node management procedure complete.

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

# 7 Handling of unknown, unforeseen, and erroneous port management service and user plane node management service data

## 7.1 General

The procedures specified in clause 5 and clause 6 apply to those messages which pass the checks described in clause 7.

Clause 7 also specifies procedures for the handling of unknown, unforeseen, and erroneous port management service (PMS) and User plane node management service (UMS) data by the receiving entity. These procedures are called "error handling procedures", but in addition to providing recovery mechanisms for error situations they define a compatibility mechanism for future extensions of the PMS or UMS.

Clauses 7.1 to 7.7 shall be applied in order of precedence.

Detailed error handling procedures in the TSN AF are implementation dependent and may vary from network to network. However, when extensions of PMS or UMS are developed, TSN AFs are assumed to have the error handling which is indicated in this clause as mandatory ("shall") and that is indicated as strongly recommended ("should").

Also, the error handling of the TSN AF is only considered as mandatory or strongly recommended when certain thresholds for errors are not reached during a dedicated connection.

For definition of semantical and syntactical errors see 3GPP TS 24.007 [4], clause 11.4.2.

The procedures specified for TT are applicable for DS-TT or NW-TT.

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

### 7.2.2 Message too long

The maximum size of a PMS message sent by the DS-TT to the TSN AF or sent by the TSN AF to the DS-TT is 65535 octets. The maximum size of aPMS message sent by the NW-TT to the TSN AF or sent by the TSN AF to the NW-TT is 65523 octets. The maximum size of a UMS message is 65531 octets.

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

## 7.3 Unknown or unforeseen message type

If the TT or the TSN AF receives a PMS message with message type not defined for the PMS or not implemented by the receiver, it shall ignore the PMS message.

NOTE: A message type not defined for the PMS in the given direction is regarded by the receiver as a message type not defined for the EPMS, see 3GPP TS 24.007 [4].

If the TT receives a message not compatible with the PMS state, the TT shall ignore the PMS message.

If the TSN AF receives a message not compatible with the PMS state, the TSN AF actions are implementation dependent.

If the NW-TT or the TSN AF receives a UMS message with message type not defined for the UMS or not implemented by the receiver, it shall ignore the UMS message. If the DS-TT receives a UMS message with message type defined for the UMS or implemented by the receiver, it shall ingnore the UMS message.

NOTE: A message type not defined for the UMS in the given direction is regarded by the receiver as a message type not defined for the UMS, see 3GPP TS 24.007 [4].

If the NW-TT receives a message not compatible with the UMS state, the NW-TT shall ignore the UMS message.

If the TSN AF receives a message not compatible with the UMS state, the TSN AF actions are implementation dependent.

## 7.4 Non-semantical mandatory information element errors

When on receipt of a message,

a) an "imperative message part" error; or

b) a "missing mandatory IE" error

is diagnosed or when a message containing:

a) a syntactically incorrect mandatory IE;

b) an IE unknown in the message, but encoded as "comprehension required" (see 3GPP TS 24.007 [4]); or

c) an out of sequence IE encoded as "comprehension required" (see 3GPP TS 24.007 [4]) is received,

If the message is a PMS message, the TT shall ignore the PMS message. If the message is a UMS message, the NW-TT shall ignore the UMS message;

the TSN AF shall proceed as follows:

the TSN AF shall:

1) try to treat the message (the exact further actions are implementation dependent); or

2) ignore the message.

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

### 7.6.3 Conditional IE errors

When upon receipt of a PMS message the TT diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error, or when it receives a PMS message containing at least one syntactically incorrect conditional IE, the TT shall ignore the message.

When upon receipt of a UMS message the NW-TT diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error, or when it receives a UMS message containing at least one syntactically incorrect conditional IE, the NW-TT shall ignore the message.

When the TSN AF receives a message and diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a message containing at least one syntactically incorrect conditional IE, the TSN AF shall either:

a) try to treat the message (the exact further actions are implementation dependent); or

b) ignore the message.

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

## 8.1 Manage port command

### 8.1.1 Message definition

The MANAGE PORT COMMAND message is sent by the TSN AF to the DS-TT or NW-TT to manage the port at the DS-TT or NW-TT, see table 8.1.1.1

Message type: MANAGE PORT COMMAND

Significance: dual

Direction: TSN AF to DS-TT, TSN AF to NW-TT

Table 8.1.1.1: MANAGE PORT COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | MANAGE PORT COMMAND message identity | Port management service message type  9.1 | M | V | 1 |
|  | Port management list | Port management list  9.2 | M | LV-E | 3-65534 |

## 8.2 Manage port complete

### 8.2.1 Message definition

The MANAGE PORT COMPLETE message is sent by the DS-TT or NW-TT to the TSN AF to complete the network-initiated port management procedure or the TSN AF-initiated port management procedure, see table 8.2.1.1

Message type: MANAGE PORTCOMPLETE

Significance: dual

Direction: DS-TT to TSN AF, NW-TT to TSN AF

Table 8.2.1.1: MANAGE PORT COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | MANAGE PORT COMPLETE message identity | Port management service message type  9.1 | M | V | 1 |
| 70 | Port management capability | Port management capability  9.3 | O | TLV-E | 5-65534 |
| 71 | Port status | Port status  9.4 | O | TLV-E | 5-65534 |
| 72 | Port update result | Port update result  9.5 | O | TLV-E | 5-65534 |

### 8.2.2 Port management capability

This IE shall be included if the TSN AF has included an operation with operation code set to "get capabilities" in the MANAGE PORT COMMAND message.

### 8.2.3 Port status

This IE shall be included if the TSN AF has included one or more operations with operation code set to "read parameter" in the MANAGE PORT COMMAND message.

### 8.2.4 Port update result

This IE shall be included if the TSN AF has included one or more operations with operation code set to "set parameter" in the MANAGE PORT COMMAND message.

## 8.3 Port management notify

### 8.3.1 Message definition

The PORT MANAGEMENT NOTIFY message is sent by the DS-TT or NW-TT to the TSN AF to notify the TSN AF of one or more changes in the value of port management parameters, see table 8.3.1.1

Message type: PORT MANAGEMENT NOTIFY

Significance: dual

Direction: DS-TT to TSN AF, NW-TT to TSN AF

Table 8.3.1.1: PORT MANAGEMENT NOTIFY message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PORT MANAGEMENT NOTIFY message identity | Port management service message type  9.1 | M | V | 1 |
|  | Port status | Port status  9.4 | M | LV-E | 4-65533 |

## 8.4 Port management notify ack

### 8.4.1 Message definition

The PORT MANAGEMENT NOTIFY ACK message is sent by the TSN AF to the DS-TT or NW-TT to acknowledge a PORT MANAGEMENT NOTIFY message, see table 8.4.1.1

Message type: PORT MANAGEMENT NOTIFY ACK

Significance: dual

Direction: TSN AF to DS-TT, TSN AF to NW-TT

Table 8.4.1.1: PORT MANAGEMENT NOTIFY ACK message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PORT MANAGEMENT NOTIFY ACK message identity | Port management service message type  9.1 | M | V | 1 |

## 8.5 Port management notify complete

### 8.5.1 Message definition

The PORT MANAGEMENT NOTIFY COMPLETE message is sent by the DS-TT to the TSN AF to complete the DS-TT-initiated port management procedure, see table 8.5.1.1

Message type: PORT MANAGEMENT NOTIFY COMPLETE

Significance: dual

Direction: DS-TT to TSN AF

Table 8.5.1.1: PORT MANAGEMENT NOTIFY COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PORT MANAGEMENT NOTIFY COMPLETE message identity | Port management service message type  9.1 | M | V | 1 |

## 8.6 Port management capability

### 8.6.1 Message definition

The PORT MANAGEMENT CAPABILITY message is sent by the DS-TT to provide the DS-TT supported port management capabilities to the TSN AF, see table 8.6.1.1

Message type: PORT MANAGEMENT CAPABILITY

Significance: dual

Direction: DS-TT to TSN AF

Table 8.6.1.1: PORT MANAGEMENT CAPABILITY message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PORT MANAGEMENT CAPABILITY message identity | Port management service message type  9.1 | M | V | 1 |
|  | Port management capability | Port management capability  9.3 | M | LV-E | 4-65533 |

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

## 8.7 Manage User plane node command

### 8.7.1 Message definition

The MANAGE USER PLANE NODE COMMAND message is sent by the TSN AF to the NW-TT to manage the User plane node functionalities, see table 8.7.1.1

Message type: MANAGE USER PLANE NODE COMMAND

Significance: dual

Direction: TSN AF to NW-TT

Table 8.7.1.1: MANAGE USER PLANE NODE COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | MANAGE USER PLANE NODE COMMAND message identity | User plane node management service message type  9.5A | M | V | 1 |
|  | User plane node management list | User plane node management list  9.5B | M | LV-E | 3-65534 |

## 8.8 Manage User plane node complete

### 8.8.1 Message definition

The MANAGE USER PLANE NODE COMPLETE message is sent by the NW-TT to the TSN AF to complete the TSN AF-initiated User plane node management procedure, see table 8.8.1.1

Message type: MANAGE USER PLANE NODE COMPLETE

Significance: dual

Direction: NW-TT to TSN AF

Table 8.8.1.1: MANAGE USER PLANE NODE COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | MANAGE USER PLANE NODE COMPLETE message identity | User plane node management service message type  9.5A | M | V | 1 |
| 70 | User plane node management capability | User plane node management capability  9.5C | O | TLV-E | 5-65534 |
| 71 | User plane nodet status | User plane node status  9.5D | O | TLV-E | 5-65534 |
| 72 | User plane node update result | User plane node update result  9.5E | O | TLV-E | 5-65534 |

### 8.8.2 User plane node management capability

This IE shall be included if the TSN AF has included an operation with operation code set to "get capabilities" in the MANAGE USER PLANE NODE COMMAND message.

### 8.8.3 User plane node status

This IE shall be included if the TSN AF has included one or more operations with operation code set to "read parameter" in the MANAGE USER PLANE NODE COMMAND message.

### 8.8.4 User plane node update result

This IE shall be included if the TSN AF has included one or more operations with operation code set to "set parameter" in the MANAGE USER PLANE NODE COMMAND message.

## 8.9 User plane node management notify

### 8.9.1 Message definition

The USER PLANE NODE MANAGEMENT NOTIFY message is sent by the NW-TT to the TSN AF to notify the TSN AF of one or more changes in the value of User plane node management parameters, see table 8.9.1.1

Message type: USER PLANE NODE MANAGEMENT NOTIFY

Significance: dual

Direction: NW-TT to TSN AF

Table 8.9.1.1: USER PLANE NODE MANAGEMENT NOTIFY message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | USER PLANE NODE MANAGEMENT NOTIFY message identity | User plane node management service message type  9.5A | M | V | 1 |
|  | User plane node status | User plane node status  9.5D | M | LV-E | 4-65534 |

## 8.10 User plane node management notify ack

### 8.10.1 Message definition

The USER PLANE NODE MANAGEMENT NOTIFY ACK message is sent by the TSN AF to the NW-TT to acknowledge a USER PLANE NODE MANAGEMENT NOTIFY message, see table 8.10.1.1

Message type: USER PLANE NODE MANAGEMENT NOTIFY ACK

Significance: dual

Direction: TSN AF to NW-TT

Table 8.10.1.1: USER PLANE NODE MANAGEMENT NOTIFY ACK message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | USER PLANE NODE MANAGEMENT NOTIFY ACK message identity | User plane node management service message type  9.5A | M | V | 1 |

## 9.1 Port management service message type

Table 9.1.1: Port management service message type

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits | | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |  | Reserved |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | | MANAGE PORT COMMAND message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | | MANAGE PORT COMPLETE message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | | PORT MANAGEMENT NOTIFY message |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | | PORT MANAGEMENT NOTIFY ACK message |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  | | PORT MANAGEMENT NOTIFY COMPLETE message |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |  | | PORT MANAGEMENT CAPABILITY message |
|  | | | | | | | | | | |
| All other values are reserved | | | | | | | | | | |

## 9.2 Port management list

The purpose of the port management list information element is to transfer from the TSN AF to the DS-TT or NW-TT a list of operations related to port management of the DS-TT or NW-TT to be performed at the DS-TT or NW-TT.

The port management list information element is coded as shown in figure 9.2.1, figure 9.2.2, figure 9.2.3, figure 9.2.4, figure 9.2.5, and table 9.2.1.

The port management list information element has a minimum length of 4 octets and a maximum length of 65535 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port management list IEI | | | | | | | | octet 1 |
| Length of port management list contents | | | | | | | | octet 2  octet 3 |
| Port management list contents | | | | | | | | octet 4  octet z |

Figure 9.2.1: Port management list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation 1 | | | | | | | | octet 4  octet a |
| Operation 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  …  octet c\* |
| Operation N | | | | | | | | octet c+1\*  octet z\* |

Figure 9.2.2: Port management list contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |

Figure 9.2.3: Operation for operation code set to "00000001"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |
| Port parameter name | | | | | | | | octet d+1  octet d+2 |

Figure 9.2.4: Operation for operation code set to "00000010", "00000100", or "00000101"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |
| Port parameter name | | | | | | | | octet d+1  octet d+2 |
| Length of port parameter value | | | | | | | | octet d+3 octet d+4 |
| Port parameter value | | | | | | | | octet d+5  octet e |

Figure 9.2.5: Operation for operation code set to "00000011"

Table 9.2.1: Port management list information element

|  |
| --- |
| Value part of the port management list information element (octets 4 to z) |
|  |
| The value part of the port management list information element consists of one or several operations. |
|  |
| Operation |
|  |
| Operation code (octet d) |
| Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 Get capabilities  0 0 0 0 0 0 1 0 Read parameter  0 0 0 0 0 0 1 1 Set parameter (NOTE)  0 0 0 0 0 1 0 0 Subscribe-notify for parameter |
| 0 0 0 0 0 1 0 1 Unsubscribe for parameter |
| All other values are spare. |
|  |
| Port parameter name (octets d+1 to d+2) |
|  |
| This field contains the name of the port parameter to which the operation applies, encoded as follows:  - 0000H Reserved;  - 0001H txPropagationDelay;  - 0002H Traffic class table;  - 0003H GateEnabled;  - 0004H AdminBaseTime;  - 0005H AdminControlListLength;  - 0006H AdminControlList;  - 0007H AdminCycleTime;  - 0008H Tick granularity;  - 0009H  to Spare  - 003FH  - 0040H lldpV2PortConfigAdminStatusV2;  - 0041H lldpV2LocChassisIdSubtype;  - 0042H lldpV2LocChassisId;  - 0043H lldpV2MessageTxInterval;  - 0044H lldpV2MessageTxHoldMultiplier;  - 0045H  to Spare  - 005FH  - 0060H lldpV2LocPortIdSubtype;  - 0061H lldpV2LocPortId;  - 0062H  to Spare  - 009FH  - 00A0H lldpV2RemChassisIdSubtype;  - 00A1H lldpV2RemChassisId;  - 00A2H lldpV2RemPortIdSubtype;  - 00A3H lldpV2RemPortId;  - 00A4H lldpTTL;  - 00A5H  to Spare  - 00CFH  - 00D0H PSFPMaxStreamFilterInstances;  - 00D1H PSFPMaxStreamGateInstances;  - 00D2H PSFPMaxFlowMeterInstances;  - 00D3H PSFPSupportedListMax;  - 00D4H  to Spare  - 00DFH  - 00E0H Stream filter instance table  - 00E1H Stream gate instance table  - 00E2H  to Spare  - 7FFFH  - 8000H  to Reserved for deployment specific parameters  - FFFFH |
| Length of port parameter value (octets d+3 to d+4) |
|  |
| This field contains the binary encoding of the length of the port parameter value |
|  |
| Port parameter value (octet d+5 to e) |
|  |
| This field contains the value to be set for the port parameter.  When the port parameter name indicates txPropagationDelay, the port parameter value field contains the binary representation of the txPropagationDelay as defined in IEEE Std 802.1Qcc [9], expressed in unit of nanoseconds and multiplied by 216, with the LSB bit included in bit 1 of the first octet. If the txPropagationDelay is too big to be represented, all bits of the port parameter value field shall be coded as "1" except the MSB bit. The length of port parameter value indicates a value of 8.  When the port parameter name indicates Traffic class table, the port parameter value field contains the traffic class table as defined in IEEE Std 802.1Q [7], encoded as the value part of the Traffic class information element as specified in clause 9.7.  When the port parameter name indicates GateEnabled, the port parameter value field contains the value of GateEnabled as defined in IEEE Std 802.1Q [7], with a Boolean value of FALSE encoded as "00000000" and a Boolean value of TRUE encoded as "00000001". The length of port parameter value field indicates a value of 1.  When the port parameter name indicates AdminBaseTime, the port parameter value field contains the value of the administrative base time as specified in IEEE Std 802.1Q [7]. The length of port parameter value field indicates a value of 10.  When the port parameter name indicates AdminControlListLength, the port parameter value field contains the value of the AdminControlListLength as specified in IEEE Std 802.1Q [7]. The length of port parameter value field indicates a value of 2.  When the port parameter name indicates AdminControlList, the port parameter value field contains the concatenation of AdminControlListLength entries, each encoded as a GateControlEntry as specified in IEEE Std 802.1Q [7].  When the port parameter name indicates AdminCycleTime, the port parameter value field contains the value of the AdminCycleTime as specified in IEEE Std 802.1Q [7]. The length of port parameter value field indicates a value of 8.  When the port parameter name indicates Tick granularity, the port parameter value field contains the value of the Tick granularity as specified in IEEE Std 802.1Q [7]. The length of port parameter value field indicates a value of 4.  When the port parameter name indicates lldpV2PortConfigAdminStatusV2, the port parameter value field contains values of lldpV2PortConfigAdminStatusV2 as specified in IEEE Std 802.1AB [6] clause 9.2.5.1 with value of txOnly encoded as 01H, rxOnly encoded as 02H, txAndRx encoded as 03H, and disabled encoded as 04H. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2LocChassisIdSubtype, the port parameter value field contains values of lldpV2LocChassisIdSubtype as specified in IEEE Std 802.1AB [6] clause 8.5.2.2. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2LocChassisId, the port parameter value field contains values of lldpV2LocChassisId in the form of an octet string as specified in IEEE Std 802.1AB [6] clause 8.5.2.3. The length of port parameter value field indicates the length of the octet string with a maximum value of 255.  When the port parameter name indicates lldpV2MessageTxInterval, the port parameter value field contains the value of lldpV2MessageTxInterval as specified in IEEE Std 802.1AB [6] table 11-2. The length of port parameter value field indicates a value of 2.  When the port parameter name indicates lldpV2MessageTxHoldMultiplier, the port parameter value field contains the value of lldpV2MessageTxHoldMultiplier as specified in IEEE Std 802.1AB [6] table 11-2. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2LocPortIdSubtype, the port parameter value field contains values of lldpV2LocPortIdSubtype as specified in IEEE Std 802.1AB [6] clause 8.5.3.2. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2LocPortId, the port parameter value field contains values of lldpV2LocPortId in the form of an octet string as specified in IEEE Std 802.1AB [6] clause 8.5.3.3. The length of port parameter value field indicates the length of the octet string with a maximum value of 255.  When the port parameter name indicates lldpV2RemChassisIdSubtype, the port parameter value field contains values of lldpV2RemChassisIdSubtype as specified in IEEE Std 802.1AB [6] clause 8.5.2.2. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2RemChassisId, the port parameter value field contains values of lldpV2RemChassisId in the form of an octet string as specified in IEEE Std 802.1AB [6] clause 8.5.2.3. The length of port parameter value field indicates the length of the octet string with a maximum value of 255.  When the port parameter name indicates lldpV2RemPortIdSubtype, the port parameter value field contains values of lldpV2RemPortIdSubtype as specified in IEEE Std 802.1AB [6] clause 8.5.3.2. The length of port parameter value field indicates a value of 1.  When the port parameter name indicates lldpV2RemPortId, the port parameter value field contains values of lldpV2RemPortId in the form of an octet string as specified in IEEE Std 802.1AB [6] clause 8.5.3.3. The length of port parameter value field indicates the length of the octet string with a maximum value of 255.  When the port parameter name indicates lldpTTL, the port parameter value field contains the value of TTL as specified in IEEE Std 802.1AB [6] clause 8.5.4. The length of port parameter value field indicates a value of 2.  When the port parameter name indicates PSFPMaxStreamFilterInstances, the parameter value field contains the value of MaxStreamFilterInstances as specified in IEEE Std 802.1Q [7] clause 12.31.1.1. The length of port parameter value field indicates a value of 4.  When the port parameter name indicates PSFPMaxStreamGateInstances, the parameter value field contains the value of MaxStreamGateInstances as specified in IEEE Std 802.1Q [7] clause 12.31.1.2. The length of port parameter value field indicates a value of 4.  When the port parameter name indicates PSFPMaxFlowMeterInstances, the parameter value field contains the value of MaxFlowMeterInstances as specified in IEEE Std 802.1Q [7] clause 12.31.1.3. The length of port parameter value field indicates a value of 4.  When the port parameter name indicates PSFPSupportedListMax, the parameter value field contains the value of SupportedListMax as specified in IEEE Std 802.1Q [7] clause 12.31.1.4. The length of port parameter value field indicates a value of 4.  When the port parameter name indicates Stream filter instance table, the port parameter value field contains a Stream filter instance table as defined in 3GPP TS 23.501 [2] table 5.28.3.1-1, encoded as the value part of the Stream filter instance table information element as specified in clause 9.8.  When the port parameter name indicates Stream gate instance table, the port parameter value field contains a Stream gate instance table as defined in 3GPP TS 23.501 [2] table 5.28.3.1-1, encoded as the value part of the Stream gate instance table information element as specified in clause 9.9.  When the hexadecimal encoding of the port parameter name is in the "8000H" to "FFFFH" range, the encoding of the port parameter value field and the value of the length of port parameter value field are deployment-specific. |
|  |
| NOTE: The "Set parameter" operation shall not be applicable for the following port parameter names: - 0001H txPropagationDelay; - 0008H Tick granularity; - 00A0H lldpV2RemChassisIdSubtype; - 00A1H lldpV2RemChassisId; - 00A2H lldpV2RemPortIdSubtype; - 00A3H lldpV2RemPortId; - 00A4H lldpTTL; - 00D0H PSFPMaxStreamFilterInstances; - 00D1H PSFPMaxStreamGateInstances; - 00D2H PSFPMaxFlowMeterInstances; and - 00D3H PSFPSupportedListMax. |

## 9.3 Port management capability

The purpose of the port management capability information element is to inform the TSN AF of the port parameters supported by the DS-TT or NW-TT.

The port management capability information element is coded as shown in figure 9.3.1, figure 9.3.2, and table 9.31.

The port management capability information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port management capability IEI | | | | | | | | octet 1 |
| Length of port management capability contents | | | | | | | | octet 2  octet 3 |
| port management capability contents | | | | | | | | octet 4  octet z |

Figure 9.3.1: port management capability information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Supported port parameter name 1 | | | | | | | | octet 4  octet 5 |
| Supported port parameter name 2 | | | | | | | | octet 6  octet 7 |
| … | | | | | | | | octet 8  octet z-2 |
| Supported port parameter name N | | | | | | | | octet z-1  octet z |

Figure 9.3.2: Port management capability contents

Table 9.3.1: Port management capability information element

|  |
| --- |
| Value part of the port management capability information element (octets 4 to z) |
|  |
| The value part of the port management capability information element consists of one or several supported port parameter names, each encoded over 2 octets as specified in table 9.2.1 for the DS-TT or NW-TT to TSN AF direction. |
|  |

## 9.4 Port status

The purpose of the port status information element is to report the values of port parameters of the DS-TT or NW-TT to the TSN AF.

The port status information element is coded as shown in figure 9.4.1, figure 9.4.2, figure 9.4.3, figure 9.4.4, figure 9.4.5, and table 9.4.1.

The port status information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port status IEI | | | | | | | | octet 1 |
| Length of port status and error contents | | | | | | | | octet 2  octet 3 |
| Port status contents | | | | | | | | octet 4  octet a |
| port error contents | | | | | | | | octet a+1  octet z |

Figure 9.4.1: Port status information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of port parameters successfully read | | | | | | | | octet 4 |
| port parameter status 1 | | | | | | | | octet 5\*  octet b\* |
| port parameter status 2 | | | | | | | | octet b+1\*  octet c\* |
| … | | | | | | | | octet c+1\*  …  octet d\* |
| port parameter status N | | | | | | | | octet d+1\*  octet a\* |

Figure 9.4.2: Port status contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port parameter name | | | | | | | | octet e  octet e+1 |
| Length of port parameter value | | | | | | | | octet e+2  octet e+3 |
| Port parameter value | | | | | | | | octet e+4  octet f |

Figure 9.4.3: Port parameter status

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of port parameters not successfully read | | | | | | | | octet a+1 |
| Port parameter error 1 | | | | | | | | octet a+2\*  octet a+3\* |
| Port parameter error 2 | | | | | | | | octet a+4\*  octet a+5\* |
| … | | | | | | | | octet a+6\*  …  octet z-2\* |
| Port parameter error N | | | | | | | | octet z-1\*  octet z\* |

Figure 9.4.4: Port error contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port parameter name | | | | | | | | octet i  octet i+1 |
| Port management service cause | | | | | | | | octet i+2 |

Figure 9.4.5: Port parameter error

Table 9.4.1: Port status information element

|  |
| --- |
| Value part of the port status information element (octets 4 to z) |
|  |
| Port status contents (octets 4 to a)  This field consists of zero or several port parameter statuses.  Port parameter status  Port parameter name (octets e to e+1) |
|  |
| This field contains the name of the port parameter which could be read successfully, encoded over 2 octets as specified in table 9.2.1 for the DS-TT or NW-TT to TSN AF direction. |
| Length of port parameter value (octets e+2 to e+3) |
|  |
| This field contains the binary encoding of the length of the port parameter value |
|  |
| Port parameter value (octets e+4 to f) |
|  |
| This field contains the value for the port parameter, encoded as specified in table 9.2.1. |
| Port error contents (octets a+1 to z)  This field consists of zero or several port parameter errors.  Port parameter error  Port parameter name (octets i to i+1) |
|  |
| This field contains the name of the port parameter whose value could not be read successfully, encoded over 2 octets as specified in table 9.2.1 for the DS-TT or NW-TT to TSN AF direction. |
| Port management service cause (octet i+2)  This field contains the port management service cause indicating the reason why the value of the port parameter could not be read successfully, encoded as follows:  Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 Port parameter not supported  0 0 0 0 0 0 1 0 Invalid port parameter value  0 1 1 0 1 1 1 1 Protocol error, unspecified  The receiving entity shall treat any other value as 0110 1111, "protocol error, unspecified". |

## 9.5 Port update result

The purpose of the port update result information element is to report to the TSN AF the outcome of the request from the TSN AF to set one or more port parameters to a specific value.

The port update result information element is coded as shown in figure 9.5.1, figure 9.5.2, figure 9.5.3, figure 9.5.4, figure 9.5.5, and table 9.5.1.

The port update result information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port update result IEI | | | | | | | | octet 1 |
| Length of port update and update error contents | | | | | | | | octet 2  octet 3 |
| Port update contents | | | | | | | | octet 4  octet a |
| Port update error contents | | | | | | | | octet a+1  octet z |

Figure 9.5.1: Port update result information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of port parameters successfully updated | | | | | | | | octet 4 |
| Port parameter update 1 | | | | | | | | octet 5\*  octet b\* |
| Port parameter update 2 | | | | | | | | octet b+1\*  octet c\* |
| … | | | | | | | | octet c+1\*  …  octet d\* |
| Port parameter update N | | | | | | | | octet d+1\*  octet a\* |

Figure 9.5.2: Port update contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port parameter name | | | | | | | | octet e  octet e+1 |
| Length of port parameter value | | | | | | | | octet e+2 |
| port parameter value | | | | | | | | octet e+3  octet f |

Figure 9.5.3: Port parameter update

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of port parameters not updated successfully | | | | | | | | octet a+1 |
| Port parameter error 1 | | | | | | | | octet a+2\*  octet a+3\* |
| Port parameter error 2 | | | | | | | | octet a+4\*  octet a+5\* |
| … | | | | | | | | octet a+6\*  …  octet z-2\* |
| Port parameter error N | | | | | | | | octet z-1\*  octet z\* |

Figure 9.5.4: Port update error contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port parameter name | | | | | | | | octet i  octet i+1 |
| Port management service cause | | | | | | | | octet i+2 |

Figure 9.5.5: Port parameter error

Table 9.5.1: Port update result information element

|  |
| --- |
| Value part of the port update result information element (octets 4 to z) |
|  |
| Port update contents (octets 4 to a)  This field consists of zero or several port parameter updates.  Port parameter update  Port parameter name (octets e to e+1) |
|  |
| This field contains the name of the port parameter which could be set successfully, encoded over 2 octets as specified in table 9.2.1 for the DS-TT or NW-TT to TSN AF direction. |
| Length of port parameter value (octet e+2) |
|  |
| This field contains the binary encoding of the length of the port parameter value |
|  |
| Port parameter value (octets e+3 to f) |
|  |
| Port error contents (octets a+1 to z)  This field consists of zero or several port parameter errors.  Port parameter error  Port parameter name (octets i to i+1) |
|  |
| This field contains the name of the port parameter whose value could not be set successfully, encoded over 2 octets as specified in table 9.2.1 for the DS-TT or NW-TT to TSN AF direction. |
| Port management service cause (octet i+2)  This field contains the port management service cause indicating the reason why the value of the port parameter could not be set successfully, encoded as follows:  Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 Port parameter not supported  0 0 0 0 0 0 1 0 Invalid port parameter value  0 1 1 0 1 1 1 1 Protocol error, unspecified  The receiving entity shall treat any other value as 0110 1111, "protocol error, unspecified". |

## 9.5A User plane node management service message type

Table 9.5A.1: User plane node management service message type

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits | | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |  | Reserved |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | | MANAGE USER PLANE NODE COMMAND message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | | MANAGE USER PLANE NODE COMPLETE message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | | USER PLANE NODE MANAGEMENT NOTIFY message |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | | USER PLANE NODE MANAGEMENT ACK message |
|  | | | | | | | | | | |
| All other values are reserved | | | | | | | | | | |

## 9.5B User plane node management list

The purpose of the User plane node management list information element is to transfer from the TSN AF to the NW-TT a list of operations related to User plane node management of the NW-TT to be performed at the NW-TT.

The User plane node management list information element is coded as shown in figure 9.5B.1, figure 9.5B.2, figure 9.5B.3, figure 9.5B.4, figure 9.5B.5, and table 9.5B.1.

The User plane node management list information element has a minimum length of 4 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node management list IEI | | | | | | | | octet 1 |
| Length of User plane node management list contents | | | | | | | | octet 2  octet 3 |
| User plane node management list contents | | | | | | | | octet 4  octet z |

Figure 9.5B.1: User plane node management list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation 1 | | | | | | | | octet 4  octet a |
| Operation 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  …  octet c\* |
| Operation N | | | | | | | | octet c+1\*  octet z\* |

Figure 9.5B.2: User plane node management list contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |

Figure 9.5B.3: Operation for operation code set to "00000001"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |
| User plane node parameter name | | | | | | | | octet d+1  octet d+2 |

Figure 9.5B.4: Operation for operation code set to "00000010", "00000100", or "00000101"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operation code | | | | | | | | octet d |
| User plane node parameter name | | | | | | | | octet d+1  octet d+2 |
| Length of User plane node parameter value | | | | | | | | octet d+3 octet d+4 |
| User plane node parameter value | | | | | | | | octet d+5  octet e |

Figure 9.5B.5: Operation for operation code set to "00000011"

Table 9.5B.1: User plane node management list information element

|  |
| --- |
| Value part of the User plane node management list information element (octets 4 to z) |
|  |
| The value part of the User plane node management list information element consists of one or several operations. |
|  |
| Operation |
|  |
| Operation code (octet d) |
| Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 Get capabilities  0 0 0 0 0 0 1 0 Read parameter  0 0 0 0 0 0 1 1 Set parameter  0 0 0 0 0 1 0 0 Subscribe-notify for parameter |
| 0 0 0 0 0 1 0 1 Unsubscribe for parameter |
| All other values are spare. |
|  |
| User plane node parameter name (octets d+1 to d+2) |
|  |
| This field contains the name of the User plane node parameter to which the operation applies, encoded as follows:  - 0000H Reserved;  - 0001H User plane node Address;  - 0002H User plane node Name;  - 0003H User plane node ID;  - 0004H  to Spare  - 0009H  - 0010H Chassis ID subtype;  - 0011H Chassis ID;  - 0012H Static filtering entries;  - 0013H  to Spare  - 0019H  - 0020H lldpV2PortConfigAdminStatusV2;  - 0021H lldpV2LocChassisIdSubtype;  - 0022H lldpV2LocChassisId;  - 0023H lldpV2MessageTxInterval;  - 0024H lldpV2MessageTxHoldMultiplier;  - 0025H  to Spare  - 004FH  - 0050H DS-TT port neighbor discovery configuration for DS-TT ports  - 0051H Discovered neighbor information for DS-TT ports  - 0052H  to Spare  - 006FH  - 0070H PSFPMaxStreamFilterInstances;  - 0071H PSFPMaxStreamGateInstances;  - 0072H PSFPMaxFlowMeterInstances;  - 0073H PSFPSupportedListMax;  - 0074H  to Spare  - 7FFFH  - 8000H  to Reserved for deployment specific parameters  - FFFFH |
| Length of User plane node parameter value (octets d+3 to d+4) |
|  |
| This field contains the binary encoding of the length of the User plane node parameter value |
|  |
| User plane node parameter value (octet d+5 to e) |
|  |
| This field contains the value to be set for the User plane node parameter.  When the User plane node parameter name indicates User plane node Address, the User plane node parameter value field contains the values of User plane node Address as defined in IEEE 802.1Q [7] clause 8.13.8. The length of User plane node parameter value field indicates a value of 6.  When the User plane node parameter name indicates User plane node Name, the User plane node parameter value field contains the values of User plane node Name in the form of an octet string as defined in IEEE 802.1Q [7] clause 12.4.1.3. The length of User plane node parameter value field indicates the length of the octet string with a maximum value of 32.  When the User plane node parameter name indicates User plane node ID, the User plane node parameter value field contains the values of User plane node Identifier as defined in IEEE 802.1Q [7] clause 14.2.5. The length of User plane node parameter value field indicates a value of 8.  When the User plane node parameter name indicates Chassis ID Subtype, the User plane node parameter value field contains the value of Chassis ID Subtype as defined in IEEE 802.1AB [6] clause 8.5.2.2. The length of User plane node parameter value field indicates a value of 1.  When the User plane node parameter name indicates Chassis ID, the User plane node parameter value field contains values of Chassis ID in the form of an octet string as specified in IEEE 802.1AB [6] clause 8.5.2.3. The length of User plane node parameter value field indicates the length of the octet string with a maximum value of 255.  When the User plane node parameter name indicates Static filtering entries, the User plane node parameter value field contains Static filtering entries as defined in 3GPP TS 23.501 [2] table 5.28.3.1-2, encoded as the value part of the Static filtering entries information element as specified in clause 9.6.  When the User plane node parameter name indicates lldpV2PortConfigAdminStatusV2, the User plane node parameter value field contains values of lldpV2PortConfigAdminStatusV2 as specified in IEEE 802.1AB [6] clause 9.2.5.1 with value of txOnly encoded as 01H, rxOnly encoded as 02H, txAndRx encoded as 03H, and disabled encoded as 04H. The length of User plane node parameter value field indicates a value of 1.  When the User plane node parameter name indicates lldpV2LocChassisIdSubtype, the User plane node parameter value field contains values of lldpV2LocChassisIdSubtype as specified in IEEE 802.1AB [6] clause 8.5.2.2. The length of User plane node parameter value field indicates a value of 1.  When the User plane node parameter name indicates lldpV2LocChassisId, the User plane node parameter value field contains values of lldpV2LocChassisId in the form of an octet string as specified in IEEE 802.1AB [6] clause 8.5.2.3. The length of User plane node parameter value field indicates the length of the octet string with a maximum value of 255.  When the User plane node parameter name indicates lldpV2MessageTxInterval, the User plane node parameter value field contains the value of lldpV2MessageTxInterval as specified in IEEE 802.1AB [6] table 11-2. The length of User plane node parameter value field indicates a value of 2.  When the User plane node parameter name indicates lldpV2MessageTxHoldMultiplier, the User plane node parameter value field contains the value of lldpV2MessageTxHoldMultiplier as specified in IEEE 802.1AB [6] table 11-2. The length of User plane node parameter value field indicates a value of 1.  When the User plane node parameter name indicates DS-TT port neighbor discovery configuration for DS-TT ports, the User plane node parameter value field contains DS-TT port neighbor discovery configuration for DS-TT ports as defined in 3GPP TS 23.501 [2] table 5.28.3.1-2, encoded as the value part of the DS-TT port neighbor discovery configuration for DS-TT ports information element as specified in clause 9.10.  When the User plane node parameter name indicates Discovered neighbor information for DS-TT ports, the User plane node parameter value field contains Discovered neighbor information for DS-TT ports as defined in 3GPP TS 23.501 [2] table 5.28.3.1-2, encoded as the value part of the Discovered neighbor information for DS-TT ports information element as specified in clause 9.11.  When the User plane node parameter name indicates PSFPMaxStreamFilterInstances, the User plane node parameter value field contains the value of PSFPMaxStreamFilterInstances as specified in IEEE 802.1Q [7] Table 12-31. The length of User plane node parameter value field indicates a value of 4.  When the User plane node parameter name indicates PSFPMaxStreamGateInstances, the User plane node parameter value field contains the value of PSFPMaxStreamGateInstances as specified in IEEE 802.1Q [7] Table 12-31. The length of User plane node parameter value field indicates a value of 4.  When the User plane node parameter name indicates PSFPMaxFlowMeterInstances, the User plane node parameter value field contains the value of PSFPMaxFlowMeterInstances as specified in IEEE 802.1Q [7] Table 12-31. The length of User plane node parameter value field indicates a value of 4.  When the User plane node parameter name indicates PSFPSupportedListMax, the User plane node parameter value field contains the value of SupportedListMax as specified in IEEE 802.1Q [7] clause 12. 31.1.4. The length of User plane node parameter value field indicates a value of 4.  When the hexadecimal encoding of the User plane node parameter name is in the "8000H" to "FFFFH" range, the encoding of the User plane node parameter value field and the value of the length of User plane node parameter value field are deployment-specific. |
|  |

## 9.5C User plane node management capability

The purpose of the User plane node management capability information element is to inform the TSN AF of the User plane node parameters supported by the NW-TT.

The User plane node management capability information element is coded as shown in figure 9.5C.1, figure 9.5C.2, and table 9.5C.1.

The User plane node management capability information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node management capability IEI | | | | | | | | octet 1 |
| Length of User plane node management capability contents | | | | | | | | octet 2  octet 3 |
| User plane node management capability contents | | | | | | | | octet 4  octet z |

Figure 9.5C.1: User plane node management capability information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Supported User plane node parameter name 1 | | | | | | | | octet 4  octet 5 |
| Supported User plane node parameter name 2 | | | | | | | | octet 6  octet 7 |
| … | | | | | | | | octet 8  octet z-2 |
| Supported User plane node parameter name N | | | | | | | | octet z-1  octet z |

Figure 9.5C.2: User plane node management capability contents

Table 9.5C.1: User plane node management capability information element

|  |
| --- |
| Value part of the User plane node management capability information element (octets 4 to z) |
|  |
| The value part of the User plane node management capability information element consists of one or several supported User plane node parameter names, each encoded over 2 octets as specified in table 9.5B.1 for the NW-TT to TSN AF direction. |
|  |

## 9.5D User plane node status

The purpose of the User plane node status information element is to report the values of User plane node parameters of the NW-TT to the TSN AF.

The User plane node status information element is coded as shown in figure 9.5D.1, figure 9.5D.2, figure 9.5D.3, figure 9.5D.4, figure 9.5D.5, and table 9.5D.1.

The User plane node status information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node status IEI | | | | | | | | octet 1 |
| Length of User plane node status and error contents | | | | | | | | octet 2  octet 3 |
| User plane node status contents | | | | | | | | octet 4  octet a |
| User plane node error contents | | | | | | | | octet a+1  octet z |

Figure 9.5D.1: User plane node status information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of User plane node parameters successfully read | | | | | | | | octet 4 |
| User plane node parameter status 1 | | | | | | | | octet 5\*  octet b\* |
| User plane node parameter status 2 | | | | | | | | octet b+1\*  octet c\* |
| … | | | | | | | | octet c+1\*  …  octet d\* |
| User plane node parameter status N | | | | | | | | octet d+1\*  octet a\* |

Figure 9.5D.2: User plane node status contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node parameter name | | | | | | | | octet e  octet e+1 |
| Length of User plane node parameter value | | | | | | | | octet e+2  octet e+3 |
| User plane node parameter value | | | | | | | | octet e+4  octet f |

Figure 9.5D.3: User plane node parameter status

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of User plane node parameters not successfully read | | | | | | | | octet a+1 |
| User plane node parameter error 1 | | | | | | | | octet a+2\*  octet a+3\* |
| User plane node parameter error 2 | | | | | | | | octet a+4\*  octet a+5\* |
| … | | | | | | | | octet a+6\*  …  octet z-2\* |
| User plane node parameter error N | | | | | | | | octet z-1\*  octet z\* |

Figure 9.5D.4: User plane node error contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node parameter name | | | | | | | | octet i  octet i+1 |
| User plane node management service cause | | | | | | | | octet i+2 |

Figure 9.5D.5: User plane node parameter error

Table 9.4.1: User plane node status information element

|  |
| --- |
| Value part of the User plane node status information element (octets 4 to z) |
|  |
| User plane node status contents (octets 4 to a)  This field consists of zero or several User plane node parameter statuses.  User plane node parameter status  User plane node parameter name (octets e to e+1) |
|  |
| This field contains the name of the User plane node parameter which could be read successfully, encoded over 2 octets as specified in table 9.2.1 for the NW-TT to TSN AF direction. |
| Length of User plane node parameter value (octets e+2 to e+3) |
|  |
| This field contains the binary encoding of the length of the User plane node parameter value |
|  |
| User plane node parameter value (octets e+4 to f) |
|  |
| This field contains the value for the User plane node parameter, encoded as specified in table 9.2.1. |
| User plane node error contents (octets a+1 to z)  This field consists of zero or several User plane node parameter errors.  User plane node parameter error  User plane node parameter name (octets to i+1) |
|  |
| This field contains the name of the User plane node parameter whose value could not be read successfully, encoded over 2 octets as specified in table 9.2.1 for the NW-TT to TSN AF direction. |
| User plane node management service cause (octet i+2)  This field contains the User plane node management service cause indicating the reason why the value of the User plane node parameter could not be read successfully, encoded as follows:  Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 User plane node parameter not supported  0 0 0 0 0 0 1 0 Invalid User plane node parameter value  0 1 1 0 1 1 1 1 Protocol error, unspecified  The receiving entity shall treat any other value as 0110 1111, "protocol error, unspecified". |

## 9.5E User plane node update result

The purpose of the User plane node update result information element is to report to the TSN AF the outcome of the request from the TSN AF to set one or more User plane node parameters to a specific value.

The User plane node update result information element is coded as shown in figure 9.5E.1, figure 9.5E.2, figure 9.5E.3, figure 9.5E.4, figure 9.5E.5, and table 9.5E.1.

The User plane node update result information element has a minimum length of 5 octets and a maximum length of 65534 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node update result IEI | | | | | | | | octet 1 |
| Length of User plane node update and update error contents | | | | | | | | octet 2  octet 3 |
| User plane node update contents | | | | | | | | octet 4  octet a |
| User plane node update error contents | | | | | | | | octet a+1  octet z |

Figure 9.5E.1: User plane node update result information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of User plane node parameters successfully updated | | | | | | | | octet 4 |
| User plane node parameter update 1 | | | | | | | | octet 5\*  octet b\* |
| User plane node parameter update 2 | | | | | | | | octet b+1\*  octet c\* |
| … | | | | | | | | octet c+1\*  …  octet d\* |
| User plane node parameter update N | | | | | | | | octet d+1\*  octet a\* |

Figure 9.5E.2: User plane node update contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node parameter name | | | | | | | | octet e  octet e+1 |
| Length of User plane node parameter value | | | | | | | | octet e+2 |
| User plane node parameter value | | | | | | | | octet e+3  octet f |

Figure 9.5E.3: User plane node parameter update

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of User plane node parameters not updated successfully | | | | | | | | octet a+1 |
| User plane node parameter error 1 | | | | | | | | octet a+2\*  octet a+3\* |
| User plane node parameter error 2 | | | | | | | | octet a+4\*  octet a+5\* |
| … | | | | | | | | octet a+6\*  …  octet z-2\* |
| User plane node parameter error N | | | | | | | | octet z-1\*  octet z\* |

Figure 9.5E.4: User plane node update error contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| User plane node parameter name | | | | | | | | octet i  octet i+1 |
| User plane node management service cause | | | | | | | | octet i+2 |

Figure 9.5E.5: User plane node parameter error

Table 9.5E.1: User plane node update result information element

|  |
| --- |
| Value part of the User plane node update result information element (octets 4 to z) |
|  |
| User plane node update contents (octets 4 to a)  This field consists of zero or several User plane node parameter updates.  User plane node parameter update  User plane node parameter name (octets e to e+1) |
|  |
| This field contains the name of the User plane node parameter which could be set successfully, encoded over 2 octets as specified in table 9.5B.1 for the NW-TT to TSN AF direction. |
| Length of User plane node parameter value (octet e+2) |
|  |
| This field contains the binary encoding of the length of the User plane node parameter value |
|  |
| User plane node parameter value (octets e+3 to f) |
|  |
| User plane node error contents (octets a+1 to z)  This field consists of zero or several User plane node parameter errors.  User plane node parameter error  User plane node parameter name (octets i to i+1) |
|  |
| This field contains the name of the User plane node parameter whose value could not be set successfully, encoded over 2 octets as specified in table 9.5B.1 for the NW-TT to TSN AF direction. |
| User plane node management service cause (octet i+2)  This field contains the User plane node management service cause indicating the reason why the value of the User plane node parameter could not be set successfully, encoded as follows:  Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 User plane node parameter not supported  0 0 0 0 0 0 1 0 Invalid User plane node parameter value  0 1 1 0 1 1 1 1 Protocol error, unspecified  The receiving entity shall treat any other value as 0110 1111, "protocol error, unspecified". |

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

## 9.14 NW-TT port numbers

The purpose of the NW-TT port numbers information element is to convey NW-TT port numbers as defined in 3GPP TS 23.501 [2] table 5.28.3.1-2.

The NW-TT port numbers information element is coded as shown in figure 9.14.1 and table 9.14.1.

The NW-TT port numbers information element has a minimum length of 3 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NW-TT port numbers IEI | | | | | | | | octet 1 |
| Length of NW-TT port numbers contents | | | | | | | | octet 2  octet 3 |
| NW-TT port number 1 value | | | | | | | | octet 4  octet 5 |
| … | | | | | | | |  |
| NW-TT port number n value | | | | | | | | octet n-1  octet n |

Figure 9.14.1: NW-TT port numbers information element

Table 9.14.1: NW-TT port numbers

|  |
| --- |
| Value part of the NW-TT port numbers information element (octets 4 to n) |
|  |
| NW-TT port numbers contents (octets 4 to n)  This field consists of zero or more NW-TT port numbers. |
|  |
| NW-TT port number (octets 4 to 5)  NW-TT port number value contains the value of Port Number as specified in IEEE Std 802.1Q [7]. |
|  |

# 10 Timers of port management service

Timers of port management service are shown in table 10.1, table 10.2, table 10.3, table 10.4 and table 10.5.

Table 10.1: Timers of port management service – TSN AF side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T100 | NOTE | Transmission of MANAGE PORT COMMAND message | MANAGE PORT COMPLETE message received | Retransmission of MANAGE PORT COMMAND message |
| NOTE: The value of this timer is network dependent. | | | | |

Table 10.2: Timers of User plane node management service – TSN AF side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T150 | NOTE | Transmission of MANAGE USER PLANE NODE COMMAND message | MANAGE USER PLANE NODE COMPLETE message received | Retransmission of MANAGE USER PLANE NODE PORT COMMAND message |
| NOTE: The value of this timer is network dependent. | | | | |

Table 10.3: Timers of port management service – DS-TT side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T200 | NOTE | Transmission of PORT MANAGEMENT NOTIFY message | PORT MANAGEMENT NOTIFY ACK message received | Retransmission of PORT MANAGEMENT NOTIFY message |
| NOTE: The value of this timer is DS-TT dependent. | | | | |

Table 10.4: Timers of port management service – NW-TT side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T300 | NOTE | Transmission of PORT MANAGEMENT NOTIFY message | PORT MANAGEMENT NOTIFY ACK message received | Retransmission of PORT MANAGEMENT NOTIFY message |
| NOTE: The value of this timer is NW-TT dependent. | | | | |

Table 10.5: Timers of User plane node management service – NW-TT side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T350 | NOTE | Transmission of USER PLANE NODE MANAGEMENT NOTIFY message | USER PLANE NODE MANAGEMENT NOTIFY ACK message received | Retransmission of USER PLANE NODE MANAGEMENT NOTIFY message |
| NOTE: The value of this timer is NW-TT dependent. | | | | |

\* \* \* End of changes \* \* \* \*