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Recommendation

ITU-T Q.5027 (07/2023)

SERIES Q: Switching and signalling, and associated measurements and tests

Signalling requirements and protocols for IMT-2020 – Protocols for IMT-2020

Protocol for IMT-2020 network integration with time sensitive network

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Recommendation ITU-T Q.5027

Protocol for IMT-2020 network integration with time sensitive network

Summary

Recommendation ITU-T Q.5027 specifies protocol for IMT-2020 network integration with time sensitive network (TSN) and introduces the communication mechanism between the IMT-2020 network and the TSN system. It also describes the parameters, procedures, signalling flow and message format between the core network function of the IMT-2020 network and the TSN translator.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T Q.5027	2023-07-14	11	11.1002/1000/15588

Keywords

IMT-2020, time sensitive network, traffic processing and synchronization.

* To access the Recommendation, type the URL https://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID.

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Protocol for IMT-2020 network integration with time sensitive network

1 Scope

This Recommendation specifies the protocol for IMT-2020 network integration with time sensitive network (TSN) and introduces the communication mechanism between the IMT-2020 network and TSN system. It also describes the parameters, procedure, signalling flow and message format between core network function of IMT-2020 network and TSN translator.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[IEEE Std 802.1AS-2020] IEEE Std 802.1AS-2020, *IEEE Standard for Local and metropolitan area networks – Timing and Synchronization for Time-Sensitive Applications*.

[IEEE Std 802.1 Qbv] IEEE Std 802.1 Qbv, *IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks – Amendment 25: Enhancements for Scheduled Traffic*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 data plane [b-ITU-T Y.3100]: The set of functions used to transfer data in the stratum or layer under consideration.

3.1.2 IMT-2020 [b-ITU-T Y.3100]: (Based on [ITU-R M.2083-0]) Systems, system components, and related aspects that support to provide far more enhanced capabilities than those described in [b-ITU-R M.1645].

3.1.3 network function [b-ITU-T Y.3100]: In the context of IMT-2020, a processing function in a network.

3.1.4 control plane [b-ITU-T Y.2011]: The set of functions that controls the operation of entities in the stratum or layer under consideration, plus the functions required to support this control.

3.1.5 user plane [b-ITU-T Y.2011]: A synonym for data plane.

3.1.6 PDU session [b-ITU-T Y.3100]: In the context of IMT-2020, an association between a user equipment (UE) and a data network that provides a protocol data unit (PDU) connectivity service.

3.1.7 grandmaster clock [IEEE Std 802.1AS-2020]: In the context of a single precision time protocol (PTP) domain, the synchronized time of a PTP Instance that is the source of time to which all other PTP Instances in the domain are synchronized.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AF	Application Function
CNC	Central Network Controller
DAF	Data Analysis Function
DS-TT	Device-Side TSN translator
E2E	End-to-End
GBR	Guaranteed Bit Rate
GM	Grandmaster
IMT	International Mobile Telecommunications
IoT	Internet of Things
NACF	Network Access Control Function
PCF	Policy Control Function
PDU	Protocol Data Unit
PSFP	Per-Stream Filtering and Policing
PTP	Precision Time Protocol
QoS	Quality of Service
RAN	Radio Access Network
SMF	Session Management Function
TSN	Time Sensitive Network
UE	User Equipment
UPF	User Plane Function

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

6 Overview

Networking is the foundation of the industrial internet and connects industrial systems via the Internet of Things (IoT), TSN, Internet and other technologies to facilitate the seamless integration of industrial data. The IMT-2020 network integration of TSN is able to provide determined real-time reliable communication for automation production.

The IMT-2020 network system is supposed to interact with the IEEE TSN system to support deterministic service transmission. The IMT-2020 network system is required to support clock synchronization, TSN protocol translation on time based on central network controller (CNC) instruction, the deterministic transmission among multiple user plane functions (UPFs) in a large area, and the network performance measurement to verify the IMT-2020 network deterministic characteristic to fulfil the traffic transmission on time. When integrated with the IEEE TSN network, the IMT-2020 network system acts as the TSN bridge of the TSN network to enable time sensitive communication and deterministic service.

7 Architecture for IMT-2020 network integration with the IEEE TSN system

7.1 The architectural model of the IMT-2020 integrated with IEEE TSN system

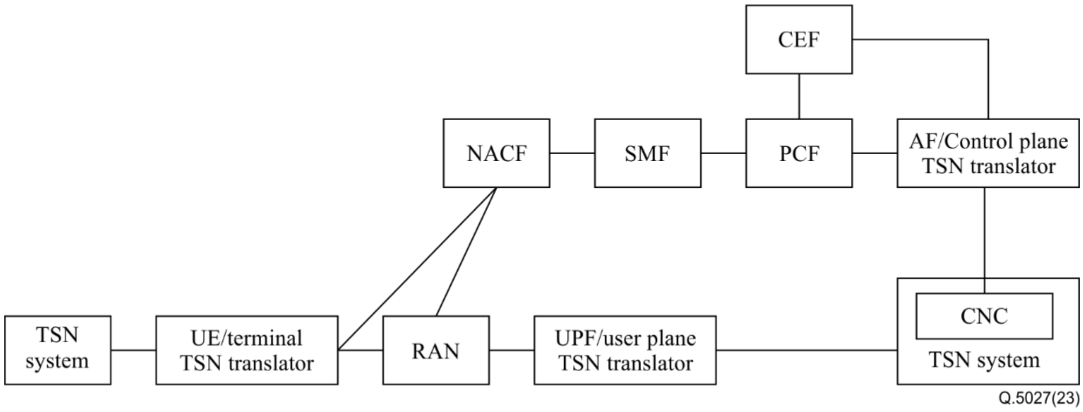

Figure 7-1 – Architecture reference model for IMT-2020 network integration with TSN

Figure 7-1 shows the architectural model of IMT-2020 network integration with TSN. It shows the communication among the core network function of the IMT-2020 network, TSN translator (e.g., user plane translator, terminal TSN translator and control plane TSN Translator) and the CNC controller of the TSN System.

The IMT-2020 network is modelled as a transparent TSN bridge providing control plane connection with the CNC controller and user plane connection with the TSN system. This model includes a control plane TSN translator that is available at the application function (AF), a user plane TSN translator at the UPF side and a terminal TSN translator at the UE side.

In order to achieve the transparency of the IMT-2020 network as for any other TSN bridge, the TSN ingress and egress are provided by the IMT-2020 network via terminal TSN translator and user plane TSN translator. The Terminal TSN translator and the user plane TSN translator need to support hold and forward functionality for de-jittering such as per-stream filtering and policing (PSFP) mechanism and the functionality of attached Ethernet devices discovery [IEEE Std 802.1 Qbv].

7.2 The enhancement for the IMT-2020 network

7.2.1 Enhancement to support time synchronization

The key technology of IMT-2020 network integration with TSN is time synchronization. The entire end-to-end (E2E) IMT-2020 network can be considered a "time-aware system" [IEEE Std 802.1AS-2020]; the User Plane TSN translator and the terminal TSN translator need to support the IEEE TSN standards. UPF/user plane TSN translator, RAN and UE/terminal TSN translator are synchronized with the IMT-2020 network internal system clock.

The outside grandmaster (GM) clock is deployed in the TSN system. The GM clock can create a sync message to convey the time information to the downstream TSN nodes to make the clocks of downstream TSN nodes synchronize with the GM clock.

To achieve time synchronization with the GM clock, when transmitting a message, the Terminal TSN translator and the user plane TSN translator will make ingress timestamping and egress timestamping; the difference between the ingress timestamping and egress timestamping is considered the calculated residence time spent within the IMT-2020 network for the message expressed in IMT-2020 network time. Then, the terminal TSN translator acting as the TSN egress port will translate the residence time into TSN time. Besides, the terminal TSN translator and the user plane TSN translator need to calculate and update the cumulative rate ratio in the message.

The UE can be synchronized with RAN through the RAN broadcasting time information.

7.2.2 Enhancement for traffic scheduling

In order to support TSN traffic scheduling over the IMT-2020 network bridge, the IMT-2020 network is required to support the aspects described below.

1) Configuration stage

The IMT-2020 network should configure the bridge information, report the bridge information to the CNC controller via AF/control plane TSN translator and receive the configuration information from the CNC controller. Received configuration information includes the traffic flow description (e.g., VLAN ID, delay requirement, periodic time, burst arrival time) and the relationship between the port numbers of the user plane TSN translator and the terminal TSN translator.

The CNC distributes configuration information to the IMT-2020 network bridge via the AF/control plane TSN translator.

To describe TSN communication traffic characteristics for use in the IMT-2020 network, the TSN communication assistance information is set by the AF/control plane TSN translator, according to the PSFP information received from the CNC controller. The TSN communication assistance information may include the traffic description information and the indication of notification. The traffic description information can assist the resource reservation to satisfy the traffic flow requirement, and the notification should be sent back once the network resource is insufficient for the traffic flow processing. The TSN communication assistance information is sent to the session management function (SMF) and then to RAN during PDU session establishment, and is useful for RAN to schedule radio resource for deterministic traffic flow processing.

2) Traffic flow processing stage

When TSN traffic arrives at the IMT-2020 network bridge, the TSN quality of service (QoS) requirement of the TSN traffic has to be mapped by the IMT-2020 network to QoS flows with the appropriate QoS configuration. Then the IMT-2020 network sets up QoS flows using the matched QoS profile to deliver TSN traffic over the IMT-2020 network bridge.

TSN QoS flows use the delay critical guaranteed bit rate (GBR) resource type, which has very strict requirements on packet delay; once a packet is delayed beyond the default threshold, it will be considered lost. There are QoS mapping tables between the TSN QoS requirement for the TSN traffic and the IMT-2020 QoS profiles; the QoS mapping tables shall be pre-configured by the CNC to the AF/control plane TSN translator.

When the RAN receives the TSN communication assistance information from the IMT-2020 core network, it can schedule resource based on this information and notify the IMT-2020 core network once the resource is insufficient for TSN traffic processing.

7.2.3 Enhancement for packet delay jitter monitoring

Packet delay jitter characterizes the variation of packet delay and can be used as an important parameter to measure network stability, which is very important for TSN communication. In order to monitor the packet delay jitter, the IMT-2020 core network should support the following enhancement for QoS monitoring.

1) Configuration stage

The IMT-2020 network receives the request from the AF/control plane TSN translator to report packet delay jitter. The request also contains packet delay jitter measurement duration, packet delay jitter measurement frequency and a quantity of packet delay jitter measurement times. The IMT-2020 network forwards the request to the UPF/user plane TSN translator and UE/terminal TSN translator, and requires the UPF/user plane TSN translator and UE/terminal TSN translator to report residence time spent within the IMT-2020 network as the end to end packet delay of TSN communication.

2) Traffic flow processing stage

When downlink TSN traffic arrives at the IMT-2020 network bridge, the UPF and user plane TSN translator report the packet delay to the SMF after receiving from the UE/terminal TSN translator. When uplink TSN traffic arrives at the IMT-2020 network bridge, the UPF/user plane TSN translator reports the packet delay directly to the SMF. The SMF forms packet delay data and sends the packet delay data to the policy control function (PCF). The PCF sends the packet delay data and time-related parameters to the data analysis function (DAF) for packet delay jitter monitoring.

7.3 Multiple UPFs involved in TSN transmission during UE mobility

Based on the vertical's requirement, IMT-2020 network integration with the TSN should support the deterministic transmission between UPFs in large area. During UE mobility, two UPFs may be involved in the PDU session and the SMF is responsible for the path relocation.

In order to upgrade the traffic flow path of TSN system alignment with the PDU session new path, the relationship between port number of Terminal TSN translator and port number of User Plane TSN translator should be updated in time. As Figure 7-2 shows, the original port number relationship between port 1 and port 2 is within bridge 1. After the UE moves, the relationship is changed and port 1 and port 3 are within bridge 2.

After this mobility, the IMT-2020 network should detect such PDU session relocation and the changing of relationships between port numbers and bridge IDs. The SMF should report such configuration updating to the AF/control plane TSN translator and then to the CNC controller. The CNC controller should recalculate the traffic path for specific traffic flow and a new path and new QoS requirement is sent to IMT-2020 network. The TSN communication assistance information can be sent to the new RAN during PDU session modification procedure.

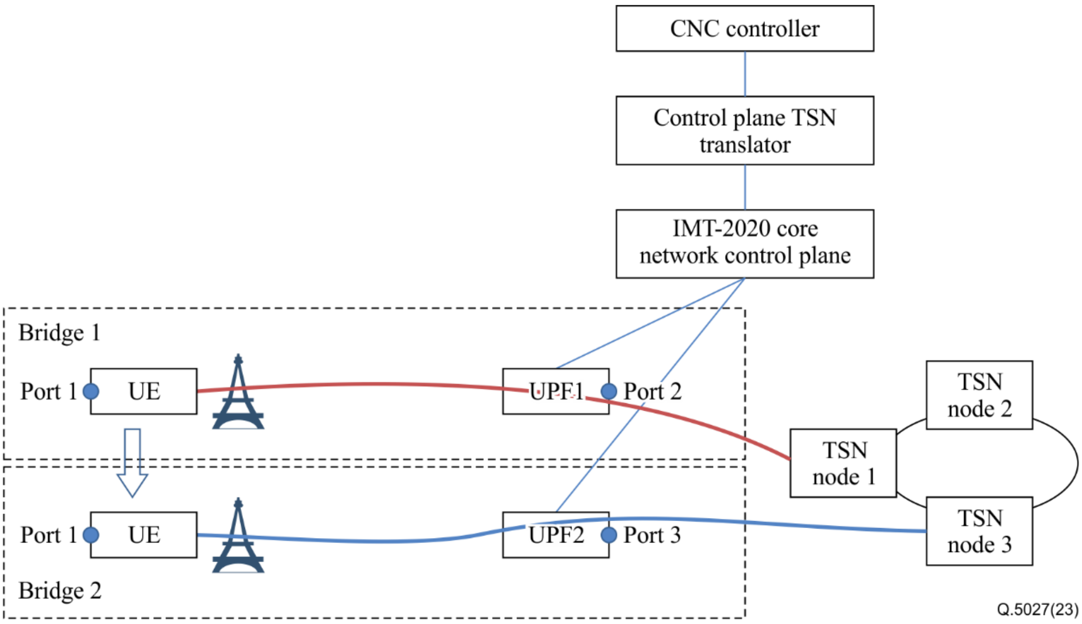

Figure 7-2 – Configuration updating during UE mobility involving multiple UPFs

8 Signalling flow

8.1 UE/terminal TSN translator node synchronization

UE/terminal TSN translator node fulfils time synchronization as shown in Figure 8-1.

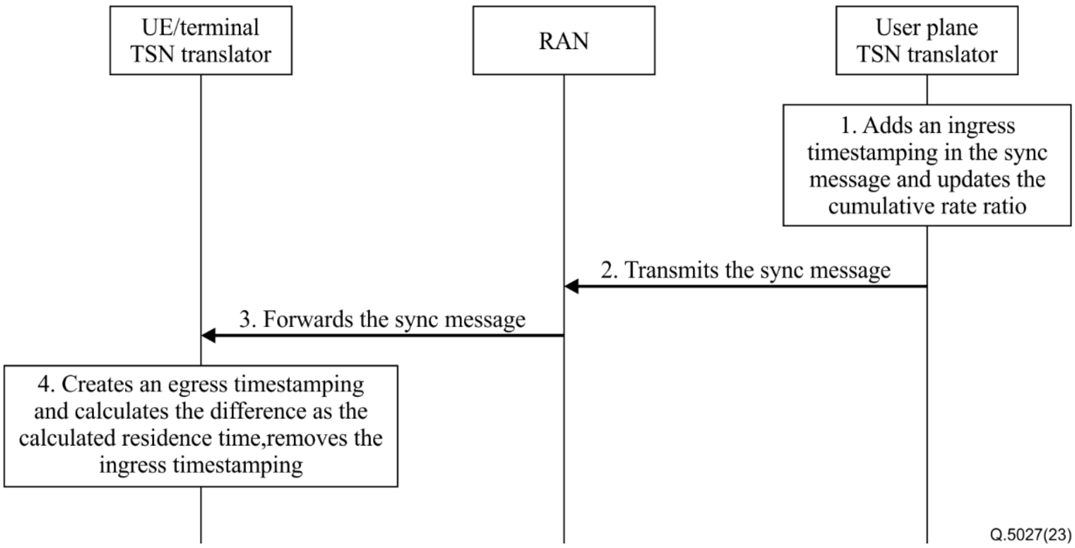

Figure 8-1 – UE/terminal TSN translator node time synchronization

1. For down link time synchronization, the user plane TSN translator adds an ingress timestamping in the sync message and updates the cumulative rate ratio.

2. The user plane TSN translator sends the sync message to RAN.

3. RAN forwards the sync message to the terminal TSN translator.

4. The terminal TSN translator creates an egress timestamping and calculates the difference between the ingress timestamping and egress timestamping as the calculated residence time spent within the IMT-2020 network for the message expressed in IMT-2020 network time. Then the

terminal TSN translator translates the residence time into TSN time and removes the ingress timestamping added by the user plane TSN translator.

8.2 IMT-2020 network enhancement to support TSN QoS requirement

IMT-2020 network enhancement to support the TSN QoS requirement is shown in Figure 8-2.

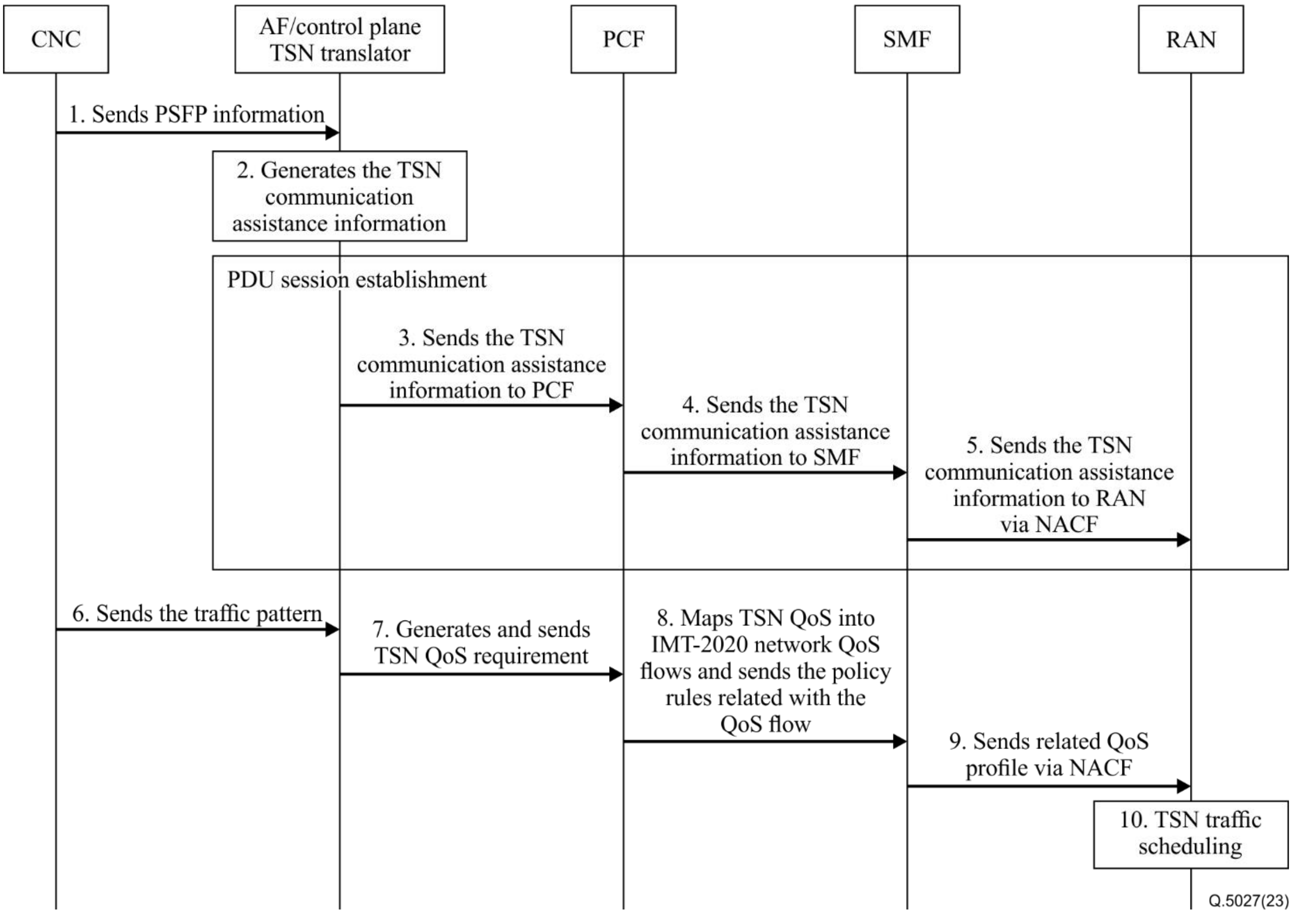

Figure 8-2 – IMT-2020 network enhancement to support TSN QoS requirement

1. CNC generates PSFP information and sends it to the AF/control plane TSN translator.

2. The AF/control plane TSN translator generates the TSN communication assistance information according to the PSFP information, e.g., traffic flow description, periodicity.

3. During the PDU session establishment, the AF/control plane TSN translator sends the TSN communication assistance information to the PCF.

4. The PCF sends the TSN communication assistance information to the SMF.

5. The SMF sends the TSN communication assistance information to the RAN via the network access control function (NACF), the TSN communication assistance information is useful for the RAN to schedule the radio resource for deterministic traffic flow processing.

6. When TSN traffic flow arrives, the CNC sends the traffic pattern to the control plane TSN translator.

7. The AF/control plane TSN translator is pre-configured with a mapping table; it generates the TSN QoS requirement and sends it to the PCF.

8. The PCF maps the TSN QoS requirement to the IMT-2020 network QoS flows with the appropriate QoS configuration, and the TSN QoS flows use the delay critical GBR resource type,

which has very strict requirements on packet delay; once a packet is delayed longer than the default threshold time, it will be considered lost. The PCF sends the policy rules related to the QoS flow to the SMF.

9. The SMF generates the related QoS profile and sends it to the RAN via the NACF.

10. The RAN can schedule the traffic with the received TSN communication assistance information and QoS profile.

8.3 UE mobility among multiple UPFs

8.3.1 Session continuity using transmission path

Session continuity is fulfilled using transmission path when UE moves among multiple UPFs, as shown in Figure 8-3.

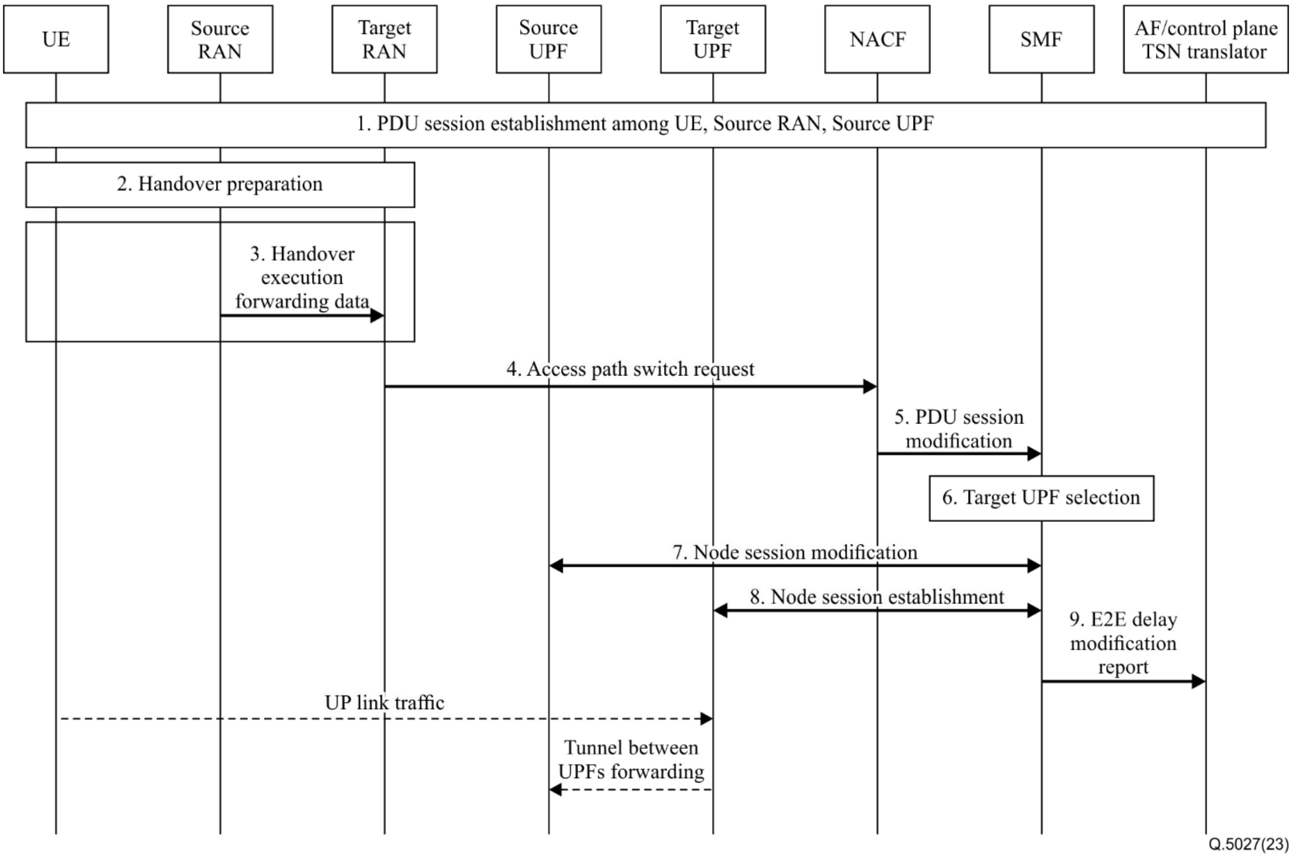

Figure 8-3 – Session continuity using transmission path between UPFs

1. UE has established a PDU session between UE, the source RAN and the source UPF.

2. During UE mobility, the source RAN and target RAN start the handover preparation.

3. The source RAN forwards the data to the target RAN to guarantee service continuity.

4. The target RAN requests access path switch from the NACF.

5. The NACF requests the PDU session modification to SMF.

6. When the SMF receives the PDU session modification request, the SMF selects a new UPF to act as an inter UPF to redirect the packet from the target RAN to the source UPF through a tunnel between UPFs.

7-8. The SMF configures the tunnel information with the source UPF and target UPF to establish the tunnel between the UPFs.

9. The SMF receives the new E2E delay considering the traffic path from UE→Target RAN→Target UPF→Source UPF. The SMF reports the new E2E delay value to the TSN AF/control plane TSN translator and then to the CNC to help create a new topology arrangement for the TSN flows.

8.3.2 Port update to support the UPF relocation

Port update during the UPF relocation is shown in Figure 8-4.

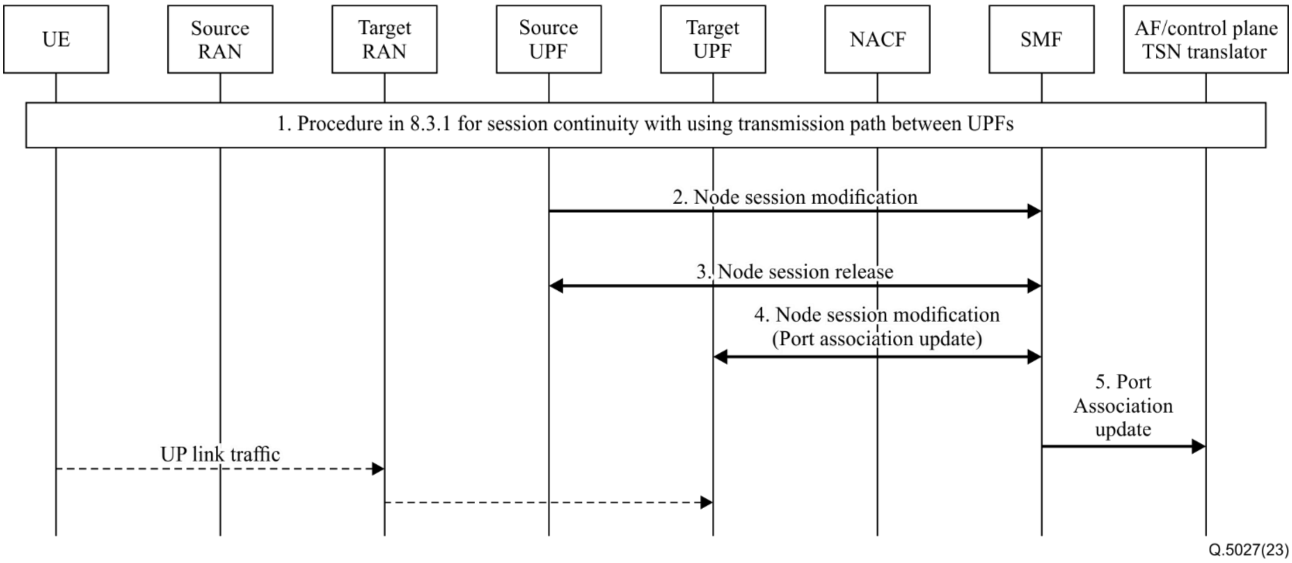

Figure 8-4 – Port update to support UPF relocation

1. During UE mobility, the procedure in 8.3.1 for session continuity can be implemented.

2. When the source UPF identifies that there is no packet transmission in the tunnel between UPFs, the source UPF notifies the related information to the SMF.

3. The SMF triggers the node session release between the SMF and source UPF.

4. The SMF triggers the node session modification between the SMF and target UPF, then the SMF may notify the device-side TSN translator (DS-TT) port number to the target UPF. So the bridge ID for target UPF is associated with the DS-TT port number.

5. The SMF can notify the port association update information to the TSN AF/control plane TSN translator. Then the AF/control plane TSN may notify the CNC to help update the topology.

8.4 IMT-2020 network support packet delay jitter monitoring

The packet delay jitter monitoring procedure is shown as Figure 8-5.

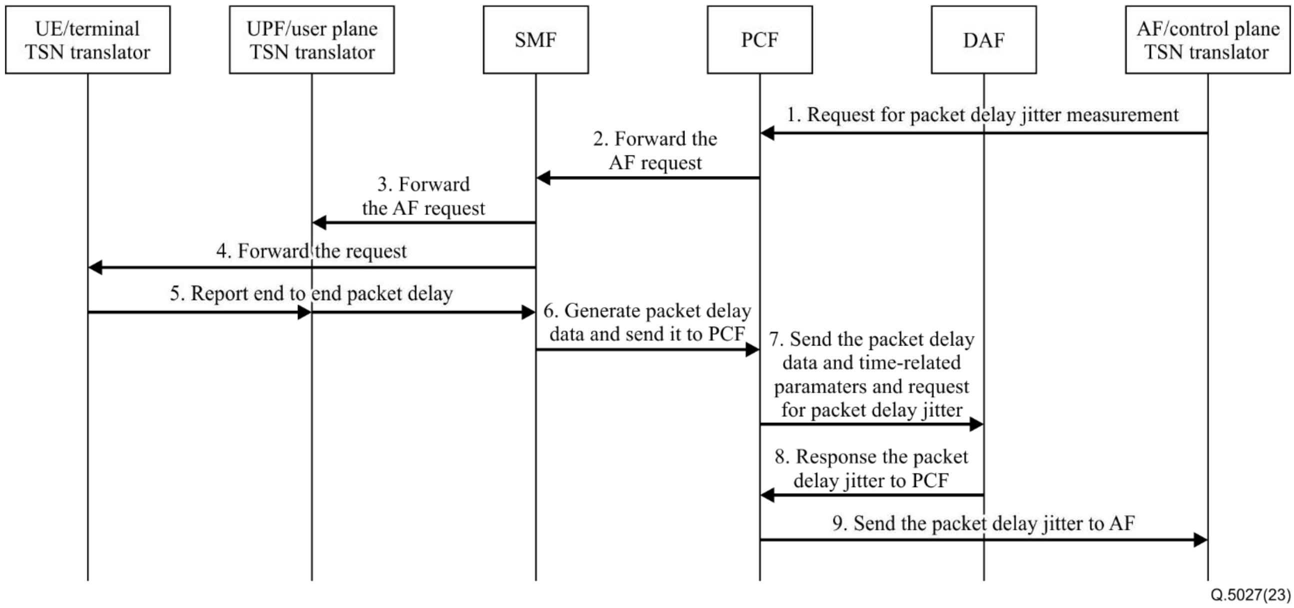

Figure 8-5 – IMT-2020 network support packet delay jitter monitoring

1. The AF/control plane TSN translator requests packet delay jitter, and sends the request to the PCF. The request also contains packet delay jitter measurement duration, packet delay jitter measurement frequency and a quantity of packet delay jitter measurement times.

2. The PCF generates a packet delay jitter monitoring policy and sends monitoring instructions to the SMF.

3-4. The SMF sends the request to the UPF/user plane TSN translator and UE/terminal TSN translator, and requires the UPF/user plane TSN translator and UE/terminal TSN translator to report residence time spent within the IMT-2020 network as the end to end packet delay of TSN communication.

5. When downlink TSN traffic arrives at the IMT-2020 network bridge, the UE/terminal TSN translator sends the packet delay to the UPF/user plane TSN translator, then the UPF/user plane TSN translator reports the packet delay to the SMF. If uplink TSN traffic arrives at the IMT-2020 network bridge, the UPF/user plane TSN translator reports the packet delay directly to the SMF.

6. The SMF collects several packet delay values according to the packet delay jitter measurement duration, and generates packet delay data. SMF sends the packet delay data to the PCF.

7. The PCF sends the packet delay data to the DAF, and also sends the time-related parameters that need to be referred to obtain the packet delay jitter including the packet delay jitter measurement duration, packet delay jitter measurement frequency and a quantity of packet delay jitter measurement times to the DAF for packet delay jitter monitoring.

8. The DAF obtains the packet delay jitter according to the packet delay data and above time-related parameter, and send the packet delay jitter to the PCF.

9. PCF sends the packet delay jitter to AF/control plane TSN translator.

8.5 IMT-2020 network support deterministic information provision

The deterministic information provision procedure is shown in Figure 8-6.

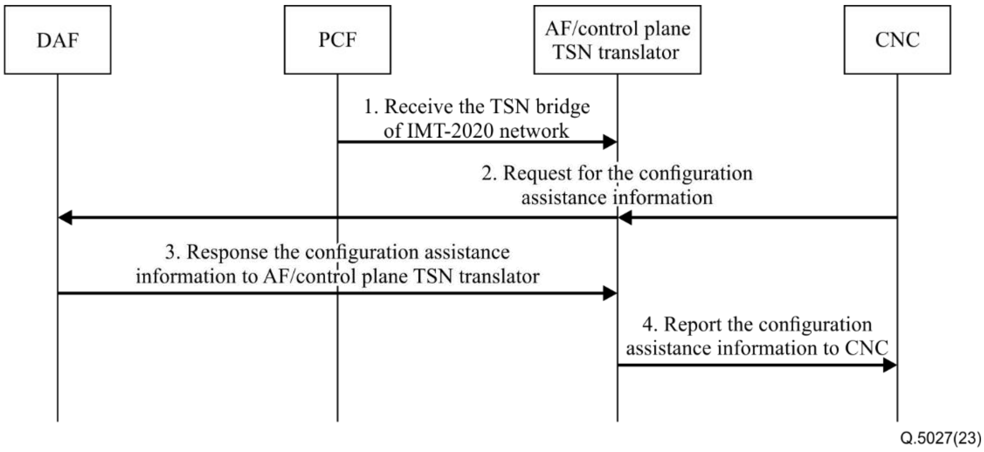

Figure 8-6 – IMT-2020 network support deterministic information provision

1. The AF/control plane TSN translator receives the TSN bridge information (e.g., PDU session ID, bridge ID, number of ports) of the IMT-2020 networks from the PCF, and the AF/Control Plane TSN Translator registers or updates the information to the TSN network if needed.

2. The CNC sends the request to the AF/control plane TSN translator for configuration assistance information, and by invoking the interface between the AF/control plane TSN translator and DAF to deliver the request to DAF for invoking the configuration assistance service, in order to measure and intelligently sense the resource usage of base stations, UEs and network devices in real time.

3. The DAF sends the response to the AF/control plane TSN translator with the configuration assistance information, which includes network usage, QoS information and other sensing information analysis.

4. The AF/control plane TSN translator reports the configuration assistance information to the CNC, allowing the TSN to know the status information of the mobile network and optimize the resource allocation.

9 Message format

9.1 UE/terminal TSN node synchronization

This packet format is used for the user plane, in which the header indicates which field is used for synchronization. Table 9-1 describes the detailed format.

Table 9-1 – Packet header format

+	0–2	3	4	5	6	7	8–15	16–23	24–31
0	version	p	R	e	s	Pn	Message	Total length	
32	TEID								
64	Sequence number							N-PDU number	Next extension header type
Conventions: P: protocol type R: reserved bits e: Extension Header Flag s: Sequence Number Flag Pn: the Number Flag of N-PDU message: the message type TEID: the tunnel endpoint identifier									

For down link time synchronization, the UPF/User Plane TSN translator adds an ingress timestamping in the sync message.

9.2 IMT-2020 network support TSN QoS requirement

AF/control plane TSN translator sends the TSN communication assistance information to the PCF by invoking Pcf_TSNAssistanceInfoAuthorization_Create_Request. Table 9-2 describes the detailed information of Pcf_PolicyAuthorization_Create_Request.

Table 9-2 – Pcf_TSNAssistanceInfoAuthorization_Create_Request

Information element	Status	Data type	Cardinality	Description
TSN communication assistance information	M	String	1…N	Indicates the traffic description information and the indication of notification
Address of the UE/terminal TSN translator	M	String	1	Indicates the address of the UE/terminal TSN translator
TSN QoS information	M	String	1...N	Indicates the TSN QoS requirement

Table 9-3 describes the detailed information of Pcf_PolicyAuthorization_Create_Request.

Table 9-3 – Pcf_TSNAssistanceInfoAuthorization_Create_Response

Information element	Status	Data type	Cardinality	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure of the policy authorization creation. 200 OK 400 Input parameter error 500 Server internal error

9.3 UE mobility among multiple UPFs

SMF reports the new E2E delay value and the port association update information to TSN AF/Control Plane TSN translator considering UPF relocation during UE mobility by invoking Smf_EventExposure_Notify. Table 9-4 describes the detailed information of Smf_EventExposure_Notify.

Table 9-4 – Smf_EventExposure_Notify

Information element	Status	Data type	Cardinality	Description
New E2E delay value	M	String	1	Indicates the new E2E delay considering the traffic path from UE→Target RAN→Target UPF→Source UPF
Correlation ID	M	Num	1...N	Indicates ID for such interaction between SMF and AF/control plane TSN translator
Port association update information	M	String	1...N	Indicates the new association between DS-TT port number and bridge ID for target UPF

Table 9-5 describes the detailed information of Smf_EventExposure_Notify_Response.

Table 9-5 – Smf_EventExposure_Notify_Response

Information element	Status	Data type	Cardinality	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure of the SMF event exposure notification. 200 OK 400 Input parameter error 500 Server internal error

9.4 IMT-2020 network support packet delay jitter monitoring

This message is used to send the request for packet delay jitter from AF/control plane TSN translator to PCF. Table 9-6 describes the detailed information of Pcf_PolicyAuthorization_Create_Request.

Table 9-6 – Pcf_PolicyAuthorization_Create_Request

Information element	Status	Data type	Cardinality	Description
Packet delay jitter measurement duration value	M	Num	1	Indicates the requested packet delay jitter measurement duration by the AF/control plane TSN translator
Packet delay jitter measurement frequency value	M	Num	1	Indicates the requested packet delay jitter measurement frequency by the AF/control plane TSN translator

Table 9-6 – Pcf_PolicyAuthorization_Create_Request

Information element	Status	Data type	Cardinality	Description
Quantity of packet delay jitter measurement times	M	Num	1...N	Indicates the requested periods of time for packet delay jitter measurement by the AF/control plane TSN translator

This message is used to send the response packet delay jitter from PCF to AF/control plane TSN translator. Table 9-7 describes the detailed information of Pcf_PolicyAuthorization_Create_Response.

Table 9-7 – Pcf_PolicyAuthorization_Create_Response

Information element	Status	Data type	Cardinality	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure for policy authorization creation. 200 OK 400 Input parameter error 500 Server internal error
Packet delay data	M	Num	1…N	N/A	Indicates the packet delay values collected by the SMF

This message is used to send the delay jitter monitoring policy from the PCF to SMF. Table 9-8 describes the detailed information of Pcf_SMPolicyControl_UpdateNotify_Request.

Table 9-8 – Pcf_SMPolicyControl_UpdateNotify_Request

Information element	Status	Data type	Cardinality	Description
Delay jitter monitoring policy instruction	M	String	1…N	Indicate the packet delay jitter monitoring policy generated by the PCF

This message is used to delay the jitter monitoring policy response from the SMF to PCF. Table 9-9 describes the detailed information of Pcf_SMPolicyControl_UpdateNotify_Response.

Table 9-9 – Pcf_SMPolicyControl_UpdateNotify_Response

Information element	Status	Data type	Cardinality	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure for policy control response for delay jitter monitoring. 200 OK 400 Input parameter error 500 Server internal error
Packet delay data	M	Num	1…N	N/A	Indicates the packet delay values collected by the SMF

This message is used to send the packet delay data from the PCF to DAF. Table 9-10 describes the detailed information of Daf_AnalyticsInfo_Request.

Table 9-10 – Daf_AnalyticsInfo_Request

Information element	Status	Data type	Cardinality	Description
Packet delay data	M	Num	1…N	Indicates the packet delay values collected by SMF
Time-related parameters	M	Num	1…N	Indicates the time-related parameters that need to be referred to obtaining the packet delay jitter

This message is used to send the packet delay jitter from the DAF to PCF. Table 9-11 describes the detailed information of Daf_AnalyticsInfo_Response.

Table 9-11 – Daf_AnalyticsInfo_Response

Information element	Status	Data type	Cardinality	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure for specific analytics service. 200 OK 400 Input parameter error 500 Server internal error
Packet delay jitter	M	Num	1	N/A	Indicates the packet delay jitter value obtained by the DAF

9.5 IMT-2020 network supports deterministic information provision

Configuration assistance information is used for measurement and sensing the resource usage in real time. This message is sent to the DAF to request configuration assistance information from the AF/control plane TSN translator. Table 9-12 describes the detailed information of Daf_ConfigAssistInfo_Request.

Table 9-12 – Daf_ConfigAssistInfo_Request

Information element	Status	Data type	Cardinality	Description
Packet delay data	M	Num	1…N	Indicates the packet delay values collected by SMF
Time-related parameters	M	Num	1…N	Indicates the time-related parameters that need to be referred to obtain the packet delay jitter

This message is used to send response to the AF/control plane TSN translator from the DAF. Table 9-13 describes the detailed information of Daf_ConfigAssistInfo _Response.

Table 9-13 – Daf_ConfigAssistInfo_Response

Information element	Status	Data type	Cardina-lity	Code value	Description
Result	M	Num	1	200 400 500	Indicates the success or failure for specific analytics service. 200 OK 400 Input parameter error 500 Server internal error
Network usage	M	Array	1...N	N/A	Indicates the relevant network usage (e.g., bandwidth usage, network port usage, link occupancy)
QoS information	M	String	1…N	N/A	Indicates the TSN QoS information

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Published in Switzerland
Geneva, 2023