**3GPP TSG-CT3 Meeting #121e C3-222184**

**E-Meeting, 6th – 12th April 2022**

**Source: Huawei**

**Title: Time synchronization error budget provisioning**

**Spec: 29.565 1.2.0**

**Agenda item: 17.16**

**Document for: Decision**

**1. Introduction**

<Introduction part (optional)>

**2. Reason for Change**

During the time synchronization configuration creation and update, the handling of the time synchronization error budget is FFS. As defined in clause 4.15.9.3.2 and 4.15.9.3.3 of TS 23.502, the TSCTSF uses the procedure in clause 4.15.9.4 to manage the 5G access stratum time distribution for the UEs that are part of the impacted PTP instance. As defined in clause 4.15.9.4 of TS 23.502, when the procedure is triggered by PTP instance activation, modification, or deactivation in the TSCTSF) and if time synchronization error budget is provided by the AF, the TSCTSF may use the PTP port state of each DS-TT to determine an Uu time synchronization error budget for corresponding SUPIs that are part of the PTP instance. If time synchronization error budget is provided by the AF, the TSCTSF calculates the Uu time synchronization error budget

**3. Conclusions**

Make above clarifications.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS 29.565 1.2.0.

\* \* \* First Change \* \* \* \*

##### 5.2.2.5.2 Creating a new configuration

Figure 5.2.2.5.2-1 illustrates the creation of a configuration.



Figure 5.2.2.5.2-1: Creation of a configuration

To create a configuration, the NF service consumer shall send an HTTP POST message to the TSCTSF to the URI "{apiRoot}/ntsctsf-time-sync/<apiVersion>/subscriptions/{subscriptionId}/configurations". The HTTP POST message shall include the TimeSyncExposureConfig data structure as request body, as shown in figure 5.2.2.5.2-1, step 1. The TimeSyncExposureConfig data structure shall include:

- the user plane node Id within the "upNodeId" attribute;

- the requested PTP instance within the "reqPtpIns" attribute;

- the time domian within the "timeDom" attribute;

- the notification URI within the "configNotifUri" attribute;

- the notification correlation Id within the "configNotifId" attribute;

and may include:

* the "gmEnable" attribute set to true if the AF requests 5GS to act as a grandmaster for PTP or gPTP;
* the Uu time synchronization error budget within the "uuErrorBudge" attribute;
* the gandmaster priority with the "gmPrio" attribute; and
* the temporal validity condition within the "tempValidity" attribute.

Upon receipt of the HTTP request from the NF service consumer, if the request is authorized, the TSCTSF shall:

- create a new resource, which represents a new "Individual Time Synchronization Exposure Configuration" instance, addressed by a URI as defined in subclause 6.1.3.5 and containing a TSCTSF created resource identifier;

- send an HTTP "201 Created" response with TimeSyncExposureConfig data structure as response body and a Location header field containing the URI of the created Individual Time Synchronization Exposure Configuration resource, i.e. "{apiRoot}/ntsctsf-time-sync/<apiVersion>/subscriptions/{subcriptionId}/configuration/{configurationId}", as shown in figure 5.2.2.5.2-1, step 2;

- use the {subscriptionId} within the requested URI and user plane node ID within the "upNodeId" attribute in the request to determine the target UEs and corresponding AF-sessions, and then contact with the PCF(s) to configure and initialize the PTP instance in the DS-TT(s) and NW-TT as defined in 3GPP TS 23.502 [3], clause 4.15.9.3.2, step 5-6;

- If the time synchronization error budget is provided, calculate the Uu time synchronization error budget using the PTP port state of each DS-TT, subscribe to event notifications of newly registered PCF for the UE by invoking Nbsf\_Management\_Subscribe Service Operation as defined in clause 4.2.6 of 3GPP TS 29.521 [r1] if not yet and send the request to the PCF for the UE for AM policy authorization by invoking Npcf\_AMPolicyAuthorization\_Create service operation as defined in clause 4.2.2 of 3GPP TS 29.534 [14] with the exception that the "asTimeDisEnabled" attribute shall be omitted or shall be set to false if included.

The TSCTSF shall associate the affected AF session to the "Individual Time Synchronization Exposure Configuration". When receiving the Npcf\_PolicyAuthorization\_Notify service operation indicating the termination of an existing PDU session and the corresponding AF session is associated with the "Individual Time Synchronization Exposure Configuration" resource, the TSCTSF shall remove the AF session from the list of AF sessions associated with the "Individual Time Synchronization Exposure Configuration" resource and invoke Npcf\_AMPolicyAuthorization\_Delete service operation as defined in clause 4.2.4 of 3GPP TS 29.534 [14] to remove the Uu time synchronization error budget for the UE if it was provided.

If the HTTP POST request from the NF service consumer is not accepted, the TSCTSF shall indicate in the response to HTTP POST request the cause for the rejection as specified in clause 6.1.7.

If the TSCTSF determines the received HTTP POST request needs to be redirected, the TSCTSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

\* \* \* Next Changes \* \* \* \*

##### 5.2.2.6.2 Updating an existing configuration

Figure 5.2.2.6.2-1 illustrates the updating of an existing configuration.



Figure 5.2.2.6.2-1: Update of a configuration

To update a configuration, the NF service consumer shall send an HTTP PUT request to the resource "{apiRoot}/ntsctsf-time-sync/<apiVersion>/subscriptions/{subscriptionId}/configurations/{configurationId" representing an existing "Individual Time Synchronization Exposure Configuration" resource, as shown in figure 5.2.2.6.2-1, step 1, to modify the configuration.

The TimeSyncExposureConfig data structure provided in the request body shall include:

- the user plane node Id within the "upNodeId" attribute;

NOTE 1: The user plane node Id cannot be changed during the modification.

- the requested PTP instance within the "reqPtpIns" attribute;

- the time domain within the "timeDom" attribute;

NOTE 2: The user plane node Id, the requested PTP instance and the time domain cannot be changed during the modification.

- the notification URI within the "configNotifUri" attribute;

- the notification correlation Id within the "configNotifId" attribute;

NOTE 2: If the notification URI or notification correlation Id is not changed the previously value is included.

and may include:

* the "gmEnable" attribute set to true if the AF requests 5GS to act as a grandmaster for PTP or gPTP;
* the Uu time synchronization error budget within the "uuErrorBudge" attribute;
* the gandmaster priority with the "gmPrio" attribute; and
* the temporal validity condition within the "tempValidity" attribute.

Upon receipt of the corresponding HTTP PUT message, if the request is authorized, theTSCTSF shall:

- update the existing "Individual Time Synchronization Exposure Configuration" resource;

- send a HTTP response including "200 OK" status code with TimeSyncExposureConfig data structure or "204 No Content" status code, as shown in figure 5.2.2.6.2-1, step 2;

- use the {subscriptionId} within the requested URI and user plane node ID within the "upNodeId" attribute in the request to determine the target UEs and corresponding AF-sessions, and then contact with the PCF(s) to configure and initialize the PTP instance in the DS-TT(s) and NW-TT as defined in 3GPP TS 23.502 [3], clause 4.15.9.3.2, step 5-6;

- If the time synchronization error budget is provided or updated, calculate the Uu time synchronization error budget using the PTP port state of each DS-TT, subscribe to event notifications of newly registered PCF for the UE by invoking Nbsf\_Management\_Subscribe Service Operation as defined in clause 4.2.6 of 3GPP TS 29.521 [r1] if not yet and send the request to the PCF for the UE for AM policy authorization by invoking Npcf\_AMPolicyAuthorization\_Create/Update service operation as defined in clause 4.2.2 of 3GPP TS 29.534 [14] with the exception that the "asTimeDisEnabled" attribute shall be omitted or shall be set to false if included.

The TSCTSF shall associate the affected AF session to the "Individual Time Synchronization Exposure Configuration". When receiving the Npcf\_PolicyAuthorization\_Notify service operation indicating the termination of an existing PDU session and the corresponding AF session is associated with the "Individual Time Synchronization Exposure Configuration" resource, the TSCTSF shall remove the AF session from the list of AF sessions associated with the "Individual Time Synchronization Exposure Configuration" resource and invoke Npcf\_AMPolicyAuthorization\_Delete service operation as defined in clause 4.2.4 of 3GPP TS 29.534 [14] to remove the Uu time synchronization error budget for the UE if it was provided.

If the HTTP PUT request from the NF service consumer is not accepted, the TSCTSF shall indicate in the response to HTTP PUT request the cause for the rejection as specified in clause 6.1.7.

If the TSCTSF determines the received HTTP PUT request needs to be redirected, the TSCTSF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [4].

\* \* \* End of Changes \* \* \* \*