**TSG-CT WG3 Meeting #117-e *C3-214076***

**E-Meeting, 18th – 27th August 2021 (Revision of C3-214xyz)**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **29.522** | **CR** | 0370 | **rev** | **-** | **Current version:** | **17.2.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Update of the resource and methods of time synchronization exposure |
|  |  |
| ***Source to WG:*** | Huawei, Nokia, Nokia Shanghai Bell, Ericsson, ZTE |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | IIoT |  | ***Date:*** | 2021-08-18 |
|  |  |  |  |  |
| ***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 canbe 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 TS 23.502, a new Nnef\_TimeSynchronization service is defined in clause 5.2.6.25, a new TSCTSF service is defined in clause 5.2.27, and the Time Synchronization exposure procedure is defined in clause 4.15.9.Depends on the time distribution method to use for the service, The AF may subscribes to the notification of the capability of the time synchronization service. Then based on the notfication, the AF creates the time synchronization configuration and activates the time synchronization service.  |
|  |  |
| ***Summary of change:*** | Defines the new resouce and methods of subscription to notification of the capability of the time synchronization service for a list of UEs.Defines the new resource and methods of the time synchronization configuration and the time synchronization service activation. |
|  |  |
| ***Consequences if not approved:*** | Not aligned with stage 2. |
|  |  |
| ***Clauses affected:*** | 2, 5.15.1.1, 5.15.1.2, 5.15.1.2.1, 5.15.1.2.3.3, 5.15.1.3.3.4, 5.15.1.4(new), 5.15.1.4.1(new), 5.15.1.4.2(new), 5.15.1.4.3(new), 5.15.1.4.3.1(new), 5.15.1.4.3.2(new), 5.15.1.4.3.3(new), 5.15.1.5(new), 5.15.1.5.1(new), 5.15.1.5.2(new), 5.15.1.5.3(new), 5.15.1.5.3.1(new), 5.15.1.5.3.2(new), 5.15.1.5.3.3(new), 5.15.1.5.3.4(new), 5.15.2, 5.15.3, 5.15.3.1(new), 5.15.3.2(new), 5.15.3.2.1(new), 5.15.3.2.2(new), 5.15.3.2.3(new), . 5.15.3.2.3.1(new), 5.15.3.2.3.2(new), 5.15.3.3(new), 5.15.3.3.1(new), 5.15.3.3.2(new), 5.15.3.3.3(new), 5.15.3.3.3.1(new), 5.15.3.3.3.2(new), 5.15.4.1, 5.15.4.2, 5.15.4.3, 5.15.4.3.1, 5.15.4.3.2, 5.15.4.3.3, 5.15.4.3.6, 5.15.4.3.x1(new), 5.15.4.3.x2(new), 5.15.4.3.x3(new), 5.15.4.4.x1(new)  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR doesn’t impact the OpenAPI file. |
|  |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st Change \*\*\*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.502: "Procedures for the 5G system".

[3] 3GPP TS 23.501: "System Architecture for the 5G".

[4] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[5] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

[6] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[7] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[9] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[10] Void.

[11] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".

[12] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[13] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[14] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[15] Void.

[16] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

[17] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[19] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

[20] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[21] 3GPP TR 21.900: "Technical Specification Group working methods".

[22] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[23] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".

[24] 3GPP TS 29.541: "5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD); Stage 3".

[25] 3GPP TS 29.542: "5G System, Session management services for Non-IP Data Delivery (NIDD); Stage 3".

[26] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[27] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[28] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G system (5GS)".

[29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[30] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[31] Void

[32] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[33] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

[34] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[35] 3GPP TS 29.515: "5G System; Gateway Mobile Location Services; Stage 3".

[36] 3GPP TS 23.273: "5G System Location Services (LCS)".

[37] 3GPP TS 33.535: "Authentication and Key Management for Applications (AKMA) based on 3GPP credentials in the 5G System (5GS)".

[38] 3GPP TS 29.535: "5G System; AKMA Anchor Services; Stage 3".

[39] 3GPP TS 33.220: "Generic Authentication Architecture (GAA); Generic Bootstrapping Architecture (GBA)".

[40] IETF RFC 7542: "The Network Access Identifier".

[41] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[42] 3GPP TS 23.548: "5G System Enhancements for Edge Computing; Stage 2".

[43] 3GPP TS 29.534: "5G System; Access and Mobility Policy Authorization Service; Stage 3".

[44] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[45] IEEE Std 1588-2019: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control".

[46] IEEE Std 802.1AS-2020: "IEEE Standard for Local and metropolitan area networks--Timing and Synchronization for Time-Sensitive Applications".

[47] 3GPP TS 29.536: "5G System; Network Slice Admission Control Services; Stage 3".

[48] 3GPP TS 24.526: "User Equipment (UE) policies for 5G System (5GS); Stage 3".

[49] 3GPP TS 24.555: "Proximity based services (ProSe) in 5G system (5GS); User Equipment (UE) policies; Stage 3".

[x] IEEE 802.1Q: "Virtual Bridged Local Area Networks".

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

#### 5.15.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-time-sync/v1**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "**3gpp-time-sync**" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.15.1.1-1 and the resources and HTTP methods used for the TimeSyncExposure API.



Figure 5.15.1.1-1: Resource URI structure of the TimeSyncExposure API

Table 5.15.1.1-1 provides an overview of the resources and HTTP methods applicable for the TimeSyncExposure API.

Table 5.15.1.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| Time Synchronization Exposure Subscriptions | /{afId}/subscriptions | GET | Read all subscriptions for a given AF |
| POST | Create a new subscription to time synchronization exposure |
| Individual Time Synchronization Exposure Subscription | /{afId}/subscriptions/{subscriptionId} | GET | Read a subscription to time synchronization exposure |
| DELETE | Delete a subscription to time synchronization exposure |
| Time Synchronization Exposure Configurations | /{afId}/subscriptions/{subscriptionId}/configurations | GET | Read all configurations for a given AF and subscription  |
| POST | Create a new configuration to time synchronization exposure |
| Individual Time Synchronization Exposure Configuration | /{afId}/subscriptions/{subscriptionId}/configurations/{configurationId} | GET | Read a configuration to time synchronization exposure |
| PUT | Modify all of the properties of an existing configuration to time synchronization exposure |
| DELETE | Delete a configuration to time synchronization exposure |

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

#### 5.15.1.2 Resource: Time Synchronization Exposure Subscriptions

##### 5.15.1.2.1 Introduction

This resource allows an AF to read all active time synchronization exposure subscribtions for the given AF, or allows an AF to create a new Individual Time Synchronization Exposure Subscription in the NEF.

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

###### 5.15.1.2.3.3 POST

The POST method creates a new subscription resource to time synchronization exposure subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.15.1.2.3.3-1 and the response data structures and response codes specified in table 5.15.1.2.3.3-2.

Table 5.15.1.2.3.3-1: Data structures supported by the POSTRequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TimeSyncExposureSubsc | M | 1 | Contains the information for the creation of a new Individual Time Synchronization Exposure Subscription resource. |

Table 5.15.1.2.3.3-2: Data structures supported by thePOST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| TimeSyncExposureSubsc | M | 1 | 201 Created | The subscription was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId} |

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

###### 5.15.1.3.3.4 DELETE

The DELETE method deletes the time synchronization exposure subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.15.1.3.3.4-1.

Table 5.15.1.3.3.4-1: URI query parameters supported by theDELETE method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| N/A |  |  |  |  |

This method shall support the request data structures specified in table 5.15.1.3.3.4-2 and the response data structures and response codes specified in table 5.15.1.3.3.4-3.

Table 5.15.1.3.3.4-2: Data structures supported by the DELETERequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| N/A |  |  |  |

Table 5.15.1.3.3.4-3: Data structures supported by theDELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| N/A |  |  | 204 No Content | The subscription was terminated successfully. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.15.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

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

#### 5.15.1.4 Resource: Time Synchronization Exposure Configurations

##### 5.15.1.4.1 Introduction

This resource allows an AF to read all active time synchronization exposure configuration for the given AF and subscription, or allows an AF to create a new time synchronization configuration and activate the time synchronization service with the configuration.

##### 5.15.1.4.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId}/configurations**

This resource shall support the resource URI variables defined in table 5.15.1.4.2-1.

Table 5.15.1.4.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId | string | Identifier of the AF. |
| subscriptionId | string | Identifier of the subscription resource. |

##### 5.15.1.4.3 Resource Methods

###### 5.15.1.4.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.4.3.

###### 5.15.1.4.3.2 GET

The GET method allows to read all active configurations for a given AF and subscription. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.15.1.4.3.2-1.

Table 5.15.1.4.3.2-1: URI query parameters supported by the GETmethod on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| N/A |  |  |  |  |

This method shall support the request data structures specified in table 5.15.1.4.3.2-2 and the response data structures and response codes specified in table 5.15.1.4.3.2-3.

Table 5.15.1.4.3.2-2: Data structures supported by the GETRequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| N/A |  |  |  |

Table 5.15.1.4.3.2-3: Data structures supported by theGET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| array(TimeSyncExposureConfig) | M | 0..N | 200 OK | The configuration information for the AF in the request URI are returned. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.4.3.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.15.1.4.3.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

###### 5.15.1.4.3.3 POST

The POST method creates a new configuration resource to activate time synchronization service for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.15.1.4.3.3-1 and the response data structures and response codes specified in table 5.15.1.4.3.3-2.

Table 5.15.1.4.3.3-1: Data structures supported by the POSTRequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TimeSyncExposureConfig | M | 1 | Parameters to create a configuration and to activate time synchronization service. |

Table 5.15.1.2.4.3-2: Data structures supported by thePOST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| TimeSyncExposureConfig | M | 1 | 201 Created | The subscription was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.4.3.3-3: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId} |

#### 5.15.1.5 Resource: Individual Time Synchronization Exposure Configuration

##### 5.15.1.5.1 Introduction

This resource allows an AF to read/modify/cancel a configuration to active/modify/deactivate Time Synchronization service with the NEF.

##### 5.15.1.5.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId}/configuration/{configurationId}**

This resource shall support the resource URI variables defined in table 5.15.1.5.2-1.

Table 5.15.1.5.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId | string | Identifier of the AF. |
| subscriptionId | string | Identifier of the subscription resource. |
| configurationId | string | Identifier of the configuration resource |

##### 5.15.1.5.3 Resource Methods

###### 5.15.1.5.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.5.2.

###### 5.15.1.5.3.2 GET

The GET method allows to read the active configuration for a given AF, subscription Id and configuration Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.15.1.5.3.2-1.

Table 5.15.1.5.3.2-1: URI query parameters supported by theGETmethod on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| N/A |  |  |  |  |

This method shall support the request data structures specified in table 5.15.1.5.3.2-2 and the response data structures and response codes specified in table 5.15.1.5.3.2-3.

Table 5.15.1.5.3.2-2: Data structures supported by the GETRequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| N/A |  |  |  |

Table 5.15.1.5.3.2-3: Data structures supported by theGET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| TimeSyncExposureConfig | M | 1 | 200 OK | The configuration information for the AF in the request URI are returned. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.5.3.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.15.1.5.3.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

###### 5.15.1.5.3.3 PUT

The PUT method modifies an existing configuration resource to update a configuration. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.15.1.5.3.3-1 and the response data structures and response codes specified in table 5.15.1.5.3.3-2.

Table 5.15.1.5.3.3-1: Data structures supported by the PUTRequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TimeSyncExposureConfig | M | 1 | Modify an existing Time Synchronization Exposure Configuration. |

Table 5.15.1.5.3.3-2: Data structures supported by thePUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| TimeSyncExposureConfig | M | 1 | 200 OK | The subscription was updated successfully.  |
| N/A |  |  | 204 No Content | The subscription was updated successfully. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.5.3.3-3: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.15.1.5.3.3-4: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

###### 5.15.1.5.3.4 DELETE

The DELETE method deletes the time synchronization exposure subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.15.1.5.3.4-1.

Table 5.15.1.5.3.4-1: URI query parameters supported by theDELETE method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| N/A |  |  |  |  |

This method shall support the request data structures specified in table 5.15.1.5.3.4-2 and the response data structures and response codes specified in table 5.15.1.5.3.4-3.

Table 5.15.1.5.3.4-2: Data structures supported by the DELETERequest Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| N/A |  |  |  |

Table 5.15.1.5.3.4-3: Data structures supported by theDELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| N/A |  |  | 204 No Content | The configuration was terminated successfully. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.15.1.5.3.4-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.15.1.5.3.4-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

### 5.15.2 Custom Operations without associated resources

|  |  |  |  |
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| --- | --- | --- | --- | --- |
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|  |  |  |  |  |

None.

### 5.15.3 Notifications

#### 5.15.3.1 Introduction

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Table 5.17.2.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description(service operation) |
| Time Synchronization Capability Notification  | {subsNotifUri} | POST | Time Synchronization Capability Notification for a list of UEs. |
| Time Synchronization Configuration Notification | {configNotifUri} | POST | Current State of Time Synchronization configuration Notification. |

#### 5.15.3.2 Time Synchronization Capability Notification

##### 5.15.3.2.1 Description

The Notification is used by the NEF to report the Time Synchronization Capability to the AF.

##### 5.15.3.2.2 Callback URI

The Callback URI **"{subsNotifUri}"** shall be used with the callback URI variables defined in table 5.15.3.2.2-1.

Table 5.15.3.2.2-1: Callback URI variables

|  |  |
| --- | --- |
| Name | Definition |
| subsNotifUri | Callback reference provided by the AF during creation of the subscription as defined in Table 5.15.4.3.2-1. |

##### 5.15.3.2.3 Operation Definition

###### 5.15.3.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.15.3.2.3.1-1 and the response data structures and response codes specified in table 5.15.3.2.3.1-2 and the Location Headers specified in table 5.15.3.2.3.1-3 and table 5.15.3.2.3.1-4.

Table 5.15.3.2.3.1-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TimeSyncExposureSubsNotif | M | 1  | Provides the time synchroniziation capabilities of a list of UEs by the NEF to the AF. |

Table 5.15.5.2.3.1-2: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| N/A |  |   | 204 No Content | The event notification is received successfully. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Editor's note: Error responses are FFS.

Table 5.17.2.2.3.1-3: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

Table 5.17.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

###### 5.15.3.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the Time Synchroniaition Capability Notification may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

Editor's note: Error responses are FFS.

Table 5.15.3.2.3.2-1: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

Table 5.15.3.2.3.2-2: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

#### 5.15.3.3 Time Synchronization Configuration Notification

##### 5.15.3.3.1 Description

The Notification is used by the NEF to report the state of Time Synchronization service configuration to the AF.

##### 5.15.3.3.2 Callback URI

The Callback URI **"{configNotifUri}"** shall be used with the callback URI variables defined in table 5.15.3.3.2-1.

Table 5.15.3.3.2-1: Callback URI variables

|  |  |
| --- | --- |
| Name | Definition |
| configNotifUri | Callback reference provided by the AF during creation of the configuration as defined in Table 5.15.4.3.6-1. |

##### 5.15.3.3.3 Operation Definition

###### 5.15.3.3.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.15.3.3.3.1-1 and the response data structures and response codes specified in table 5.15.3.3.3.1-2 and the Location Headers specified in table 5.15.3.3.3.1-3 and table 5.15.3.3.3.1-4.

Table 5.15.3.3.3.1-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| TimeSyncExposureConfigNotif | M | 1  | Provides the current state of time synchroniziation service configuration by the NEF to the AF. |

Table 5.15.5.3.3.1-2: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| N/A |  |   | 204 No Content | The notification is received successfully. |
| N/A |  |  | 307 Temporary Redirect | Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A |  |  | 308 Permanent Redirect | Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent.Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Editor's note: Error responses are FFS.

Table 5.15.3.3.3.1-3: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

Table 5.15.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

###### 5.15.3.3.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the state of Time Synchroniaition Service Configuration Notification may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

Editor's note: Error responses are FFS.

Table 5.15.3.3.3.2-1: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

Table 5.15.3.3.3.2-2: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

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

#### 5.15.4.1 General

This subclause specifies the application data model supported by the TimeSyncExposure API.

#### 5.15.4.2 Reused data types

The data types reused by the TimeSyncExposure API from other specifications are listed in table 5.15.4.2-1.

Table 5.15.4.2-1: Re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| Datetime | 3GPP TS 29.122 [4] |  |
| Dnn | 3GPP TS 29.571 [8] | Identifies a DNN. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| NotificationMethod | 3GPP TS 29.508 [26] |  |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| Snssai | 3GPP TS 29.571 [8] | Identifies the S-NSSAI. |
| Supi | 3GPP TS 29.571 [8] | Identifies a SUPI. |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.15.5-1. |
| Uinteger | 3GPP TS 29.571 [8] | Unsigned integer. |
| Uri | 3GPP TS 29.571 [8] | Identifies a referenced resource. |

#### 5.15.4.3 Structured data types

##### 5.15.4.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

##### 5.15.4.3.2 Type: TimeSyncExposureSubsc

Table 5.15.4.3.2-1: Definition of type TimeSyncExposureSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| exterGroupId | ExternalGroupId | C | 0..1 | Identifies a group of UE(s) for which the time synchronization capabilities is requested. (NOTE 1) |  |
| gpsis | array(Gpsi) | C | 1..N | Contains a list of UE for which the time synchronization capabilities is requested. (NOTE 1) |  |
| anyUeInd | boolean | C | 0..1 | Identifies whether the AF request applies to any UE (i.e. all UEs). This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 1) (NOTE 2) |  |
| notifMethod | NotificationMethod | O | 0..1 | If "notifMethod" is not supplied, the default value "ON\_EVENT\_DETECTION" applies. |  |
| dnn | Dnn | C | 0..1 | Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. (NOTE 2) |  |
| snssai | Snssai | C | 0..1 | Identifies an S-NSSAI. (NOTE 2) |  |
| afServiceId | string | O | 0..1 | Identifies a service on behalf of which the AF is issuing the request. |  |
| subscribedEvents | array(SubscribedEvent) | O | 1..N | Identifies the requirement to be notified of the event(s). |  |
| subsNotifUri | Uri | M | 1 | Notification URI for time sensitive capability reporting. |  |
| subsNotifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
| maxReportNbr | Uinteger | O | 0..1 | If omitted, there is no limit. |  |
| expiry | DateTime | C | 0..1 | This attribute indicates the expiry time of the subscription, after which the NEF shall not send any event notifications and the subscription becomes invalid. It may be included in an event subscription request and may be included in an event subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription. |  |
| repPeriod | DurationSec | C | 0..1 | Is supplied for notification Method "periodic". |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Represents the features supported by the NF service consumer. This parameter shall be supplied by the NF service consumer in the POST request and the response that requested the creation of an Individual Time Synchronization Subscription resource. |  |
| NOTE 1: Only one of the properties "gpsis", "anyUeInd" or "externalGroupId" shall be included.NOTE 2 The properties of "anyUeInd" may be included only when the properties of "dnn” and “snssai" are included. |

##### 5.15.4.3.3 Type: TimeSyncCapability

Table 5.15.4.3.3-1: Definition of type TimeSyncCapability

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| supis | array(Supi) | C | 1..N | Contains a list of UEs for which the time synchronization request is applied. |  |
| gpsis | array(Gpsi) | C | 1.N | Contains a list of UEs for which the time synchronization capabilities is applied. |  |
| upNodeId | Uint64 | O | 0..1 | Identifies the applicable NW-TT. Contains a TSC user plane node Id. If integrated with TSN, the user plane node Id is a bridge Id defined in IEEE 802.1Q [x] clause 14.2.5. |  |
| disMethods | DistributionMethod | O | 0..1 | Identifies the time synchronization distribution methods supported by 5GS. |  |
| gmCapable | GmCapable | O | 0..1 | Indicates whether NW-TT supports acting as a gPTP or PTP grandmaster. |  |
| ptpProfiles | string | O | 0..1 | Identifies the PTP profiles supported by 5GS for the reported UE. |  |
|  |  |  |  |  |  |
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|  |

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

##### 5.15.4.3.6 Type: TimeSyncExposureConfig

Table 5.15.4.3.6-1: Definition of type TimeSyncExposureConfig

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| upNodeId | Uint64 | O | 0..1 | Identifies the applicable NW-TT. Contains a TSC user plane node Id. If integrated with TSN, the user plane node Id is a bridge Id defined in IEEE 802.1Q [x] clause 14.2.5. |  |
| reqDisMethod | DistributionMethod | O | 0..1 | Identifies the time synchronization distribution method requested by the AF. |  |
| gmEnable | boolean | O | 0..1 | Indicates that the AF requests 5GS to act as a grandmaster for PTP or gPTP if it is included and set to true. The default value "false" shall apply, if the attribute is not present. |  |
| gmPrio | Uinteger | O | 0..1 | Indicates a priority used as defaultDS.priority1 when generating Announce message when 5GS acts as (g)PTP GM. |  |
| timeDom | Uinteger | O | 0..1 | Indicate the (g)PTP domain that the (TSN)AF is located in. |  |
| ptpProfiles | string | O | 0..1 | Identifies the PTP profiles supported by 5GS for the reported UE. |  |
| tempValidity | TemporalValidity | O | 0..1 | Indicates the time interval during which the AF request is to be applied. |  |
| configNotifUri | Uri | M | 1 | Notification URI for configuration state reporting. |  |
| configNotifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
|  |  |  |  |  |  |
|  |

Editor's note: How a clock accuracy parameter as well as other parameters for time synchronization can be supported is FFS.

##### 5.15.4.3.x1 Type: TimeSyncExposureSubsNotif

Table 5.15.4.3.x1-1: Definition of type TimeSyncExposureSubsNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subsNotifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
| eventNotifs | array(SubsEventNotification) | M | 1..N | Notifications about subscribed Individual Events |  |

##### 5.15.4.3.x2 Type SubsEventNotification

Table 5.15.4.3.x2-1: Definition of type SubsEventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | SubscribedEvent | M | 1 | Subscribed events |  |
| timeSyncCapas | array(TimeSyncCapability) | O | 1..N | Contains a list of time syncroniziation capabilities for the UEs |  |

##### 5.15.4.3.x3 Type: TimeSyncExposureConfigNotif

Table 5.15.4.3.x3-1: Definition of type TimeSyncExposureConfigNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| configNotifId | string | M | 1 | Notification Correlation ID assigned by the NF service consumer. |  |
| stateOfConfig | string | M | 1 | Indicates the current state of time synchroniztion service configuration |  |

Editor's note: The data type of "stateOfConfig" attribute is FFS.

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

##### 5.4.3.4.x1 Enumeration: SubscribedEvent

Table 5.4.3.4.x1-1: Enumeration SubscribedEvent

|  |  |
| --- | --- |
| Enumeration value | Description |
| AVAILABILITY\_FOR\_TIME\_SYNC\_SERVICE | The AF requests to be notified when the UE is availablility for time synchronization service. |

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