**3GPP TSG-CT WG4 Meeting #98eC4-203341**

**E-Meeting, 02nd – 12th June 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.563** | **CR** | **0004** | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | HSS Event Exposure | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UDICOM | | | | |  | ***Date:*** | | | 2020-05-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | CT4 agreed CR#0014 to TS 29.632 (stage-2), so the corresponding stage-3 details need to be specified accordingly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add a new Nhss\_EE service. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Misalignment with stage-2 specifications. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.x (new), 6.x (new), A.x (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 introduces a new OpenAPI specification:  - TS29563\_Nhss\_EE.yaml | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

## 5.x Nhss\_EventExposure Service

### 5.x.1 Service Description

See 3GPP TS 23.632 [8].

### 5.x.2 Service Operations

#### 5.x.2.1 Introduction

For the Nhss\_EventExposure service the following service operations are defined:

- Subscribe

- Unsubscribe

- Notify

- ModifySubscription

The Nhss\_EventExposure service is used by consumer NFs (e.g. UDM) to subscribe to notifications of event occurrence by means of the Subscribe service operation.

The Nhss\_EventExposure service is also used by the consumer NFs (e.g. UDM) that have previously subscribed to notifications, to unsubscribe by means of the Unsubscribe service operation.

The Nhss\_EventExposure service is also used by the subscribed consumer NFs (e.g. UDM) to modify an existing subscription by means of the ModifySubscription service operation.

#### 5.x.2.2 Subscribe

##### 5.x.2.2.1 General

The following procedures using the Subscribe service operation are supported:

- Subscribe to Notification of event occurrence

##### 5.x.2.2.2 Subscription to Notification of event occurrence

Figure 5.x.2.2.2-1 shows a scenario where the NF service consumer sends a request to the HSS to subscribe to notifications of event occurrence. The request contains a callback URI, the type of event that is monitored and additional information e.g. SCEF Id, event filters and reporting options.



Figure 5.x.2.2.2-1: NF service consumer subscribes to notifications

1. The NF service consumer sends a POST request to the parent resource (collection of subscriptions) (.../{ueId}/ee-subscriptions), to create a subscription as present in message body. The request may contain an expiry time, suggested by the NF Service Consumer, representing the time upto which the subscription is desired to be kept active and the time after which the subscribed event(s) shall stop generating notifications. Additionally, the request may include an SCEF Id if Common Network Exposure is used (i.e. if combined SCEF+NEF requested the event(s) to be subscribed/monitored in EPC)

2a. On success, the HSS responds with "201 Created" with the message body containing a representation of the created subscription. The Location HTTP header shall contain the URI of the created subscription.

2b. If the user does not exist, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

2c. If there is no valid subscription data for the UE, i.e. based on the UE's subscription information monitoring of the requested EventType is not allowed, or the requested EventType is not supported, HTTP status code "403 Forbidden" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

#### 5.x.2.3 Unsubscribe

##### 5.x.2.3.1 General

The following procedures using the Unsubscribe service operation are supported:

- Unsubscribe to Notifications of event occurrence

##### 5.x.2.3.2 Unsubscribe to notifications of event occurrence

Figure 5.x.2.3.2-1 shows a scenario where the NF service consumer sends a request to the HSS to unsubscribe from notifications of event occurrence. The request contains the URI previously received in the Location HTTP header of the response to the subscription.



Figure 5.x.2.3.2-1: NF service consumer unsubscribes to notifications

1. The NF service consumer sends a DELETE request to the resource identified by the URI previously received during subscription creation.

2a. On success, the HSS responds with "204 No Content".

2b. If there is no valid subscription available (e.g. due to an unknown SubscriptionId value), HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

#### 5.x.2.4 Notify

##### 5.x.2.4.1 General

The following procedures using the Notify service operation are supported:

- Event Occurrence Notification

##### 5.x.2.4.2 Event Occurrence Notification

Figure 5.x.2.4.2-1 shows a scenario where the HSS notifies the NF service consumer (that has subscribed to receive such notification) about occurrence of an event. The request contains the callbackReference URI as previously received in the EeSubscription.



Figure 5.x.2.4.2-1: Event Occurrence Notification

1. The HSS sends a POST request to the callbackReference as provided by the NF service consumer during the subscription.

2. The NF Service Consumer responds with "204 No Content".

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

#### 5.x.2.5 ModifySubscription

##### 5.x.2.5.1 General

The following procedures using the ModifySubscription service operation are supported:

- Modification of an EE-Subscription to notification of events

##### 5.x.2.5.2 Modification of a subscription

The service operation is invoked by a NF Service Consumer, e.g. UDM, towards the HSS, when it needs to modify an existing subscription previously created by itself at the HSS.

The NF Service Consumer shall modify the subscription by using HTTP method PATCH with the URI of the individual subscription resource to be modified.



Figure 5.x.2.5.2-1: NF service consumer updates subscription

1. The NF service consumer (e.g. NEF) shall send a PATCH request to the resource representing a subscription. The modification may be for the events subscribed or for updating the event report options.

2a. On success, the request is accepted, the HSS shall respond with "204 No Content".

2b. If the resource does not exist e.g. the subscriptionId cannot be found, HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

2c. If the modification can't be accepted, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

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

## 6.x Nhss\_EventExposure Service API

### 6.x.1 API URI

URIs of this API shall have the following root:

{apiRoot}/<apiName>/<apiVersion>/

where "apiRoot" is defined in clause 4.4.1 of 3GPP TS 29.501 [5], the "apiName" shall be set to "nhss-ee" and the "apiVersion" shall be set to "v1" for the current version of this specification.

### 6.x.2 Usage of HTTP

#### 6.x.2.1 General

HTTP/2, as defined in IETF RFC 7540 [13], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nhss\_EE service shall comply with the OpenAPI [14] specification contained in Annex A5.

#### 6.x.2.2 HTTP standard headers

##### 6.x.2.2.1 General

The usage of HTTP standard headers shall be supported as specified in clause 5.2.2 of 3GPP TS 29.500 [4].

##### 6.x.2.2.2 Content type

The following content types shall be supported:

JSON, as defined in IETF RFC 8259 [15], signalled by the content type "application/json".

The Problem Details JSON Object (IETF RFC 7807 [16] signalled by the content type "application/problem+json"

JSON Patch (IETF RFC 6902 [41]). The use of the JSON Patch format in a HTTP request body shall be signalled by the content type "application/json-patch+json".

#### 6.x.2.3 HTTP custom headers

##### 6.x.2.3.1 General

The usage of HTTP custom headers shall be supported as specified in clause 5.2.3 of 3GPP TS 29.500 [4].

### 6.x.3 Resources

#### 6.x.3.1 Overview



Figure 6.x.3.1-1: Resource URI structure of the Nhss\_EE API

Table 6.x.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.x.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name (Archetype) | Resource URI | HTTP method or custom operation | Description |
| EeSubscriptions (Collection) | /{ueId}/ee-subscriptions | POST | Create a subscription |
| Individual subscription (Document) | /{ueId}/ee-subscriptions/{subscriptionId} | PATCH | Update the subscription identified by {subscriptionId} |
| DELETE | Delete the subscription identified by {subscriptionId}, i.e. unsubscribe |

#### 6.x.3.2 Resource: EeSubscriptions (Collection)

##### 6.x.3.2.1 Description

This resource is used to represent subscriptions to notifications.

##### 6.x.3.2.2 Resource Definition

Resource URI: {apiRoot}/nhss-ee/v1/{ueIdentity}/ee-subscriptions

This resource shall support the resource URI variables defined in table 6.x.3.2.2-1.

Table 6.x.3.2.2-1: Resource URI variables for this resource

|  |  |
| --- | --- |
| Name | Definition |
| apiRoot | See clause 6.x.1 |
| ueId | Represents the identity of the UE in the HSS (IMSI) |

##### 6.x.3.2.3 Resource Standard Methods

###### 6.x.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.x.3.2.3.1-1.

Table 6.x.3.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| n/a |  |  |  |  |

This method shall support the request data structures specified in table 6.x.3.2.3.1-2 and the response data structures and response codes specified in table 6.x.3.2.3.1-3.

Table 6.x.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| EeSubscription | M | 1 | The subscription that is to be created |

Table 6.x.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| CreatedEeSubscription | M | 1 | 201 Created | Upon success, a response body containing a representation of the created Individual subscription resource shall be returned, along with event reports that might be immediately available at the HSS.  The HTTP response shall include a "Location" HTTP header that contains the resource URI of the created resource. |
| ProblemDetails | O | 0..1 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors:  - MONITORING\_NOT\_ALLOWED  - MAXIMUM\_RESOURCES\_EXCEEDED |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:  - USER\_NOT\_FOUND |
| ProblemDetails | O | 0..1 | 501 Not Implemented | The "cause" attribute may be used to indicate one of the following application errors:  - UNSUPPORTED\_MONITORING\_EVENT\_TYPE  - UNSUPPORTED\_MONITORING\_REPORT\_OPTIONS  This response shall not be cached. |

#### 6.x.3.3 Resource: Individual subscription (Document)

##### 6.x.3.3.1 Resource Definition

Resource URI: {apiRoot}/nhss-ee/v1/{ueId}/ee-subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.x.3.3.1-1.

Table 6.x.3.3.1-1: Resource URI variables for this resource

|  |  |
| --- | --- |
| Name | Definition |
| apiRoot | See clause 6.x.1 |
| ueIdentity | Represents the identity of the UE in the HSS (IMSI) |
| subscriptionId | The subscriptionId identifies an individual subscription to notifications |

##### 6.x.3.3.2 Resource Standard Methods

###### 6.x.3.3.2.1 DELETE

This method shall support the URI query parameters specified in table 6.x.3.3.2.1-1.

Table 6.x.3.3.1.1-1: URI query parameters supported by the DELETE method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| n/a |  |  |  |  |

This method shall support the request data structures specified in table 6.x.3.3.2.1-2 and the response data structures and response codes specified in table 6.x.3.3.2.1-3.

Table 6.x.3.3.2.1-2: Data structures supported by the Delete Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| n/a |  |  | The request body shall be empty. |

Table 6.x.3.3.2.1-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:  - USER\_NOT\_FOUND  - SUBSCRIPTION\_NOT\_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

###### 6.x.3.3.2.2 PATCH

This method shall support the URI query parameters specified in table 6.x.3.3.2.2-1.

Table 6.x.3.3.2.2-1: URI query parameters supported by the PATCH method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| supported-features | SupportedFeatures | O | 0..1 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.x.3.3.2.2-2 and the response data structures and response codes specified in table 6.x.3.3.2.2-3.

Table 6.x.3.3.2.2-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| array(PatchItem) | M | 1..N | Items describe the modifications to the Event Subscription |

Table 6.x.3.3.2.2-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Upon success, an empty response body shall be returned. |
| PatchResult | M | 1 | 200 OK | Upon success, the execution report is returned. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:  - USER\_NOT\_FOUND  - SUBSCRIPTION\_NOT\_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |
| O | 0..1 | 403 Forbidden | One or more attributes are not allowed to be modified.  The "cause" attribute may be used to indicate one of the following application errors:  - MODIFICATION\_NOT\_ALLOWED, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

### 6.x.4 Custom Operations without associated resources

In this release of this specification, no custom operations without associated resources are defined for the Nhss\_EventExposure Service.

### 6.x.5 Notifications

#### 6.x.5.1 General

This clause will specify the use of notifications and corresponding protocol details if required for the specific service. When notifications are supported by the API, it will include a reference to the general description of notifications support over the 5G SBIs specified in TS 29.500 / TS 29.501.

#### 6.x.5.2 Event Occurrence Notification

The POST method shall be used for Event Occurrence Notifications and the URI shall be as provided during the subscription procedure.

Resource URI: {callbackReference}

Support of URI query parameters is specified in table 6.x.5.2-1.

Table 6.x.5.2-1: URI query parameters supported by the POST method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| n/a |  |  |  |  |

Support of request data structures is specified in table 6.x.5.2-2 and of response data structures and response codes is specified in table 6.x.5.2-3.

Table 6.x.5.2-2: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| array(MonitoringReport) | M | 1..N | A list of MonitoringReports each of which contains information regarding the occurred event |

Table 6.x.5.2-3: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:  - CONTEXT\_NOT\_FOUND |
| NOTE: In addition, common data structures as listed in table 6.1.7-1 are supported. | | | | |

### 6.x.6 Data Model

#### 6.x.6.1 General

This clause specifies the application data model supported by the API.

Table 6.x.6.1-1 specifies the data types defined for the Nhss\_EE service API.

Table 6.x.6.1-1: Nhss\_EE specific Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Clause defined | Description |
| EeSubscription | 6.x.6.2.2 | A subscription to Notifications |
| CreatedEeSubscription | 6.x.6.2.3 |  |
| MonitoringConfiguration | 6.x.6.2.4 | Monitoring Configuration |
| MonitoringReport | 6.x.6.2.5 | Monitoring Report |
| Report | 6.x.6.2.6 |  |

Table 6.x.6.1-2 specifies data types re-used by the Nhss\_EE service API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nhss\_EE service API.

Table 6.x.6.1-2: Nhss\_EE re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| Uri | 3GPP TS 29.571 [7] | Uniform Resource Identifier |
| SupportedFeatures | 3GPP TS 29.571 [7] | See 3GPP TS 29.500 [4] clause 6.6 |
| DateTime | 3GPP TS 29.571 [7] |  |
| PatchResult | 3GPP TS 29.571 [7] |  |
| DurationSec | 3GPP TS 29.571 [7] |  |
| DiameterIdentity | 3GPP TS 29.571 [7] |  |
| EventType | 3GPP TS 29.503 [x] |  |

#### 6.x.6.2 Structured data types

##### 6.x.6.2.1 Introduction

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

##### 6.x.6.2.2 Type: EeSubscription

Table 6.x.6.2.2-1: Definition of type EeSubscription

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| callbackReference | Uri | M | 1 | URI provided by the NF service consumer to receive notifications |
| monitoringConfigurations | map(MonitoringConfiguration) | O | 1..N | A map (list of key-value pairs where referenceId converted from integer to string serves as key) of MonitoringConfigurations |
| scefId | DiameterIdentity | O | 0..1 | Diameter Identify (FQDN) of the SCEF |
| supportedFeatures | SupportedFeatures | O | 0..1 | See clause 6.x.8 |

##### 6.x.6.2.3 Type: CreatedEeSubscription

Table 6.x.6.2.3-1: Definition of type CreatedEeSubscription

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| eeSubscription | EeSubscription | M | 1 | This IE shall contain the representation of the created event subscription. |
| eventReports | array(MonitoringReport) | O | 1..N | This IE when present, shall contain the status of events that are requested for immediate reporting as well, if those events are available at the time of subscription. |

##### 6.x.6.2.4 Type: MonitoringConfiguration

Table 6.x.6.2.4-1: Definition of type MonitoringConfiguration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| eventType | EventType | M | 1 | Event type |
| immediateFlag | boolean | O | 0..1 | Indicates if an immediate event report in the subscription response indicating current value / status of the event is required, if available. If the flag is not present, then immediate reporting shall not be done. |

##### 6.x.6.2.5 Type: MonitoringReport

Table 6.x.6.2.5-1: Definition of type MonitoringReport

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| referenceId | ReferenceId | M | 1 |  |
| eventType | EventType | M | 1 | Event type. |
| timeStamp | DateTime | M | 1 | Point in time at which the event occured |
| report | Report | O | 0..1 |  |

##### 6.x.6.2.6 Type: Report

TBD

#### 6.x.6.3 Simple data types and enumerations

##### 6.x.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

##### 6.x.6.3.2 Simple data types

The simple data types defined in table 6.x.6.3.2-1 shall be supported.

Table 6.x.6.3.2-1: Simple data types

|  |  |  |
| --- | --- | --- |
| Type Name | Type Definition | Description |
| ReferenceId | integer | ReferenceId is used as key in a map of MonitoringConfigurations; see clause 6.x.6.2.4. |

### 6.x.7 Error Handling

#### 6.x.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [4].

#### 6.x.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4].

#### 6.x.7.3 Application Errors

The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [4] may also be used for the Nhss\_EventExposure service. The following application errors listed in Table 6.x.7.3-1 are specific for the Nhss\_EventExposure service.

Table 6.x.7.3-1: Application errors

|  |  |  |
| --- | --- | --- |
| Application Error | HTTP status code | Description |
| MONITORING\_NOT\_ALLOWED | 403 Forbidden | The subscriber does not have the necessary subscription for monitoring with the requested Event Type. |
| USER\_NOT\_FOUND | 404 Not Found | The user does not exist |
| CONTEXT\_NOT\_FOUND | 404 Not Found | It is used when no corresponding context exists. |
| UNSUPPORTED\_MONITORING\_EVENT\_TYPE | 501 Not Implemented | The monitoring configuration contains unsupported event type. |
| UNSUPPORTED\_MONITORING\_REPORT\_OPTIONS | 501 Not Implemented | The monitoring configuration contains unsupported report options. |

### 6.x.8 Feature Negotiation

The optional features in table 6.x.8-1 are defined for the Nhss\_EE API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.x.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
|  |  |  |

### 6.x.9 Security

As indicated in 3GPP TS 33.501 [6] and 3GPP TS 29.500 [4], the access to the Nhss\_EE API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [18]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [19]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nhss\_EE API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [19], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nhss\_EE service.

The Nhss\_EE API defines a single scope "nhss-ee" for OAuth2 authorization (as specified in 3GPP TS 33.501 [6]) for the entire API, and it does not define any additional scopes at resource or operation level.

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

## A.X Nhss\_EE API

openapi: 3.0.0

info:

version: '1.0.0'

title: 'Nhss\_EE'

description: |

HSS Event Exposure

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externalDocs:

description: 3GPP TS 29.563 Home Subscriber Server (HSS) Services for Interworking With UDM, version 16.1.0

url: 'http://www.3gpp.org/ftp/Specs/archive/29\_series/29.563/'

servers:

- url: '{apiRoot}/nhss-ee/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.

security:

- {}

- oAuth2ClientCredentials:

- nhss-ee

paths:

/{ueId}/ee-subscriptions:

post:

summary: Subscribe

operationId: CreateEeSubscription

tags:

- EE Subscription (Collection)

parameters:

- name: ueId

in: path

description: IMSI of the subscriber

required: true

schema:

$ref: '#/components/schemas/Imsi'

requestBody:

content:

application/json:

schema:

$ref: '#/components/schemas/EeSubscription'

required: true

responses:

'201':

description: Expected response to a valid request

content:

application/json:

schema:

$ref: '#/components/schemas/CreatedEeSubscription'

headers:

Location:

description: 'Contains the URI of the newly created resource, according to the structure: {apiRoot}/nhss-ee/v1/{ueIdentity}/ee-subscriptions/{subscriptionId}'

required: true

schema:

type: string

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'501':

$ref: 'TS29571\_CommonData.yaml#/components/responses/501'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

description: Unexpected error

callbacks:

eventOccurrenceNotification:

'{request.body#/callbackReference}':

post:

requestBody:

required: true

content:

application/json:

schema:

type: array

items:

$ref: '#/components/schemas/MonitoringReport'

minItems: 1

responses:

'204':

description: Successful Notification response

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

description: Unexpected error

/{ueId}/ee-subscriptions/{subscriptionId}:

delete:

summary: Unsubscribe

operationId: DeleteEeSubscription

tags:

- Delete EE Subscription

parameters:

- name: ueId

in: path

description: IMSI of the subscriber

required: true

schema:

$ref: '#/components/schemas/Imsi'

- name: subscriptionId

in: path

description: Id of the EE Subscription

required: true

schema:

type: string

responses:

'204':

description: Successful response

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

description: Unexpected error

patch:

summary: Patch

operationId: UpdateEeSubscription

tags:

- Update EE Subscription

parameters:

- name: ueId

in: path

description: IMSI of the subscriber

required: true

schema:

$ref: '#/components/schemas/Imsi'

- name: subscriptionId

in: path

description: Id of the EE Subscription

required: true

schema:

type: string

requestBody:

content:

application/json-patch+json:

schema:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchItem'

minItems: 1

required: true

responses:

'200':

description: Expected response to a valid request

content:

application/json:

schema:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchResult'

'204':

description: Successful response

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

default:

description: Unexpected error

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

nhss-ee: Access to the nhss-ee API

schemas:

# COMPLEX TYPES:

Imsi:

type: string

pattern: '^(imsi-[0-9]{5,15})$'

EeSubscription:

type: object

required:

- callbackReference

properties:

callbackReference:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

scefId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/DiameterIdentity'

monitoringConfigurations:

description: A map (list of key-value pairs where ReferenceId serves as key) of MonitoringConfigurations

type: object

additionalProperties:

$ref: '#/components/schemas/MonitoringConfiguration'

minProperties: 1

supportedFeatures:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

CreatedEeSubscription:

type: object

required:

- eeSubscription

properties:

eeSubscription:

$ref: '#/components/schemas/EeSubscription'

eventReports:

type: array

items:

$ref: '#/components/schemas/MonitoringReport'

minItems: 1

MonitoringConfiguration:

type: object

required:

- eventType

properties:

eventType:

$ref: 'TS29503\_Nudm\_EE.yaml#/components/schemas/EventType'

immediateReport:

type: boolean

MonitoringReport:

type: object

required:

- referenceId

- eventType

- timeStamp

properties:

referenceId:

$ref: '#/components/schemas/ReferenceId'

eventType:

$ref: 'TS29503\_Nudm\_EE.yaml#/components/schemas/EventType'

timeStamp:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'

report:

$ref: '#/components/schemas/Report'

Report:

type: object # TBD

# SIMPLE TYPES:

ReferenceId:

type: integer

# ENUMS:

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