**3GPP TSG-CT3 Meeting #134 *C3-242065***

[**Changsha**](https://www.3gpp.org/ftp/tsg_ct/WG3_interworking_ex-CN3/TSGC3_128_Bratislava/Invitation/)**, China, 15th April – 19th April 2024**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.522** | **CR** |  **1217** | **rev** | **-** | **Current version:** | **18.5.0** |  |
|  |
| *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 to AKMA API to support AKMA service restrictions to roaming UE. |
|  |  |
| ***Source to WG:*** | Nokia, China Mobile |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | TEI18, AKMA-CT |  | ***Date:*** | 2024-04-08 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | As per agreed stage-2 CR (S3-240915), following new requirements related to detection of roaming UEs and restrictions of AKMA services to such roaming UEs has been agreed. From TS 33.535:Cl 6.3:The NEF forwards the response to the AF, the response contains the KAF, the KAF expiration time (KAF exptime) and optionally GPSI (external ID) or the failure indication of roaming not allowed.7.3.2 Nnef\_AKMA\_ApplicationKey\_Get service operation **Service operation name:** Nnef\_AKMA\_ApplicationKey\_Get.**Description:** The NF consumer requests the NEF to provide AF related key material.**Input, Required:** A-KID, AF\_ID **Input, Optional:** UEID not needed indication, Service Disable URI. **Output, Required:** **Output, Optional:** KAF, KAF expiration time, GPSI (external ID) or failure indication.7.3.x Nnef\_AKMA\_ServiceDisableNotification service operation**Service operation name:** Nnef\_AKMA\_ServiceDisableNotification**Description:** NEFnotifies the NF consumer about AKMA service is disabled.**Input, Required:** A-KID**Input, Optional:** None**Output, Required:** None**Output, Optional:** None |
|  |  |
| ***Summary of change:*** | 1. Including support of Notification from NEF towards AF.
2. Including Notification URI in the AkmaAfKeyRequest data type.
3. Define new data type ServiceDisableNotif used in notification of AKMA service disable information.
4. Added new application error to deny AKMA service for the roaming UE.
 |
|  |  |
| ***Consequences if not approved:*** | Not compliant with stage 2 requirements |
|  |  |
| ***Clauses affected:*** | 4.4.23.2, 4.4.23.3(new), 5.14.4, 5.14.4.1 (new), 5.14.4.2 (new), 5.14.5.1, 5.14.5.2, 5.14.5.3.2, 5.14.5.3.3, 5.14.5.3.4 (new), 5.14.6, 5.14.7.3, A.12 |
|  |  |
|  | **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 new backward compatible feature support to the open API: AKMA API |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* First change \* \* \* \*

#### 4.4.23.2 AKMA Application Key Request

In order to retrieve the AKMA application key, the AF shall send an HTTP POST request message to the resource URI "{apiRoot}/3gpp-akma/v1/retrieve". The HTTP POST request shall include the AkmaAfKeyRequest data structure that shall contain the identification of AF and an A-KID, and if the "RoamingRestiction" feature is supported, may contain a notification URI for the AF to receive notifications on the AKMA service disablement information.

Upon receipt of the corresponding HTTP POST message from the AF, if the AF's request is authorized by the NEF, then the NEF shall interact with the AAnF to retrieve the AKMA application key by using Naanf\_AKMA service as defined in 3GPP TS 29.535 [38]. After receiving a successful response from the AAnF, the NEF shall respond to the AF with an HTTP "200 OK" status code, including a KAF and the expiration time of the KAF, and if "anonInd" attribute contained in AkmaAfKeyRequest data type is not set to "true" in the incoming request, optionally the GPSI (external ID) which may be translated from the SUPI received from the AAnF. The SUPI shall not be included in the response to the external AF. If the NEF receives an error response from the AAnF, the NEF shall respond to the AF with a proper error status code.

If the NEF receives a response from the AAnF with an HTTP "403 Forbidden" status code and the response message body including a ProblemDetails data structure with the "cause" attribute set to the "K\_AKMA\_NOT\_PRESENT" or "ROAMING\_AKMA\_SERVICE\_DENIED" application error, then the NEF shall relay this response to the AF.

\* \* \* \* Next changes \* \* \* \*

#### 4.4.23.3 AKMA Service Disablement Notification

This procedure is used by the NEF to notify a previously subscribed AF of AKMA service disablement information.

When AKMA related sessions have already been started (before roaming was detected), and as soon as the PLMN change is detected at the AAnF, the AAnF may execute AKMA service disablement procedure via the NEF based on the roaming policy to indicate to the AF that the AKMA service is disabled.

In order to notify an AF of AKMA service disablement, the NEF shall send an HTTP POST request message to the AF with the request body including the ServiceDisableNotif data structure.

Upon reception of this notification request, the AF shall acknowledge its successful reception by sending a response message with an HTTP "204 No Content" status code and may stop providing the AKMA service to the UE.

On failure, the AF shall take proper error handling actions, as specified in clause 5.14.7, and respond to the NEF with an appropriate error status code.

\* \* \* \* Next changes \* \* \* \*

### 5.14.4 Notifications

#### 5.14.4.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.14.4.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description(service operation) |
| AKMA Service Disablement Notification | {notifUri} | POST | Enable the NEF to notify a previously subscribed AF of the disablement of the AKMA service for the UE. |

\* \* \* \* Next changes \* \* \* \*

#### 5.14.4.2 AKMA Service Disablement Notification

##### 5.14.4.2.1 Description

The AKMA Service Disablement Notification is used by the NEF to notify the AF of AKMA service disablement for the UE.

##### 5.14.4.2.2 Target URI

The Callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 5.14.4.2.2-1.

Table 5.14.4.2.2-1: Callback URI variables

|  |  |
| --- | --- |
| Name | Definition |
| notifUri | Callback URI provided by the AF during retrievel of AKMA application key as defined in table 5.14.3.2.2-1. |

\* \* \* \* Next changes \* \* \* \*

##### 5.14.4.2.3 Operation Definition

This method shall support the request data structures specified in table 5.14.4.2.3.1-1 and the response data structures and response codes specified in table 5.14.4.2.3-2.

Table 5.14.4.2.3-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ServiceDiableNotif | M | 1 | Represents the AKMA Service Disablement Notification. |

Table 5.14.4.2.3-2: Data structures supported by the POST Response Body on this resource

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

Table 5.14.4.2.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.19.4.2.3-4: Headers supported by the 308 Response Code on this resource

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

\* \* \* \* Next changes \* \* \* \*

#### 5.14.5.1 General

This clause specifies the application data model supported by the AKMA API. Table 5.14.5.1-1 specifies the data types defined for the AKMA API.

Table 5.14.5.1-1: AKMA API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| AkmaAfKeyRequest | 5.14.5.3.2 | Represents AKMA application key retrieval request information. |  |
| AkmaAfKeyData | 5.14.5.3.3 | Represents AKMA application key information. |  |
| ServiceDisableNotif | 5.15.5.3.4 | Represents a AKMA service disable information. |  |

\* \* \* \* Next changes \* \* \* \*

#### 5.14.5.2 Reused data types

The data types reused by the AKMA API from other specifications are listed in table 514.5.2-1.

Table 5.14.5.2-1: Re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| DateTime | 3GPP TS 29.122 [4] | Represents a data and a time. |
| Gpsi | 3GPP TS 29.571 [8] | Represents a GPSI. |
| ProblemDetails | 3GPP TS 29.122 [4] | Represents error related information. |
| Supi | 3GPP TS 29.571 [8] | Represents a SUPI. |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features. |
| Uri | 3GPP TS 29.122 [4] | Represents a URI. |

\* \* \* \* Next changes \* \* \* \*

##### 5.14.5.3.2 Type: AkmaAfKeyRequest

Table 5.14.5.3.2-1: Definition of type AkmaAfKeyRequest

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability(NOTE) |
| afId | AfId | M | 1 | Identification of AF |  |
| aKId | AKId | M | 1 | A-KID |  |
| anonInd | Boolean | O | 0..1 | Indicates whether an anonymous user access. Set to "true" if an anonymous user access is requested; otherwise set to "false".Default value is "false" if omitted. |  |
| notifiUri | Uri | O | 0..1 | Contains the notification URI via which the AF desires to receive notifications on AKMA service disablement. | RoamingRestriction |
| suppFeat | SupportedFeatures | O | 0..1 | Indicates the list of Supported features used as described in clause 5.14.6. |  |
| NOTE: Properties marked with a feature as defined in clause 5.14.6 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |

\* \* \* \* Next changes \* \* \* \*

##### 5.14.5.3.3 Type: AkmaAfKeyData

Table 5.14.5.3.3-1: Definition of type AkmaAfKeyData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability(NOTE) |
| kaf | String | M | 1 | KAF |  |
| expiry | DateTime | M | 1 | Expiration time of KAF. |  |
| gpsi | Gpsi | O | 0..1 | Indicates an external ID of the UE. (NOTE 2, NOTE 3) |  |
| supi | Supi | C | 0..1 | Indicates the SUPI of the UE. (NOTE 2) |  |
| suppFeat | SupportedFeatures | O | 0..1 | Indicates the features supported by both the AF and the NEF. |  |
| NOTE 1: Properties marked with a feature as defined in clause 5.14.6 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.NOTE 2: When the "AkmaAfKeyData" data structure is used in the current release of this specification, the "gpsi" attribute may be included and the "supi" attribute is not applicable.NOTE 3 When the "anonInd" attribute contained in AkmaAfKeyRequest data type is set to "true" in the incoming request, the "gpsi" attribute shall not be included. |

\* \* \* \* Next changes \* \* \* \*

##### 5.14.5.3.4 Type: ServiceDisableNotif

Table 5.14.5.3.4-1: Definition of type ServiceDisableNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| aKId | AKId | M | 1 | Contains the A-KID. | RoamingRestriction |

\* \* \* \* Next changes \* \* \* \*

### 5.14.6 Used Features

The table below defines the features applicable to the AKMA API. Those features are negotiated as described in clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.14.6-1: Features used by AKMA API

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | RoamingRestriction | This feature indicates the support of roaming UE detection by the network and the denial of the AKMA services to roaming UEs. |
|  |  |  |

\* \* \* \* Next changes \* \* \* \*

#### 5.14.7.3 Application Errors

The application errors defined for the AKMA API are listed in table 5.14.7.3-1.

Table 5.14.7.3-1: Application errors

|  |  |  |  |
| --- | --- | --- | --- |
| **Application Error** | **HTTP status code** | **Description** | **Applicability** |
| K\_AKMA\_NOT\_PRESENT | 403 Forbidden | Indicates that the KAKMA identified by the A-KID provided in the AKMA Application Key retrieval request body is not present at the AAnF. |  |
| ROAMING\_AKMA\_SERVICE\_DENIED | 403 Forbidden | Indicates that the Network identifies the request is for a Roaming UE and denies the AKMA service. | RoamingRestriction |

\* \* \* \* Next changes \* \* \* \*

# A.12 AKMA API

openapi: 3.0.0

info:

 title: 3gpp-akma

 version: 1.1.0-alpha.1

 description: |

 API for AKMA.

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externalDocs:

 description: >

 3GPP TS 29.522 V18.3.0; 5G System; Network Exposure Function Northbound APIs.

 url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.522/'

security:

 - {}

 - oAuth2ClientCredentials: []

servers:

 - url: '{apiRoot}/3gpp-akma/v1'

 variables:

 apiRoot:

 default: https://example.com

 description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:

 /retrieve:

 post:

 summary: Retrieve AKMA Application Key Information.

 operationId: RetrieveAKMAAppKey

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: The requested information was returned successfully.

 content:

 application/json:

 schema:

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

 '204':

 description: No Content.

 '307':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/404'

 '411':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29122\_CommonData.yaml#/components/responses/default'

 callbacks:

 ServiceDisablementNotification:

 '{$request.body#/notifUri}':

 post:

 requestBody:

 description: >

 Represents the AKMA service disablement information.

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '204':

 description: No content. The notification is successfully received and processed.

 '307':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/308'

 '400':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/400'

 '401':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/401'

 '403':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/403'

 '404':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/404'

 '411':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/429'

 '500':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/500'

 '503':

 $ref: 'TS29122\_CommonData.yaml#/components/responses/503'

 default:

 $ref: 'TS29122\_CommonData.yaml#/components/responses/default'

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{tokenUrl}'

 scopes:

 nnef-akma:gpsi-access: >

 Return GPSI in the AKMA Application Key information for the UE.

 schemas:

 AkmaAfKeyRequest:

 description: >

 Represents the parameters to request the retrieval of AKMA Application Key information.

 type: object

 properties:

 suppFeat:

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

 notifUri:

 $ref: 'TS29122\_CommonData.yaml#/components/schemas/Uri'

 afId:

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

 aKId:

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

 anonInd:

 type: boolean

 description: >

 Indicates whether an anonymous user access. Set to "true" if an anonymous user access is

 requested; otherwise set to "false". Default value is "false" if omitted.

 default: false

 required:

 - afId

 - aKId

 AkmaAfKeyData:

 description: Represents AKMA Application Key information data.

 type: object

 properties:

 suppFeat:

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

 gpsi:

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

 expiry:

 $ref: 'TS29122\_CommonData.yaml#/components/schemas/DateTime'

 kaf:

 type: string

 supi:

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

 required:

 - kaf

 - expiry

 ServiceDisableNotif:

 description: Represents the AKMA Service Disable Notification.

 type: object

 properties:

 aKId:

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

 required:

 - aKId

#Simple Data types

 AfId:

 description: Represents an AF identifier.

 type: string

 AKId:

 description: Represents an AKMA Key Identifier.

 type: string

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