**3GPP TSG-CT WG4 Meeting #111-eC4-224abc**

**E-Meeting, 18th – 26th August 2022 *was C4-224262***

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  |
| *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:***  | EE Subscription Notification Error Handling |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | CT4 |
|  |  |
| ***Work item code:*** | TEI17, 5G\_CIoT |  | ***Date:*** | 2022-08-24 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** |  |
|  | *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)* |
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| ***Reason for change:*** | For event subscriptions, an event subscription maybe locally removed or no longer valid at the NF consumer but not successfully un-subscribed in the AMF. In such a case, the AMF will deliver the notification to the callback URI and the NF consumer may respond with:* 404, when the invalid subscription associating with a unique callback URI; or
* 400 with RESOURCE\_CONTEXT\_NOT\_FOUND, when the callback URI is still valid but the subscription context is no longer valid.

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| --- | --- | --- |
| RESOURCE\_CONTEXT\_NOT\_FOUND | 400 Bad Request | The notification request is rejected because the callback URI still exists in the receiver of the notification, but the specific resource context identified within the notification payload is not found in the NF service consumer. |

Additionally OAuth2 is not specified for notification in current standard, so notification request shall not be challenged with 401 response. But if the callback URI is not correctly configured in NF consumer which requiring HTTP authorization, i.e. sending 401 response to AMF on the notification requests, the AMF will not be able to handle the challenge and successfully deliver the notification anyway.If the AMF keep retrying or sending further notifications to the above callback URIs, the negative response will always be returned, which unnecessarily increase the negative KPI and waste the network bandwidth.This CR propose the AMF remove the subscription when received above response codes and application errors. |
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| ***Summary of change:*** | Clarify that the AMF terminate the subscription when receive the status codes and application error as stated in reason for change. |
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| ***Consequences if not approved:*** | AMF continue deliver notification for invalid subscriptions, leads to negative KPI and waste of network bandwidth. |
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| ***Clauses affected:*** | 5.3.2.4.1 |
|  |  |
|  | **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 does not require version Update on OpenAPI files. |
|  |  |
| ***This CR's revision history:*** | Rev1:- Change Category to Cat F- Change WIC to TEI17, 5G\_CIoT- Add an example why the 401 code may received for notification request. |

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

##### 5.3.2.4.1 General

The Notify service operation is invoked by the AMF, to send a notification, towards the notification URI, when certain event included in the subscription has taken place.

The AMF shall use the HTTP method POST, using the notification URI received in the subscription creation as specified in clause 5.3.2.2.2, including e.g. the subscription ID, Event ID(s) for which event has happened, notification correlation ID provided by the NF service consumer at the time of event subscription, to send a notification. See Figure 5.3.2.4.1-1.

Additionally, the Notify service operation shall also be invoked by the AMF, when there is a change of AMF during UE mobility procedures and if the subscription Id changes (i.e. Registration procedures and Handover procedures).



Figure 5.3.2.4.1-1 Notify

1. The AMF shall send a POST request to send a notification.

2a. On success, "204 No content" shall be returned by the NF Service Consumer.

2b. On failure or redirection, the appropriate HTTP status code (e.g. "403 Forbidden") indicating the error shall be returned and appropriate additional error information should be returned.

 When the AMF received the following response code (and application error), the AMF should consider the subscription is no longer valid and terminate the subscription:

- "400 Bad Request" with application error "RESOURCE\_CONTEXT\_NOT\_FOUND"

- "401 Unauthorized" (e.g. when the NF consumer incorrectly enabled certain HTTP authentication mechanism on the callback URI)

- "404 Not Found"

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

Table 5.2.7.2-1: Protocol and application errors common to several 5GC SBI API specifications (HTTP server)

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| --- | --- | --- |
| Protocol or application Error | HTTP status code | Description |
| INVALID\_API | 400 Bad Request | The HTTP request contains an unsupported API name or API version in the URI. |
| INVALID\_MSG\_FORMAT | 400 Bad Request | The HTTP request has an invalid format. |
| INVALID\_QUERY\_PARAM | 400 Bad Request | The HTTP request contains an unsupported query parameter in the URI. (NOTE 1) |
| MANDATORY\_QUERY\_PARAM\_INCORRECT | 400 Bad Request | A mandatory query parameter, or a conditional query parameter but mandatory required, for an HTTP method was received in the URI with semantically incorrect value. (NOTE 1) |
| OPTIONAL\_QUERY\_PARAM\_INCORRECT | 400 Bad Request | An optional query parameter for an HTTP method was received in the URI with a semantically incorrect value that prevents successful processing of the service request. (NOTE 1) |
| MANDATORY\_QUERY\_PARAM\_MISSING | 400 Bad Request | Query parameter which is defined as mandatory, or as conditional but mandatory required, for an HTTP method is not included in the URI of the request. (NOTE 1) |
| MANDATORY\_IE\_INCORRECT | 400 Bad Request | A mandatory IE (within the JSON body or within a variable part of an "apiSpecificResourceUriPart" or within an HTTP header), or conditional IE but mandatory required, for an HTTP method was received with a semantically incorrect value. (NOTE 1)  |
| OPTIONAL\_IE\_INCORRECT | 400 Bad Request | An optional IE (within the JSON body or within an HTTP header) for an HTTP method was received with a semantically incorrect value that prevents successful processing of the service request. (NOTE 1) |
| MANDATORY\_IE\_MISSING | 400 Bad Request | A mandatory IE (within the JSON body or within the variable part of an "apiSpecificResourceUriPart" or within an HTTP header), or conditional IE but mandatory required, for an HTTP method is not included in the request. (NOTE 1) |
| UNSPECIFIED\_MSG\_FAILURE | 400 Bad Request | The request is rejected due to unspecified client error. (NOTE 2) |
| RESOURCE\_CONTEXT\_NOT\_FOUND | 400 Bad Request | The notification request is rejected because the callback URI still exists in the receiver of the notification, but the specific resource context identified within the notification payloadis not found in the NF service consumer. |
| CCA\_VERIFICATION\_FAILURE | 403 Forbidden | The request is rejected due to a failure to verify the CCA at the receiving entity (e.g. NRF or NF service producer).  |
| TOKEN\_CCA\_MISMATCH | 403 Forbidden | The request is rejected due to a mismatch between the subject claim in the access token and subject claim in the CCA. |
| MODIFICATION\_NOT\_ALLOWED | 403 Forbidden | The request is rejected because the contained modification instructions attempt to modify IE which is not allowed to be modified. |
| SUBSCRIPTION\_NOT\_FOUND | 404 Not Found | The request for modification or deletion of subscription is rejected because the subscription is not found in the NF. |
| RESOURCE\_URI\_STRUCTURE\_NOT\_FOUND | 404 Not Found | The request is rejected because a fixed part after the first variable part of an "apiSpecificResourceUriPart" (as defined in clause 4.4.1 of 3GPP TS 29.501 [5]) is not found in the NF.This fixed part of the URI may represent a sub-resource collection (e.g. contexts, subscriptions, policies) or a custom operation. (NOTE 5) |
| INCORRECT\_LENGTH | 411 Length Required | The request is rejected due to incorrect value of a Content-length header field. |
| NF\_CONGESTION\_RISK | 429 Too Many Requests | The request is rejected due to excessive traffic which, if continued over time, may lead to (or may increase) an overload situation of the NF instance. (NOTE 7) |
| NF\_SERVICE\_CONGESTION\_RISK | 429 Too Many Requests | The request is rejected due to excessive traffic which, if continued over time, may lead to (or may increase) an overload situation of the NF service instance. (NOTE 7) |
| INSUFFICIENT\_RESOURCES | 500 Internal Server Error | The request is rejected due to insufficient resources. |
| UNSPECIFIED\_NF\_FAILURE | 500 Internal Server Error | The request is rejected due to unspecified reason at the NF. (NOTE 3) |
| SYSTEM\_FAILURE | 500 Internal Server Error | The request is rejected due to generic error condition in the NF. |
| NF\_FAILOVER | 500 Internal Server Error | The request is rejected due to the unavailability of the NF, and the requester may trigger an immediate re-selection of an alternative NF based on this information.(NOTE 6) (NOTE 8). |
| NF\_SERVICE\_FAILOVER | 500 Internal Server Error | The request is rejected due to the unavailability of the NF service, and the requester may trigger an immediate re-selection of an alternative NF service based on this information.(NOTE 6) (NOTE 8). |
| INBOUND\_SERVER\_ERROR | 502 Bad Gateway | The request is rejected due to the receipt of an 5xx error from an inbound server that the NF Service Producer accessed while attempting to fulfil the request (see clause 6.4.2.1).  |
| NF\_CONGESTION | 503 Service Unavailable | The NF instance experiences congestion and performs overload control, which does not allow the request to be processed. (NOTE 4) (NOTE 7) |
| NF\_SERVICE\_CONGESTION | 503 Service Unavailable | The NF service instance experiences congestion and performs overload control, which does not allow the request to be processed. (NOTE 4) (NOTE 7) |
| TARGET\_NF\_NOT\_REACHABLE | 504 Gateway Timeout | The request is not served as the target NF is not reachable. (NOTE 6) |
| TIMED\_OUT\_REQUEST | 504 Gateway Timeout | The request is rejected due a request that has timed out at the HTTP client (see clause 6.11.2).  |
| NOTE 1: "invalidParams" attribute shall be included in the "ProblemDetails" data structure indicating unsupported, missing or incorrect IE(s) or query parameter(s) or 3gpp-Sbi-Discovery-\* header(s).NOTE 2: This application error indicates error in the HTTP request and there is no other application error value that can be used instead.NOTE 3: This application error indicates error condition in the NF and there is no other application error value that can be used instead.NOTE 4: If the reason for rejection is a temporary overload, the NF may include in the response a Retry-After header field to indicate how long the service is expected to be unavailable.NOTE 5: If the request is rejected because of an error in an URI before the first variable part of an "apiSpecificResourceUriPart", the "404 Not Found" HTTP status code may be sent without "ProblemDetails" data structure indicating protocol or application error.NOTE 6: The NF service consumer (as receiver of the cause code) should stop sending subsequent requests addressing the resource contexts in the producer's NF instance (for NF\_FAILOVER) or NF service instance (for NF\_SERVICE\_FAILOVER) to avoid massive rejections.  The NF service consumer may reselect an alternative NF service producer as specified clause 6.5 of 3GPP TS 23.527 [38], e.g. using the Binding Indication of resource context. It is implementation specific for the NF service consumer to determine when and whether the NF producer becomes available again, e.g. when there is no other alternative available or at expiry of a local configured timer.NOTE 7: When a NF service producer receives NF\_CONGESTION\_RISK, NF\_SERVICE\_CONGESTION\_RISK, NF\_CONGESTION and NF\_SERVICE\_CONGESTION from a NF service consumer when sending a request message towards a callback/notification URI, the NF service producer shall identify the NF service consumer that is congested using either the authority of the notification/callback URI or together with the "callback-uri-prefix" if it is provided in 3gpp-Sbi-consumer-info as specified in clause 5.2.3.3.7.NOTE 8: The NF service producer (as receiver of the cause code) should stop sending subsequent notification requests addressing the session contexts towards the consumer NF (service) instance to avoid massive rejections, where the consumer NF (service) instance shall be identified by either the authority of the notification/callback URI or together with the "callback-uri-prefix" if it is provided in 3gpp-Sbi-consumer-info as specified in clause 5.2.3.3.7. The NF service producer may reselect an alternative NF service consumer as specified in clause 6.6 of 3GPP TS 23.527 [38], e.g. using the Binding Indication of the session context. It is implementation specific for the NF service producer to determine when and whether the NF consumer becomes available again, e.g. when there is no other alternative available or at expiry of a local configured timer. Note that if a consumer NF service instance complying with an earlier version of the specification shares the same authority with other consumer NF service instances and sends the NF\_FAILOVER and NF\_SERVICE\_FAILOVER causes to a NF service producer while not supporting the new callback-uri-prefix parameter in 3gpp-Sbi-consumer-info, this can result in the NF service producer no longer sending traffic to these consumer NF service instances sharing the same authority. |

\* \* \* Information \* \* \* \*