**3GPP TSG CT WG3 Meeting #142 *C3-253xxx***

**Goteborg, SE, 25th – 29th August, 2025 was C3-253313**

**Source: Huawei**

**Title: Pseudo-CR on completing the definition of the Naiotf\_AIoT\_Notify service operation**

**Spec: 3GPP TS 29.569**

**Agenda item: 19.70 (AmbientIoT-CT)**

**Document for: Agreement**

**1. Introduction**

As per the latest stage 2 updates in TS 23.369 (v19.0.0):

- The requirements on the content of the AIoT Operations Notification request/response body are now completed in stage 2 as per the updates in clauses 6.2.2, 6.2.3 and 7.2.4 of TS 23.369. This needs hence to be reflected in the stage 3 definition of the AIoT Operations Notification procedure with one additional conditional attribute to convey the Read command specific report information.

In addition:

- The attribute conveying the supported features in the AIoT Notification request needs to be removed as there is no feature negotiation in notifications, the features applicable for the operation that created the subscription (e.g., the Inventory/Command request in this case), either implicitly or explicitly, also apply for the notification.

- Further corrections and alignments/enhancements of the AIoT Operations Notification related requirements.

**2. Reason for Change**

- Update the relevant clauses of the service description and API definition and the OpenAPI description for the AIoT Operations Notification functionality/procedure to align with the above-detailed stage 2 updates and necessary updates/corrections to apply.

**3. Conclusions**

N/A

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS 29.569 V 1.0.0.

\* \* \* \* Start of changes \* \* \* \*

##### 5.2.2.4.2 AIoT Operations Notification

Figure 5.2.2.4.2-1 depicts a scenario where the AIOTF sends a request to notify a previously subscribed NF service consumer on AIoT operations related event(s) (see also clauses 6.2.2 and 6.2.3 of 3GPP TS 23.369 [14]).



Figure 5.2.2.4.2-1: AIoT Operations Notification

1. In order to notify a previously subscribed service consumer on AIoT operations related event(s), the AIOTF shall send an HTTP POST request message to the NF service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the NF service consumer as part of the request used to trigger the corresponding AIoT service operation (e.g., Inventory, Command), as defined in clause 5.2.2.2 or clause 5.2.2.3, and the request body including the AIoTNotif data structure.

2a. Upon success, the NF service consumer shall respond to the AIOTF with an HTTP "204 No Content" status code.

2b. On failure, the NF service consumer shall take proper error handling actions, as specified in clause 6.1.7, and respond to the AIOTF with an appropriate error status code.

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

#### 6.1.6.1 General

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

Table 6.1.6.1-1 specifies the data types defined for the Naiotf\_AIoT service-based interface protocol.

Table 6.1.6.1-1: Naiotf\_AIoT specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| AIoTFailReason | 6.1.6.3.3 | Represents the AIoT failure reason. |  |
| AIoTNotif | 6.1.6.2.6 | Represents the AIoT Operations Notification. |  |
| CommandReq | 6.1.6.2.4 | Represents the AIoT command request. |  |
| CommandResp | 6.1.6.2.5 | Represents the AIoT command response. |  |
| DevicesRepInfo | 6.1.6.2.8 | Represents the AIoT device(s) related reporting information. |  |
| InventoryReq | 6.1.6.2.2 | Represents the AIoT inventory request. |  |
| InventoryResp | 6.1.6.2.3 | Represents the AIoT inventory response. |  |
| AIoTDevices | 6.1.6.2.7 | Represents the AIoT device(s) related information. |  |

Table 6.1.6.1-2 specifies data types re-used by the Naiotf\_AIoT service-based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Naiotf\_AIoT service-based interface.

Table 6.1.6.1-2: Naiotf\_AIoT re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AiotArea | 3GPP TS 29.571 [16] | Represents the AIoT Service Area. |  |
| AiotDevPermId | 3GPP TS 29.571 [16] | Represents the permanent identifier of the AIoT Device. |  |
| CommandType | 3GPP TS 29.522 [15] | Represents the type of AIoT command. |  |
| AiotFilteringInformation | 3GPP TS 29.571 [16] | Represents the the filtering information used for identifying the target AIoT device(s). |  |
| ProblemDetails | 3GPP TS 29.571 [16] | Represents error related information. |  |
| RedirectResponse | 3GPP TS 29.571 [16] | Contains redirection related information. |  |
| SupportedFeatures | 3GPP TS 29.571 [16] | Used to negotiate the applicability of optional features. |  |
| Uinteger | 3GPP TS 29.571 [16] | Represents an unsigned integer. |  |
| Uri | 3GPP TS 29.571 [16] | Represents a URI. |  |

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

##### 6.1.6.2.6 Type: AIoTNotif

Table 6.1.6.2.6-1: Definition of type AIoTNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| transId | string | M | 1 | Contains the identifier of the AIoT transaction to which the notification is related. |  |
| devicesRepData | array(DevicesRepInfo) | C | 1..N | Contains the AIoT device(s) related reporting information.(NOTE) |  |
| lastRepInd | boolean | C | 0..1 | Indicates that this is the last reporting from the NF service consumer for the AIoT service operation identified by the "transId" attribute.- "true" indicates that this is the last report.This attribute shall be present only when this is the last reporting from the NF service consumer for the AIoT service operation identified by the "transId" attribute.When present, this attribute shall be set to "true". The presence of this attribute set to the value "false" is forbidden.(NOTE) |  |
|  |  |  |  |  |  |
| NOTE: At least one of these attributes shall be present. |

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

##### 6.1.6.2.8 Type: DevicesRepInfo

Table 6.1.6.2.8-1: Definition of type DevicesRepInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| deviceId | AiotDevPermId | M | 1 | Contains the identifier of the AIoT device to which the reporting information is related. |  |
| readCmdRep | Bytes | C | 1..N | Contains the Read command specific report information for the AIoT device identified by the "deviceId" attribute.This attribute may be present only if the reporting information is related to a Read command operation, i.e., the "commandType" attribute is set to "READ" in the corresponding AIoT Command service operation.(NOTE) |  |
| failureReason | AIoTFailReason | C | 0..1 | Contains the command operation failure reason.(NOTE) |  |
| NOTE: These attributes are mutually exclusive. |

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

##### 6.1.6.3.3 Enumeration: AIoTFailReason

The enumeration AIoTFailReason represents the AIoT failure reason. It shall comply with the provisions defined in table 6.1.6.3.3-1.

Table 6.5.6.3.3-1: Enumeration AIoTFailReason

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| BLOCKED\_BY\_DEVICE | Indicates that the AIoT failure reason is that the AIoT operation was blocked or not allowed by the AIoT device for unspecified reasons. |  |
| PROCESSING\_ERROR\_AT\_DEVICE | Indicates that the AIoT failure reason is that there was an error when processing the AIoT operation at the AIoT device. |  |
| INPUT\_PARAMS\_ERROR\_AT\_DEVICE | Indicates that the AIoT failure reason is that the AIoT operation was blocked by the AIoT device due to incorrect or corrupted input parameters or input data. |  |

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

# A.2 Naiotf\_AIoT API

openapi: 3.0.0

info:

 title: Naiotf\_AIoT Service API

 version: 1.0.0-alpha.3

 description: |

 API for\_AIoT Service.

 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

 All rights reserved.

externalDocs:

 description: 3GPP TS 29.abc V1.0.0; Ambient IoT Function (AIOTF) Services.

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

servers:

 - url: '{apiRoot}/naiotf-aiot/v1'

 variables:

 apiRoot:

 default: https://example.com

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

security:

 - {}

 - oAuth2ClientCredentials:

 - naiotf-aiot

paths:

 /request-inv:

 post:

 summary: Request to perform an AIoT inventory operation.

 operationId: InventoryRequest

 tags:

 - AIoT Inventory Request (custom operation without associated resources)

 security:

 - {}

 - oAuth2ClientCredentials:

 - naiotf-aiot

 - oAuth2ClientCredentials:

 - naiotf-aiot

 - naiotf-aiot:inventory

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: >

 OK. The AIoT inventory request is successfully received and processed, and the requested

 AIoT inventory related information is returned in the response body.

 content:

 application/json:

 schema:

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

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

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

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

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

 '404':

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

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

 callbacks:

 AIoTOperationsNotif:

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

 post:

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '204':

 description: >

 No Content. The AIoT Operations Notification is successfully received and

 acknowledged.

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

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

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

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

 '404':

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

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

 /request-cmd:

 post:

 summary: Request to perform an AIoT command operation.

 operationId: CommandRequest

 tags:

 - AIoT Command Request (custom operation without associated resources)

 security:

 - {}

 - oAuth2ClientCredentials:

 - naiotf-aiot

 - oAuth2ClientCredentials:

 - naiotf-aiot

 - naiotf-aiot:command

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: >

 OK. The AIoT command request is successfully received and processed, and the requested

 AIoT command related information is returned in the response body.

 content:

 application/json:

 schema:

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

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

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

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

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

 '404':

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

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

 callbacks:

 AIoTOperationsNotif:

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

 post:

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '204':

 description: >

 No Content. The AIoT Operations Notification is successfully received and

 acknowledged.

 '307':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/307'

 '308':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/308'

 '400':

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

 '401':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/401'

 '403':

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

 '404':

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

 '411':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/411'

 '413':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/413'

 '415':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/415'

 '429':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/429'

 '500':

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

 '502':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/502'

 '503':

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

 default:

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

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{nrfApiRoot}/oauth2/token'

 scopes:

 naiotf-aiot: >

 Enables to access all the resources and custom operations of the Naiotf\_AIoT API.

 naiotf-aiot:inventory: >

 Enables to access only the InventoryRequest custom operation (Naiotf\_AIoT\_Inventory

 service operation) of the Naiotf\_AIoT API.

 naiotf-aiot:command: >

 Enables to access only the CommandRequest custom operation (Naiotf\_AIoT\_Command

 service operation) of the Naiotf\_AIoT API.

 schemas:

#

# STRUCTURED DATA TYPES

#

 InventoryReq:

 description: Represents the AIoT inventory request.

 type: object

 properties:

 afId:

 type: string

 targetArea:

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

 targetDevices:

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

 numDevices:

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

 notifUri:

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

 suppFeat:

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

 required:

 - afId

 - notifUri

 anyOf:

 - required: [targetArea]

 - required: [targetDevices]

 InventoryResp:

 description: Represents the AIoT inventory response.

 type: object

 properties:

 transId:

 type: string

 suppFeat:

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

 required:

 - transId

 CommandReq:

 description: Represents the AIoT command request.

 type: object

 properties:

 afId:

 type: string

 commandType:

 $ref: 'TS29522\_AIoT.yaml#/components/schemas/CommandType'

 targetArea:

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

 targetDevices:

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

 numDevices:

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

 msgSize:

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

 notifUri:

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

 suppFeat:

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

 required:

 - afId

 - commandType

 - notifUri

 anyOf:

 - required: [targetArea]

 - required: [targetDevices]

 CommandResp:

 description: Represents the AIoT command response.

 type: object

 properties:

 transId:

 type: string

 suppFeat:

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

 required:

 - transId

 AIoTNotif:

 description: Represents the AIoT Operations Notification.

 type: object

 properties:

 transId:

 type: string

 devicesRepData:

 type: array

 items:

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

 minItems: 1

 lastRepInd:

 type: boolean

 enum:

 - true

 description: >

 Indicates that this is the last reporting from the NF service consumer for the AIoT

 service operation identified by the "transId" attribute.

 "true" indicates that this is the last report.

 This attribute shall be present only when this is the last reporting from the NF service

 consumer for the AIoT service operation identified by the transId attribute.

 When present, this attribute shall be set to "true". The presence of this attribute set

 to the value "false" is forbidden.

 required:

 - transId

 anyOf:

 - required: [devicesRepData]

 - required: [lastRepInd]

 AIoTDevices:

 description: Represents the AIoT device(s) related information.

 type: object

 properties:

 devices:

 type: array

 items:

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

 minItems: 1

 filteringInfo:

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

 anyOf:

 - required: [devices]

 - required: [filteringInfo]

 DevicesRepInfo:

 description: Represents the AIoT device(s) related reporting information.

 type: object

 properties:

 deviceId:

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

 readCmdRep:

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

 failureReason:

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

 required:

 - deviceId

 not:

 required: [readCmdRep, failureReason]

#

# SIMPLE DATA TYPES

#

#

# ENUMERATIONS

#

 AIoTFailReason:

 anyOf:

 - type: string

 enum:

 - BLOCKED\_BY\_DEVICE

 - PROCESSING\_ERROR\_AT\_DEVICE

 - INPUT\_PARAMS\_ERROR\_AT\_DEVICE

 - type: string

 description: >

 This string provides forward-compatibility with future extensions to the enumeration

 and is not used to encode content defined in the present version of this API.

 description: |

 Represents the AIoT failure reason.

 Possible values are:

 - BLOCKED\_BY\_DEVICE: Indicates that the AIoT failure reason is that the AIoT operation was

 blocked or not allowed by the AIoT device for unspecified reasons.

 - PROCESSING\_ERROR\_AT\_DEVICE: Indicates that the AIoT failure reason is that there was an

 error when processing the AIoT operation at the AIoT device.

 - INPUT\_PARAMS\_ERROR\_AT\_DEVICE: Indicates that the AIoT failure reason is that the AIoT

 operation was blocked by the AIoT device due to incorrect or corrupted input parameters or

 input data.

#

# Data types describing alternative data types or combinations of data types

#

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