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

**Goteborg, SE, 25th – 29th August, 2025 was C3-253312**

**Source: Huawei, CEWiT, Lenovo, Ericsson**

**Title: Pseudo-CR on completing the definition of the Naiotf\_AIoT\_Command 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 Command request/response body are now completed in stage 2 as per the updates in clauses 6.2.3 and 7.2.3 of TS 23.369. This needs hence to be reflected in the stage 3 definition of the AIoT Command procedure with 3 additional conditional attributes to convey the offset and data length (both applicable for the read and write operations) and the application data to write (applicable only for the write operation).

In addition:

- Additional error handling cases to cover the situations where the target(s) of the AIoT Command request (e.g., target AIoT device(s), filtering information) is/are not supported and/or not allowed and the the AIOTF fails to process the AIoT Command request (e.g., NG- RAN and optionally RAN Reader selection failure).

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

**2. Reason for Change**

- Update the relevant clauses of the service description and API definition and the OpenAPI description for the AIoT Command 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 \* \* \* \*

##### 5.2.2.3.1 General

This service operation is used by an NF service consumer to request to perform an AIoT Command operation at the AIOTF.

The following procedures are supported by the "Naiotf\_AIoT\_Command" service operation:

- AIoT Command Request.

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

##### 5.2.2.3.2 AIoT Command Request

Figure 5.2.2.3.2-1 depicts a scenario where an NF service consumer requests to perform an AIoT Command operation to the AIOTF (see also clause 6.2.3 of 3GPP TS 23.369 [14]).



Figure 5.2.2.3.2-1: AIoT Command Request

1. In order to request to perform an AIoT Command operation, the NF service consumer shall send an HTTP POST request message to the AIOTF targeting the URI of the corresponding custom operation (i.e., "CommandRequest"), with the request body containing the CommandReq data structure.

2a. Upon reception of the Command request from the NF service consumer:

- the AIOTF may perform the AF authorization for AIoT Services procedure as defined in clauses 5.6 and 6.2.2 of 3GPP TS 23.369 [14]; and

- if the AF authorization for AIoT Services procedure is successful and upon successful processing of the request, the AIOTF shall respond to the NF service consumer with an HTTP "200 OK" status code to indicate that the AIoT Command request is successfully received and processed, with the response body containing AIoT Command related information within the CommandResp data structure.

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

- if AF authorization for AIoT Services procedure is not successful, the AIOTF shall reject the request with an HTTP "403 Forbidden" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "AF\_NOT\_AUTHORIZED" application error;

- if the target(s) of the AIoT Command request (e.g., target AIoT device(s), filtering information) is/are not supported and/or not allowed, the AIOTF shall reject the request with an HTTP "403 Forbidden" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "AIOT\_TARGETS\_ERROR" application error; and

- if the AIOTF fails to process the AIoT Command request, the AIOTF shall reject the request with an HTTP "500 Internal Server Error" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "UNSPECIFIED\_FAILURE" application error.

\* \* \* \* 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 |
| 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. |  |
| 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. |  |
| Bytes | 3GPP TS 29.571 [16] | Represents a sequence of bytes. |  |
| 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 \* \* \* \*

##### 6.1.6.2.4 CommandReq

Table 6.1.6.2.4-1: Definition of type CommandReq

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| afId | string | M | 1 | Contains the identifier of the AF that triggered the request. |  |
| commandType | CommandType | M | 1 | Contains the type of the requested command. |  |
| targetArea | AiotArea | C | 0..1 | Contains the target area within which the requested command operation shall apply.(NOTE) |  |
| targetDevices | AIoTDevices | C | 0..1 | Contains the target AIoT device(s) related information.(NOTE) |  |
| numDevices | Uinteger | O | 0..1 | Contains the approximative number of the targeted AIoT device(s). |  |
| msgSize | Uinteger | O | 0..1 | Contains the approximative message size in units of Bytes.This attribute may be present only if the "commandType" attribute is set to "READ". |  |
| offset | Uinteger | C | 0..1 | Contains the offset, expressed in units of bytes.This attribute shall be present only if the "commandType" attribute is set to "READ" or "WRITE":- If the "commandType" attribute is set to "READ", this attribute contains the offset from which to read the application data.- If the "commandType" attribute is set to "WRITE", this attribute contains the offset from which to write the application data. |  |
| length | Uinteger | C | 0..1 | Contains the length of application data, expressed in units of bytes (i.e., byte length).This attribute shall be present only if the "commandType" attribute is set to "READ" or "WRITE":- If the "commandType" attribute is set to "READ", this attribute contains the length of application data to read.- If the "commandType" attribute is set to "WRITE", this attribute contains the length of application data to write. |  |
| data | Bytes | C | 0..1 | Contains the application data to write.This attribute shall be present only if the "commandType" attribute is set to "WRITE". |  |
| notifUri | Uri | M | 1 | Contains the URI via which the AIoT Command operation related notifications shall be delivered. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.1.8.This attribute shall be present only when feature negotiation is required. |  |
| NOTE: At least one of these attributes shall be present. |

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

##### 6.1.6.2.5 Type: CommandResp

Table 6.1.6.2.5-1: Definition of type CommandResp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| transId | string | M | 1 | Contains the identifier of the transaction that is created for the command request. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.1.8.This attribute shall be present only when feature negotiation is required. |  |

\* \* \* \* 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.

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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

 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'

 offset:

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

 length:

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

 data:

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

 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

 devices:

 type: array

 items:

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

 minItems: 1

 lastRepInd:

 type: boolean

 default: false

 description: >

 Contains the Last Report Indication, i.e., indicates whether this is the last reporting

 from the NF service consumer.

 true indicates that this is the last report.

 false indicates that this is not the last report.

 The default value is false when this attribute is omitted.

 suppFeat:

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

 required:

 - transId

 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]

#

# SIMPLE DATA TYPES

#

#

# ENUMERATIONS

#

#

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

#

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