**3GPP TSG CT WG3 Meeting #138 C3-246220**

**Orlando, US, 18 – 22 November, 2024 (revision of C3-245506)**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **29.522** | **CR** | **1400** | **rev** | **2** | **Current version:** | **19.0.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | UAVFlightAssistance API and data model definition |
|  |  |
| ***Source to WG:*** | Huawei, Ericsson, Nokia |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | UAS\_Ph3 |  | ***Date:*** | 2024-10-25 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *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:*** | In clause 4.4.1.1.3 of TS 23.256, the Nnef\_UAVFlightAssistance service was defined for the USS changeover scenario. This CR proposes to define the data model and API of this service. |
|  |  |
| ***Summary of change:*** | Define the data model and API of Nnef\_UAVFlightAssistance service. |
|  |  |
| ***Consequences if not approved:*** | The stage 2 requirement is missing in stage 3. |
|  |  |
| ***Clauses affected:*** | 5.38(new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.256 CR 0141 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR does not impact the OpenAPI file. |
|  |  |
| ***This CR's revision history:*** | **Rev 2:*** Remove the Editor’s Note for GET method from clause 5.38.2.
* Update the descriptions of some attributes and data types.
* Add "suppFeat" attribute in PlannedFlightPaths data type.
* Add requested purpose as added in TS 23.256 CR 0141.
 |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st Change \*\*\*

## 5.38 UAVFlightAssistance API

Editor's note: The definition of the OpenAPI file and service descriptions will be added once the data model definition is stable.

### 5.38.1 Introduction

The UAVFlightAssistance service shall use the UAVFlightAssistance API.

The API URI of UAVFlightAssistance API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [2], i.e.:

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

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].

- "apiName" shall be set to "3gpp-uav-flight-assistance".

- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above API URI.

### 5.38.2 Resources

This clause describes the structure for the Resource URIs as shown in Figure 5.38.2-1 and the resources and HTTP methods used for the UAVFlightAssistance API.



Figure 5.38.2-1: Resource URI structure of the UAVFlightAssistance API

Table 5.38.2-1 provides an overview of the resources and applicable HTTP methods.

Table 5.38.2-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI (relative path under API URI) | HTTP method or custom operation | Description(service operation) |
| UAV Flight Assistance Configurations | /{afId}/configurations | POST | Create a new UAV Flight Assistance Configuration. |
| Individual UAV Flight Assistance Configuration | /{afId}/configurations/{configurationId} | PUT | Update an existing "Individual UAV Flight Assistance Configuration" resource. |
| DELETE | Delete an existing "Individual UAV Flight Assistance Configuration" resource. |

#### 5.38.2.2 Resource: UAV Flight Assistance Configurations

##### 5.38.2.2.1 Introduction

This resource allows an AF to create a new UAV Flight Assistance Configuration resource for a given AF.

##### 5.38.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-uav-flight-assistance/<apiVersion>/{afId}/configurations**

This resource shall support the resource URL variables defined in table 5.38.2.2.2-1.

Table 5.38.2.2.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId | string | Identifier of the AF. |

##### 5.38.2.2.3 Resource Methods

###### 5.38.2.2.3.1 POST

This method enables an AF to request the creation of a new UAV Flight Assistance Configuration at the NEF.

This method shall support the URI query parameters specified in table 5.38.2.2.3.1-1.

Table 5.38.2.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 5.38.2.2.3.1-2 and the response data structures and response codes specified in table 5.38.2.2.3.1-3.

Table 5.38.2.2.3.1-2: Data structures supported by the POST request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| PlannedFlightPaths | M | 1 | Representation of UAV Flight Assistance Configuration to be created in the NEF. |

Table 5.38.2.2.3.1-3: Data structures supported by the POST response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Responsecodes | Description |
| PlannedFlightPaths | M | 1 | 201 Created | Successful case. A representation of the created Individual UAV Flight Assistance Configuration is returned.The URI of the created resource shall be returned in an HTTP "Location" header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.38.2.2.3.1-4: Headers supported by the 201 response code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP response header | Data type | P | Cardinality | Description |
| Location | string | M | 1 | The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-uav-flight-assistance/<apiVersion>/{afId}/configurations/{configurationId} |

#### 5.38.2.3 Resource: Individual UAV Flight Assistance Configuration

##### 5.38.2.3.1 Introduction

This resource represents an Individual UAV Flight Assistance Configuration managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

##### 5.38.2.3.2 Resource Definition

Resource URL: **{apiRoot}/3gpp-uav-flight-assistance/<apiVersion>/{afId}/configurations/{configurationId}**

This resource shall support the resource URI variables defined in table 5.38.2.3.2-1.

Table 5.38.2.3.2-1: Resource URL variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId | string | Identifier of the AF. |
| configurationId | string | Identifier of the configuration. |

##### 5.38.2.3.3 Resource standard methods

###### 5.38.2.3.3.1 PUT

This method enables an AF to update an existing Individual UAV Flight Assistance Configuration resource at the NEF.

This method shall support the URI query parameters specified in table 5.38.2.3.3.1-1.

Table 5.38.2.3.3.1-1: URI query parameters supported by the PUT method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures specified in table 5.38.2.3.3.1-2 and the response data structures and response codes specified in table 5.38.2.3.3.1-3.

Table 5.38.2.3.3.2-1: Data structures supported by the PUT request body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| PlannedFlightPaths | M | 1 | Parameters to update the Individual UAV Flight Assistance Configuration resource. |

Table 5.38.2.3.3.1-3: Data structures supported by the PUT response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| PlannedFlightPaths | M | 1 | 200 OK | The Individual UAV Flight Assistance Configuration resource was updated successfully and a representation of the created resource is returned in the response body. |
| n/a |  |  | 204 No Content | The Individual UAV Flight Assistance Configuration resource was successfully updated and no content is to be returned in the response body. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF.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 target URI located in an alternative NEF.Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.38.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.38.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

###### 5.38.2.3.3.2 DELETE

This method enables an AF to request the deletion of an Individual UAV Flight Assistance Configuration resource at the NEF.

This method shall support the URI query parameters specified in table 5.38.2.3.3.2-1.

Table 5.38.2.3.3.2-1: 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 5.38.2.3.3.2-2 and the response data structures and response codes specified in table 5.38.2.3.3.2-3.

Table 5.38.2.3.3.2-2: Data structures supported by the DELETE request body on this resource

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

Table 5.38.2.3.3.2-3: Data structures supported by the DELETE response body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | ResponseCodes | Description |
| n/a |  |  | 204 No Content | Successful response. The Individual UAV Flight Assistance Configuration resource was successfully deleted. |
|  |  |  | 307 Temporary Redirect | Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF.Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4]. |
|  |  |  | 308 Permanent Redirect | Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF.Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: The mandatory HTTP error status code for the DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

Table 5.38.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Table 5.38.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located in an alternative NEF. |

Editor's note: Whether PATCH method is needed or not is FFS.

### 5.38.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

### 5.38.4 Notifications

5.38.4.1 General

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

**Table 5.38.4.1-1: Notifications overview**

|  |  |  |  |
| --- | --- | --- | --- |
| **Notification** | **Callback URI** | **HTTP method or custom operation** | **Description****(service operation)** |
| UAV Flight Assistance Notification  | {notifUri} | POST | Enable the NEF to notify an AF of UAV Flight Assistance information. |

5.38.4.2 UAV Flight Assistance information Notification

5.38.4.2.1 Description

This Notification is used by the NEF to report UAV Flight Assistance information to the AF.

5.38.4.2.2 Target URI

The Callback URI **“{notifUri}”** shall be used with the callback URI variables defined in table 5.38.4.2.2-1.

**Table 5.38.4.2.2-1: Callback URI variables**

|  |  |
| --- | --- |
| **Name** | **Definition** |
| notifUri | Callback URI provided by the AF during UAV Flight Assistance Configuration creation or modification. |

5.38.4.2.3 Operation Definition

This method shall support the request data structures specified in table 5.38.4.2.3-1 and the response data structures and response codes specified in table 5.38.4.2.3-2.

**Table 5.38.4.2.3-1: Data structures supported by the POST Request Body on this resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Description** |
| UAVFlightAssistNotif | M | 1 | Represents the notification on UAV Flight Assistance information. |

**Table 5.38.4.2.3-2: Data structures supported by the POST Response Body on this resource**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data type** | **P** | **Cardinality** | **Response****codes** | **Description** |
| NotifyResponse | M | 1 | 200 OK | The receipt of the notification is acknowledged. |
| n/a |  |  | 204 No Content | The notification is successfully received and acknowledged. |
| 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 POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |

**Table 5.38.4.2.3-3: Headers supported by the 307 Response Code on this resource**

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

**Table 5.38.4.2.3-4: Headers supported by the 308 Response Code on this resource**

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

### 5.38.5 Data Model

#### 5.38.5.1 General

This clause specifies the application data model supported by the UAVFlightAssistance API. Table 5.38.5.1-1 specifies the data types defined for the UAVFlightAssistance API.

Table 5.38.5.1-1: UAVFlightAssistance API specific Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Clause defined | Description |
| FlightPathInfo | 5.38.5.2.4 | The information of each segment that constitutes the single flight path. |
| NotifyResponse | 5.38.5.2.6 | Represents the response to the notification. |
| PlannedFlightPaths | 5.38.5.2.2 | Represents the planned flight path(s). |
| RequestPurpose | 5.38.5.3.4 | Represents the purpose of the request. |
| SingleFlightPath | 5.38.5.2.3 | Represents the single flight path. |
| UAVFlightAssistNotif | 5.38.5.2.5 | Represents the UAV status notification. |
| UavStatus | 5.38.5.3.3 | The status of the UAV. |

Table 5.38.5.1-2 specifies data types re-used by the UAVFlightAssistance API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the UAVFlightAssistance API.

Table 5.38.5.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |  |
| LocationArea5G | 3GPP TS 29.122 [4] | Represents location area information. |  |
| TimeWindow | 3GPP TS 29.122 [4] | Represents a time window. |  |
| Uinteger | 3GPP TS 29.571 [8] | Represents an unsigned integer. |  |

#### 5.38.5.2 Structured data types

##### 5.38.5.2.1 Introduction

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

##### 5.38.5.2.2 Type: PlannedFlightPaths

Table 5.38.5.2.2-1: Definition of type PlannedFlightPaths

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| uavId | Gpsi | M | 1 | Identifies the UAV. |  |
| reqPurpose | RequestPurpose | M | 1 | Contains the purpose of the request. |  |
| notifUri | Uri | M | 1 | Notification URI for USS changing reporting. |  |
| notifId | string | O | 0..1 | Indicates the Notification Correlation ID. |  |
| flightPaths | array(SingleFlightPath) | O | 1..N | Indicates the list of flight paths. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features used as defined in clause 5.38.6.This attribute shall be present only when feature negotiation needs to take place. |  |

##### 5.38.5.2.3 Type: SingleFlightPath

Table 5.38.5.2.3-1: Definition of type SingleFlightPath

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| pathInfo | array(FlightPathInfo) | M | 1..N | Each element contains the flight path information for each segment that constitutes the single flight path. |  |

##### 5.38.5.2.4 Type: FlightPathInfo

Table 5.38.5.2.4-1: Definition of type FlightPathInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| areaInfo | LocationArea5G | M | 1 | Indicates the area information for UAV. |  |
| uavSpeed | Uinteger | O | 0..1 | Indicates the speed of the UAV.  |  |
| height | Uinteger | O | 0..1 | Indicates the flight height of the UAV. |  |
| timeSchedule | TimeWindow | O | 0..1 | Indicates the time schedule for crossing/spending at each area indicated by the "areaInfo" attribute. |  |

##### 5.38.5.2.5 Type: UAVFlightAssistNotif

Table 5.38.5.2.5-1: Definition of type UAVFlightAssistNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notifId | string | O | 0..1 | Indicates the Notification Correlation ID. |  |
| uavStatus | UavStatus | M | 1 | Indicates the status of the UAV. |  |
| borderPoint | LocationArea5G | O | 0..1 | Indicates the border-crossing point.  |  |

##### 5.38.5.2.6 Type: NotifyResponse

Table 5.38.5.2.6-1: Definition of type NotifyResponse

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| chgCompleteInd | boolean | M | 1 | This attribute is used to indicate whether the USS changeover is completed successfully.When present, it shall be set as follows:- true: USS changeover is completed successfully;- false (default): USS changeover failed. |  |

Editor's note: The support of sending the response of the notification is FFS.

#### 5.38.5.3 Simple data types and enumerations

##### 5.38.5.3.1 Introduction

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

##### 5.38.5.3.2 Simple data types

The simple data types defined in table 5.38.5.3.2-1 shall be supported.

Table 5.38.5.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
| n/a |  |  |  |

##### 5.38.5.3.3 Enumeration: UavStatus

Table 5.38.5.3.3-1: Enumeration UavStatus

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| LEAVING | The status of the UAV is leaving an area (e.g. TA/Cell) which is part of the planned flight path. |  |
| ENTERING | The status of the UAV is entering an area (e.g. TA/Cell) which is part of the planned flight path. |  |
| DEVIATING | The status of the UAV is deviating an area (e.g. TA/Cell) which is part of the planned flight path. |  |

##### 5.38.5.3.4 Enumeration: RequestPurpose

Table 5.38.5.3.4-1: Enumeration RequestPurpose

The enumeration RequestPurpose represents the the purpose of the retrieved information.

|  |  |
| --- | --- |
| Enumeration value | Description |
| USS\_CHANGEOVER | Indicates the purpose of the request is for USS changeover. |
| PRE\_FLIGHT\_PLANNING | Indicates the purpose of the request is for pre-flight planning. |
| IN\_FLIGHT\_MONITORING | Indicates the purpose of the request is for in flight monitoring. |

### 5.38.6 Used Features

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

Table 5.38.6-1: Features used by UAVFlightAssistance API

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

### 5.38.7 Error handling

#### 5.38.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [4]. In addition, the requirements in the following clauses shall apply.

#### 5.38.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the UAVFlightAssistance API.

#### 5.38.7.3 Application Errors

The application errors defined for the UAVFlightAssistance API are listed in table 5.38.7.3-1.

Table 5.38.7.3-1: Application errors

|  |  |  |
| --- | --- | --- |
| Application Error | HTTP status code | Description |
|  |  |  |

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