**3GPP TSG-SA WG6 Meeting #52-bis-e S6-23gggg**

**e-meeting, 11th – 20th January 2023 (revision of S6-23xxxx)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **-** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HELP***](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 | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Addition of procedures for DAA configuration and support by the UAE-layer at DAA | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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 can be 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:*** | | Addition of procedures for DAA configuration and support by the UAE-layer at DAA is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The addition of procedures for DAA configuration and support by the UAE-layer at DAA is added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The addition of procedures for DAA configuration and support by the UAE-layer at DAA will still be missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.7 (new), 7.7.1 (new), 7.7.2 (new), 7.7.2.1 (new), 7.7.2.2 (new), 7.7.2.3 (new), 7.7.2.3.1 (new), 7.7.2.3.2 (new), 7.7.3 (new), 7.7.3.1 (new), 7.7.3.2 (new), 7.7.3.3 (new), 7.7.3.4 (new), 7.7.3.5 (new), 7.7.3.6 (new), 7.7.3.7 (new), 7.7.3.8 (new), 7.7.3.9 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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's revision history:*** | |  | | | | | | | | |

## 7.7 UAE layer support for DAA services and applictions

### 7.7.1 General

This feature enables the UAS application enablement services for assisting the UAS application with DAA handling. In particular, the UAE layer provides support for the following operations:

- Support of the registration of the UAE clients DAA capability to the UAE server as described in clause 7.1a.

- Support the distribution of the DAA policies from the UAS application specific server to the UAE server and the UAE client, as described in clause 7.7.2.1 and clause 7.7.2.2.

- Assist and coordinate support the DAA handling process in the UAS application, as described in clause 7.7.2.3.

A DAA policy has two components:

1. The DAA application policy. This policy is used by the application and transparently provided from the UAS application specific server to the UAS client. The DAA application policy shall be timestamped and stored at the UAE server.
2. The DAA support policy. This policy is used by the UAE layer, and contains information pertaining to the UAE layer. This set of parameters are used by the UAE layer to provide support for DAA applications.

NOTE: The Detect and Avoid operations performed by the UAS application layer are out of scope of the present specification.

### 7.7.2 Procedures

#### 7.7.2.1 Management of DAA support configuration

Figure 7.7.2.1-1 illustrates the DAA support management procedure where the UAE server receives an application request for managing the DAA configuration parameters from the UAS application specific server.

Pre-condition:

- The UAV has received its UAS ID from the UAS application specific server.

- The UAV has performed the UAS UE registration procedure.



Figure 7.7.2.1-1: DAA support management procedure

1. The UAS application specific server sends to the UAE server a DAA support management request. The request includes the UAV (UAE client) identifier and the DAA policies.

2. The UAE server shall send to the UAS application specific server a DAA support management response with a positive or negative acknowledgement of the request.

3. The UAE server shall execute the DAA configuration according to clause 7.7.2.2.

4. After execution of DAA configuration, the UAE server shall send a DAA support management complete to the UAS application specific server .

#### 7.7.2.2 DAA support configuration procedure

Figure 7.7.2.2-1 illustrates the DAA support configuration procedure. This procedure enables the configuration of the UAE client, based on a request from UAS application specific server to configure DAA policies to the UAE client.

Pre-conditions:

1. The UAS UEs are connected to 5GS and authenticated and authorized by UAS application specific server as specified in clause 5.2 of 3GPP TS 23.256 [4].

2. UAE server has established a UAE session with the respective UAE clients as the UAE clients are successfully registered to the UAE server.

3. UAE server has performed the DAA support management procedure according to clause 7.7.2.1.



Figure 7.7.2.2-1: DAA support configuration procedure

1. The UAE server shall send a DAA support configuration request to the UAE client. The UAE client receives a DAA support configuration request from the UAE server that includes the DAA configuration parameters.

2. The UAE client shall store or remove the DAA configuration parameters as per the information received in step 1.

3. The UAE client shall send a DAA support configuration response to the UAE server.

#### 7.7.2.3 UAE layer support for DAA applications

##### 7.7.2.3.1 Client initiated DAA support

Figure 7.7.2.3.1-1 illustrates the procedure with client initiated DAA support.

Pre-conditions:

1. UAE server has provided DAA policies to the UAE client.



Figure 7.7.2.3.1-1: Client initiated DAA support

1. The UAE layer has, e.g. based on the DAA support policy and/or information provided by the U2X layer, detected UAVs in proximity.

2. The UAE client shall send a DAA client event information (i.e., U2X layer detected information) to the UAE server indicating a detected flight path conflict with one or more UAVs in proximity.

If the UAE client considers an emergency situation (e.g., due to lack of response from the UAE server and/or UAS application specific server), the UAE client shall inform the application layer (i.e., UAS client) based on the DAA support policy.

3. The UAE server shall record the DAA client event information with current timestamp. UAE server shall request UAE client location information from the SEAL location services. The UAE server shall record the received location information with current timestamp. The UAE server shall send the DAA client event information to the UAS application specific server.

NOTE: The UAE server needs to provide trusted and timely network-based location information to the USS which can be used as critical input for USS to handle or record DAA situations. The USS can provide deconflicting instructions to the UAV based on provided location information or handle properly potential flight path deviation due to DAA that is deconflicted locally.

4. The UAS application specific server provides a DAA client event information acknowledge to the UAE server. The UAS application specific server may include more information in the acknowledgement (e.g., other UAVs detected information by network).

5. The UAE server shall send a DAA client event information acknowledge to the UAE client, and the UAE client shall provide the application layer (i.e. UAS client) with the consolidated information from the UAS application specific server.

##### 7.7.2.3.2 Server initiated DAA support

Figure 7.7.2.3.2-1 illustrates the procedure with UAS application server initiated DAA support.

Pre-conditions:

1. UAS application specific server has provided DAA configuration parameters to the UAE client.



Figure 7.7.2.3.2-1: Server initiated DAA support

1. The UAS application specific server has discovered a conflict related to DAA (e.g., presence of other UAVs in proximity of the UAV), and will provide the UAE client with relevant information.

NOTE: An example of such a conflict is that an UAV with U2X capabilities, see clause 7.7.2.3.1 step 1, provides information about objects in proximity to the UAS application specific server. The UAS application specific server can, based on this, e.g. provide information to one or more surrounding UAVs that does not have U2X capability.

2. The UAS application specific server sends a DAA server event information to the UAE server which includes information of other UAVs in the proximity of the UAV. The UAE server shall verify that the request is authorized before sending the DAA support information to the UAE client.

3. The UAE server shall send a DAA server event information to the UAE client. Coordination with Real-Time UAV connection status monitoring and location reporting is performed by the UAE server, see clause 7.5 and 3GPP TS 23.434 [5], clause 9.3.

Further, UAE client shall provide the application layer with the consolidated information from the UAS application specific server.

4. The UAE client shall send to the UAE server a DAA server event information acknowledge.

5. The UAE server shall send a DAA server event information acknowledge to the UAS application specific server.

### 7.7.3 Information flows

#### 7.7.3.1 DAA support management request

Table 7.7.3.1-1 describes the information flow DAA support management request from the UAS application specific server to the UAE server.

Table 7.7.3.1-1: DAA support management request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| UASS ID | M | Identity of the UAS application specific server which requests the DAA management. This ID can be the USS identifier, when the UAS application specific server is the USS. |
| UAS ID | M | The identification of the UAS for which the DAA support management request applies. This could be in form of identifier for the UAS, e.g group ID; or collection of individual identifiers for the UAV and UAV-C, e.g. CAA level UAV ID, GPSI |
| The DAA application policy container (see NOTE 1) | O | The DAA application policy container consists of the application policy for DAA. |
| The DAA support policy container (see NOTE 2) | O | The DAA support policy container consists of the requirements and policy for DAA. |
| > Emergency action | M | Action by the UAE client if lack of response from the UAE server and/or UAS application specific server) at DAA client support information. |
| NOTE 1: The DAA application policy container is transparently forwarded to the UAS application. Modifications or removal of content in the DAA application policy is the responsibility of the application layer.  NOTE 2: If DAA support policy container is not included for a USS, it indicates removal of the DAA support policy related information for this USS.  NOTE 3: A complete list of parameters for the DAA support policy is specified by 3GPP TS 24.257 [13]. | | |

#### 7.7.3.2 DAA support management response

Table 7.7.3.2-1 describes the information flow DAA support management response from the UAE server to the UAS application specific server.

Table 7.7.3.2-1: DAA support management response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The positive or negative result of the DAA support management request. |

#### 7.7.3.3 DAA support management complete

Table 7.7.3.3-1 describes the information flow DAA support management complete from the UAE server to the UAS application specific server.

Table 7.7.3.3-1: DAA support management complete

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The positive or negative result of provision of the DAA application policy to the UAS application. |

#### 7.7.3.4 DAA support configuration request

Table 7.7.3.4-1 describes the information flow DAA support configuration request from the UAE server to the UAE client.

Table 7.7.3.4-1: DAA support configuration request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| UAS ID | M | The identification of the UAS for which the DAA management request applies. This could be in form of identifier for the UAS, e.g group ID; or collection of individual identifiers for the UAV and UAV-C, e.g. CAA level UAV ID, GPSI |
| The DAA application policy container (see NOTE 1) | O | The DAA application policy container consists of the application policy for DAA. |
| The DAA support policy container (see NOTE 2) | O | The DAA support policy container consists of the requirements and policy for DAA. |
| > Emergency action | M | Action by the UAE client if lack of response from the UAE server and/or UAS application specific server) at DAA client support information. |
| NOTE 1: The DAA application policy container is transparently forwarded to the UAS application. Modifications or removal of content in the DAA application policy is the responsibility of the application layer.  NOTE 2: If DAA support policy container is not included for a USS, it indicates removal of the DAA support policy related information for this USS.  NOTE 3: A complete list of parameters for the DAA support policy is specified by 3GPP TS 24.257 [13]. | | |

#### 7.7.3.5 DAA support configuration response

Table 7.7.3.5-1 describes the information flow DAA support configuration response from the UAE client to the UAE server.

Table 7.7.3.5-1: DAA support configuration response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | The positive or negative result of provision of the DAA application policy to the UAS application. |

#### 7.7.3.6 DAA client event information

Table 7.7.3.6-1 describes the information flow DAA client event information from the UAE client to the UAE server and from the UAE server to the UAS application specific server.

Table 7.7.3.6-1: DAA client event information

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| UAS ID | M | The identification of the UAS for which the DAA client support information applies. This could be in form of identifier for the UAS, e.g group ID; or collection of individual identifiers for the UAV and UAV-C, e.g. CAA level UAV ID, GPSI |
| UAE layer detected information |  | List of UASes where e.g. U2X layer has detected possible flight path conflict. |
| > UAS identity | O | The identification of an U2X-UAS where U2X layer has detected possible flight path conflict |
| > Location information | O | Location of an U2X-UAS where U2X layer has detected possible flight path conflict. |

#### 7.7.3.7 DAA client event information acknowledge

Table 7.7.3.7-1 describes the information flow DAA client event information acknowledge from the UAS application specific server to the UAE server and from the UAE server to the UAE client.

Table 7.7.3.7-1: DAA client event information acknowledge

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| UAS ID | M | The identification of the UAS for which the DAA client support information acknowledge applies. This could be in form of identifier for the UAS, e.g group ID; or collection of individual identifiers for the UAV and UAV-C, e.g. CAA level UAV ID, GPSI |
| UAE layer detected information |  | List of UASes where the UAS application specific server has confirmed possible flight path conflict. |
| > UAS identity | O | The identification of an UAS where UAS application specific server has confirmed possible flight path conflict. |
| > Location information | O | Location of an UAS where UAS application specific server has confirmed possible flight path conflict. |

#### 7.7.3.8 DAA server event information

Table 7.7.3.8-1 describes the information flow DAA server event information from the UAS application specific server to the UAE server and from the UAE server to the UAE client.

Table 7.7.3.8-1: DAA server event information

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| UAS ID | M | The identification of the UAS for which the DAA server support information applies. This could be in form of identifier for the UAS, e.g group ID; or collection of individual identifiers for the UAV and UAV-C, e.g. CAA level UAV ID, GPSI |
| UAE layer detected information |  | List of UASes where the UAS application specific server has confirmed possible flight path conflict. |
| > UAS identity | O | The identification of an UAS where UAS application specific server has confirmed possible flight path conflict. |
| > Location information | O | Location of an UAS where UAS application specific server has confirmed possible flight path conflict. |

#### 7.7.3.9 DAA server event information acknowledge

Table 7.7.3.9-1 describes the information flow DAA server event information acknowledge from the UAE client to the UAE server and from the UAE server to the UAS application specific server.

Table 7.7.3.9-1: DAA server event information acknowledge

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Reason | M | Acknowledgement of DAA server event information. |

## \* \* \* End of Change \* \* \*