**[R19 FS\_UAS\_Ph3] Pre-SA2#164 NWM Discussion for KI#1 - Version 0.0.1**

**SA2**

[**https://nwm-trial.etsi.org/#/documents/8895**](https://nwm-trial.etsi.org/#/documents/8895)

# 1 Introduction

**As a result of SA2#163 meeting (May 2024), TR 23.700-59 including KI#1 conclusions was sent to SA#104 for Information. After SA#104 (June 2024), TR 23.700-59v1.0.0 is available.**

**As a result of SA#104 (June 2024), WID ”Phase 3 for UAS, UAV and UAM” including the following KI#1 objective was approved (SP-240997).**

* **WT#1:** Enhance NEF services to support service exposure and interactions between MNOs and UTM functions for supporting the following:
* Pre-mission flight planning and in-mission flight monitoring for UAV UEs.
* Support enabling USS/UTM to request NEF assistance for pre-mission flight planning and in-mission flight monitoring by enhancing NEF services.
* Support enabling USS/UTM to request QoS Sustainability Analytics containing the UAV UE flight path information defined as 3D location waypoints.
* C2 communication reliability.
* Capture how to reuse the existing redundant transmission mechanisms such as redundant PDU Sessions, redundant user plane paths for C2 communication reliability as Informative Annex in TS 23.256.
* The scenario of multiple USS serving different geographical areas corresponding to the UAV UE flight path.
* Support a changeover from one USS to another USS for UAV UE assisted by 5GC.

***Please provide you feedback by July 26th EoB.***

# 2 Collecting companies view related to KI#1

# 2.1 KI#1 (NEF service enhancements) - Flight planning/monitoring

# 2.1.1 Companies View related to KI#1 - Flight planning/monitoring

**Question#1-1:** For NEF Assist Pre-mission Flight Planning, do you think if any more information NEF can generate from existing available information as assistance information ? (e.g. the QoS can’t be satisfied at specific location (e.g. waypoints/geographical area) and the time interval that cannot be used for a fight route according to the QoS Sustainability Analytics)

**Feedback Form 1: Feedback on Question#1-1**

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| **1 – Ericsson LM**  We have not identified any but we are open to hear specifics and how such input may be used |
| **2 – LG Electronics France** Not needed.  We believe that according to the following conclusion captured in clause 8.1.1, NEF can subscribe/request QoS Sustainability Analytics in Step 9 of Figure 6.1.3.1-1 in addition to Movement Behaviour Analytics, and consider QoS Sustainability Analytics as well to generate assistance information for pre-mission flight planning (e.g. the best matched route or potential flight route(s)) in Step 11 of Figure 6.1.3.1-1. So, no additional/separate information needs to be generated by NEF as assistance information.  *- Solution#1 with necessary update is considered for developing a framework for NEF-assisted pre-mission flight planning and in-mission flight monitoring by a 3GPP network. However, Solution#1 can be complemented with the following aspects from other solution: the use of QoS Sustainability analytics from Solution#3. In detail, the following aspects can be considered for the update of Solution#1 and complemented with Solution#3.* |
| **3 – Huawei Technologies France**  not sure how to interprete the question texts ”if any more information NEF can generatefrom**existing available information** as assistance information ?” does it mean NEF can only provide (pre-)R18 information to USS?  However, TR conclusion says ”e.g. the assistance information **may be the best matched route among the ones provided from the USS/UTM**, or **potential flight route(s)** if candidate flight route(s) is not provided from the USS/UTM.” These two information are NOT (pre)rel-18 information but new (R19) information.  It seems the TR conclusion means ”yes” to this quesion already. |
| **4 – CATT**  We support to generate information “the QoS can’t be satisfied at specific location (e.g. waypoints/geographical area) and the time interval that cannot be used for a fight route” as assistance information.  Current conclusion states “the assistance information may be …. potential flight route(s) if candidate flight route(s) is not provided from the USS/UTM”. It means the NEF has to plan the fight route on behalf of USS/UTM, which is beyond NEF’s functionality. The NEF shoud be only responsible to assist USS for flight planning.  In our understanding, if the flight route(s) provided by USS can’t be matched, then based on the QoS sustainability analytics (e.g. the output of “QoS Sustainability” predictions” with information Applicable Area, Applicable Time Period, Crossed Reporting Threshold), the NEF can determine that requested QoS can’t be satisfied at specific location (e.g. via a translation from TAIs/Cell IDs to waypoints) and time |
| interval for the provided fight route. And this information can be exposed to USS/UTM to assist the replanning of flight route (e.g. avoid planning a waypoint at specific location and time interval that the QoS can’t be satisfied). |
| **5 – Samsung R&D Institute India**  Existing conclusion is enough |

# 2.2 KI#1 (NEF service enhancements) - Multiple USS

# 2.2.1 Companies View related to KI#1 - Multiple USS

**Question#1-2:** Regarding ”The USS(s) supporting multiple USS feature are capable of handling the same

CAA Level UAV ID for the UAV across source and target USSs.” captured in clause 8.1.2, is there any issue ?

**Feedback Form 2: Feedback on Question#1-2**

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| **1 – QUALCOMM Europe Inc. - Italy**  Some companies raised the potential issues that a USS may not be able to support the CAA-Level UAV ID assigned by another USS. This is not only an artificial issue, it is preposterous. Since the area of service of two USS will be adjacent and may even overlap, if the CAA-Level UAV ID of an UAV UE cannot be handled by another USS, it means a USS may receive information for UAV UEs that it cannot recognize or handle. Moreover, if the problem indeed existed, then there could be situations where two UAV UEs, handled by two adjacent USS, could be assigned the same CAA-Level UAV ID, thus creating conflicts in UTM mechanisms. Clearly, this has not been thought through, and has been raised as an artificial issue to push for specific unnecessary mechanisms.  The format of the CAA-Level UAV ID is to be defined by global regulatory bodies like ICAO, or delegated to RTCA, and can easily be defined to be applicable globally, after all it is a string. Inter-USS communications being defined e.g. in GUTMA already allow an USS to retrieve information about a UAV from another USS, thus even if an USS does not have all the information associated with a CAA-Level UAV ID, it can retrieve it from another USS. Again, the issue is bogus and if contributors took the time to actually read the USS mechanisms being standardized by global bodies, they would realize there is absolutely no issue.  Finally, 3GPP needs to stop wasting time discussing aspects that are outside the scope of 3GPP. the format, handling, and authentication of CAA-Level UAV ID has been left to bodies outside 3GPP by design since release 17, so let’s stop wasting time focusing on aspects that are not in the scope of our work. |
| **2 – Ericsson LM**  No, as CAA Level UAV ID includes information about UAV’s serial number, and it is meant to be used by UTM actors (including USS) for identification. Moreover, it embeds mechanisms available to entities outside the 3GPP system to resolve a CAA Level UAV ID identification and discover the USS handling |
| for the respective UAV. If the target USS has some issues with such handling, the USS could contact the source USS and ask for assistance via means outside the 3GPP scope. |
| **3 – LG Electronics France**  No issue.  We support view from Qualcomm and Ericsson. |
| **4 – CATT**  No issue.  How to gurantee ”The USS(s) supporting multiple USS feature are capable of handling the same CAA  Level UAV ID for the UAV across source and target USSs.” is out of 3GPP scope. |
| **5 – Huawei Technologies France** there is an issue.  It is clearly mentioned CAA-level UAV ID can be allocated within a USS domain. Thus it is questionable whether the CAA-level UAV ID can be used in another USS domain. The potential technical issues are e.g. how to deal with the conflict of the CAA-level UAV ID allocated by different domain? how the USS use the CAA-level UAV ID for authentication / authorization? The latter issue needs coordination with SA3 WG.  Some companies assume the issues listed should be addresses by other SDO /UAV organization, which might be true. But, we need to have clear information from other SDO /UAV organization what the solutions for these issues. We recommend companies who is familiar with the area please provide relevant information. |
| **6 – Samsung R&D Institute India**  Agree with others that CAA-Level-UAV ID is unique for an UAV . Its like SUPI for the UE . |

**Question#1-3:** Do you think that CAA Level ID change during USS changeover needs to be supported and if so why ?

**Feedback Form 3: Feedback on Question#1-3**

**1 – QUALCOMM Europe Inc. – Italy**

Since rel. 17 and the introduction of UUAA, the CAA-Level UAV ID can be modified by the USS (i.e. a new one issued) every time the UUAA procedure is performed. It is up to UTM policies and procedures to decide when and why to assign a new CAA-Level UAV ID to the UAV UE. Therefore, change of CAALevel UAV ID when the USS changes is already supported without the need for any additional work. Whether such change will happen or not depends on regional UTM policies and procedures defined for specific USSes outside of 3GPP. 3GPP does not require any time wasted on discussing this.

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| **2 – Ericsson LM**  No, as indicated in the previous question the reasoning behind. |
| **3 – LG Electronics France**  Change of CAA-Level UAV ID is already supported as described below in TS 23.256. Therefore, we don’t think any specific/dedicated mechanism to support change of CAA-Level UAV ID during USS changeover is needed.  *”The aviation domain may allocate a new CAA-level UAV Identity for the UAV at any time.”* |
| **4 – CATT**  See answer above. |
| **5 – Huawei Technologies France** it is true that change of CAA-Level UAV ID is already supported as described below in TS 23.256.  But in previous release during the UAV flight there is always the same USS connected to the UAV. It means the change of the CAA-level UAV ID is also responsible by the USS.  However, the UAV changeover involves two USS, source and target. The change of CAA-level UAV may be necessary due to the target USS cannot understand the CAA-level UAV ID used in source USS domain, and cannot invoke the subsequent UAV authentication and authorization.  At lease the motivation to change CAA-level UAV ID is different from the existing design. |
| **6 – Samsung R&D Institute India**  There won’t be any change to CAA-Level-UAV ID just because USS is being changed. We don’t see this an issue, |

**Question#1-4:** Multiple USSs can be available for target USS and check between serving USS and NEF can be performed. It is understood that serving USS is responsible to choose the target USS for changeover. Do you think if anything needs to be added and if so why ?

**Feedback Form 4: Feedback on Question#1-4**

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| **1 – QUALCOMM Europe Inc. - Italy**  Having the serving USS determine the target USS is sufficient. NEF exposure is available to any serving USS that has an SLA with the MNO, thus any USS can access the NEF services and NEF does not need to perform any action. Selection by the serving USS is sufficient. |
| **2 – InterDigital Communications**  In addition, UAS-NF should be informed about the target USS information. |

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| In TS23.256, clause 4.4.2 USS discovery, it says that ”In order to enable the interaction between the 3GPP network and the USS serving a UAS, the **3GPP network needs to discover the correct USS serving a specific UAV.**” Therefore, for changeover case, new serving USS (i.e., target USS) shall be informed to UAS-NF.  It is needed for UUAA procedure between UAV and target USS because UAS-NF shall route authentication messages to the correct target USS and CAA-Level UAV ID is not sufficient for routing message at multiple USS case.  And UAS-NF shall be able to authorize the access of NEF services for UAVs only from its serving USS. |
| **3 – Ericsson LM**  Yes it would be beneficial, the serving USS needs to provide a list of suitable USS candidates, together with their addresses and, optionally, geographical areas that their serve to the NEF/UAS NF so that the NEF could use this information for authorization of a new USS and to ensure that UAV’s information (such as location, presence of UAVs in an area etc.) is shared/provided only to USS-s that needs such information. When it comes to the authorization of a new USS, if the NEF is aware of target USS candidates, the NEF would be able to check (a) whether a new USS is the USS that has performed the UUAA with the UAV and (b) the USS that has performed UUAA with the UAV is allowing another USS (i.e. a target USS) to access the information about the UAV. Additionally, the NEF could, based on the UAV’s location and information about which geographical area is served by a particular USS, determine whether the UAV is present at a TA that is relevant for the USS requesting the information about the UAV. |
| **4 – LG Electronics France** No strong view on this Q. |
| **5 – Huawei Technologies France**  it is the serving USS to determine the target USS — we should use this principle as the basis for normative work. |
| **6 – Samsung R&D Institute India**  In stead of one USS, now in the deployment there will be multiple USS which serves a different service areas. Hence not only UASNF but even UAV need to have the USS addresses with corresponding service area which is needed during basic UUAA procedure itself. Hence in our view both UAV and UASNF need to have list of USS addresses per service areas deployed in a PLMN |

# 3 Summary on companies view related to KI#1

# 3.1 KI#1 (NEF service enhancements) - Flight planning/monitoring

**On Question#1-1:**

- 5 companies provided feedback.

- No major support on "any more information provided by NEF" in addition to the information from NEF in clause 8.1.1 of TR 23.700-59.

- One company commented that providing potential flight route(s) by the NEF if candidate flight route(s) is not provided from the USS/UTM is beyond NEF's responsibility. So, to assist USS/UTM to determine potential flight route(s), QoS Sustainability related information needs to be provided by NEF to USS/UTM.

# 3.2 KI#1 (NEF service enhancements) - Multiple USS

**On Question#1-2:**

- 6 companies provided feedback.

- The majority view is "No issue" regarding the USS(s) supporting multiple USS feature are capable of handling the same CAA Level UAV ID for the UAV across source and target USSs.

- One company commented that we need to have clear information from other SDO /UAV organization regarding handling of CAA Level UAV ID for multiple USS scenario, so ask companies who are familiar with the area to provide relevant information.

**On Question#1-3:**

- 6 companies provided feedback.

- The majority view is "No issue" on change of CAA-Level UAV ID during USS changeover.

- One company commented that there may be the case that the target USS cannot understand the CAA-level UAV ID used in source USS domain, so cannot invoke the subsequent UAV authentication and authorization.

**On Question#1-4:**

- 6 companies provided feedback.

- Various opinion provided including the following aspects that can be considered during normative phase:

• Configuration of list of USS addresses per service areas in UAV UE and NEF/UAS NF

• Providing a list of suitable USS candidates (USS addresses and, optionally, geographical serving areas) from the serving USS to NEF/UAS NF so that the NEF/UAS NF could use this information for authorization of a new USS and to ensure that UAV’s information is shared/provided only to USS-s that need such information.