**3GPP TSG-SA2 Meeting #155 *S2-230xxxx***

**Athens, Greece, February 20 – 24, 2023 (revision of)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.502** | **CR** | **XXXX** | **rev** | **-** | **Current version:** | **18.0.0** |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | AIMLsys: KI#7 – UE location related filtering criteria supported by the NEF | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | OPPO, Toyota, Sony, Oracle | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIMLsys | | | | |  | ***Date:*** | | | 2023-02-08 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In order to enable 5GC to assist the Application AI/ML AF to preform candidate member selection, a new NEF services for assistance to member selection is specified. The AF can request the NEF to provide a list of recommended UEs based on the member selection filtering criteria requested by the AF.  UE location including UE's travel history, direction and separation distance are some of the important filtering criteria. Those criteria can assist the FL sever to select suiable UEs which have the reliable dataset of the different visited AoI(s) to ensure enough geographic location features to be collected. Based on the UE location related criteria, NEF can provide a list of UE which are within the FL coverage area but were roving within the target AoI over the historical nomadic period and with the different direction and in the different sub-area within the FL coverage Area. Then the AF can further determine which UE(s) should be selected to participate in the AIML operation. | | | | | | | | |
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| ***Summary of change:*** | | * Add UE location related criteria and the corresponding description. * Add the procedure on how the NEF can use those criteria to derive the candidate UE list and provide to the AF | | | | | | | | |
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| ***Consequences if not approved:*** | | Not able to provide a 5GC mechanism to support the member selection based on the UE location related information to assist the Application AI/ML operation. | | | | | | | | |
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| ***Clauses affected:*** | | 4.15.Y.2, 4.15.Y.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 ... | | |
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| ***Other comments:*** | | This CR is part of outcome of SI FS\_AIMLsys. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* Start of Changes \* \* \*

#### 4.15.Y.2 Filtering Criteria for 5GS assistance for UE member selection

Table 4.15.Y.2-1 provides a summary of the of the UE member filtering criteria that the AIML AF may request.

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| --- | --- | --- | --- |
| UE Member filtering criteria | Description of filtering criterion | UE filtering information | Detailed description clause |
| UE current location | Indicate the certain area that the selected UE appears | Service operation: Namf\_EventExposure  Filter: a list of GPSI(s) or SUPI(s) | 4.15.Y.3 |
| UE historical location | Indicate the certain area that the selected UE appeared in a historical period of time | Service operation:  Nnwdaf\_AnalyticsSubscription  Filter: Analytics ID = UE mobility,  Filters include "Visited AoI = Target AOI" and "target period = historical nomadic period | 4.15.Y.3 |
| UE trajectory | Indicate the certain area trajectory that the selected UEs move in or out in the past or in the future | Service operation:  Nnwdaf\_AnalyticsSubscription  Filter: Analytics ID= UE Mobility | 4.15.Y.3 |
| UE direction | Indicate the selected UEs should include different moving direction | Service operation:  Nnwdaf\_AnalyticsSubscription  Filter: Analytics ID= UE Mobility, Direction | 4.15.Y.3 |
| UE separation distance | Indicate the selected UEs should comply with a minimum separation distance with each other | Service operation:  Namf\_EventExposure service operation  Filter: a list of GPSI(s) or SUPI(s) | 4.15.Y.3 |

Table 4.15.Y.2-1: Description of UE Member filtering criteria

\* \* \* Next Changes \* \* \*

#### 4.15.Y.3.X Specific procedure for the 5GC assistance to Member selection based on the UE’s travel history, direction and separation distance



Figure 4.15.Y.3.X-1: 5GC assistane to Member selection based on the UE’s travel history, direction and separation distance

1. AF requests 5GS assistance to support the UE selection by considering the UE's historical location, UE's current location, separation distance and direction. AF includes the UE lists and the following criteria as part of the FL UE selection request:
   * + UE historical location: The Target AoI where the UEs have been roving over the historical nomadic period before moving into the FL coverage area.
     + FL Coverage Area: The FL training server's coverage area, i.e. the coverage area of the FL training server where the selected UEs participate in the FL operation
     + Separation distance: Select those UEs that are geographically separated, fulfilling the separation distance no smaller than the certain separation distance
     + Direction: Select the UE with the different direction in the FL coverage Area.

When providing a target area for FL, the AF may provide sub-areas, and provide a maximum number of UEs that should take part in FL from each sub-area.

2. NEF translates the GPSIs to SUPIs and maps the filtering criteria into the corresponding UE filtering information, NEF identifies which information need to be collected and proceeds with the corresponding procedures which may involve a composite set of 5GC service procedures corresponding to a set of 5GC events, analytics and/or notifications (e.g. UPF, PCF UDM, NWDAF, AMF) listed in the Table 5.2.6.X.1-1.

3-4. The NEF invokes Namf\_EventExposure\_Subscribe service operation with the UE list, event ID = Number of UEs present in a geographical area. AMF will provide a list of UEs that are within the FL coverage area to the NEF using the Namf\_EventExposure\_Notify service operation. The NEF obtains the list of possible targets UEs from AMF within the FL training server's coverage.

5. In order to identify the appropriate NWDAF which can provide analytic output to derive the visited AOI info and to get the UE direction for the possible target UEs above, the NEF needs to select the suitable NWDAF by initiating the NWDAF discovery request (Analytics ID = UE mobility, AOI = Target AOI) with UE list.

6-7. The NEF invokes NWDAF Analytics Info request (UE list, Analytics ID = UE mobility, Filters include "Visited AoI = Target AOI" and "target period = historical nomadic period"). NWDAF will then provide a list of UEs that were ever roving within the target AOI, at the minimum, over the historical nomadic period NWDAF and also provide a list of UEs location in the order of which the UE passes through to the NEF. Then the NEF gets the corresponding statistics of UE mobility and the UE's direction.

8-9. The NEF compares the UE list provided by the AMF in steps 3-4 against the UE list provided by the NWDAF in steps 6-7. The NEF will then determine the FL candidate UEs which are now within the FL coverage area but were roving within the target AOI over the historical nomadic period and UE with the different direction and in the different sub-area within the FL coverage Area as requested by AF. The NEF notifies AF for such UE candidate list.

10. The NEF also needs to consider the list of UEs which are now within the FL coverage area, but may move out of the FL coverage area. Therefore, for each UE in the candidate list in steps 8-9, the NEF invokes the Namf\_EventExposure\_Notify service with UE ID = SUPI, Event ID=UE moving in/out of AOI (PRA) to keep track the movement of the UE(s) in/out of the AOI.

11-12. If step 10 identifies any UE which is moving out of the FL coverage area, the NEF may further notify AF of the given UE which is moving out the coverage.

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