**SA WG2 Meeting #159S2-2311499**

**Xiamen, PRC, October 9-13th, 2023 (revision of S2-2310897)**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.316** | **CR** | **2119** | **rev** | **1** | **Current version:** | **18.3.0** |  |
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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:***  | Correcting Miscellaneous small mistakes related with AUN3 devices |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | S2 |
|  |  |
| ***Work item code:*** | 5WWC\_Ph2 |  | ***Date:*** | 2023-09-04 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | 1. Following sentence is wrong as a W-AGF does not manage registrations

The W-CP and W-UP protocols shall be able to manage multiple separate Registrations and PDU Sessions for different SUPIs between the same pair of 5G-RG and W-AGF1. Unclear how W-AGF and AMF determine to apply AUN3 related policies
2. Not fully specified that when a W-AGF receives a N2 UE Context Release Command for a N2 connection related with a 5G -RG, it needs to release the connections related with AUN3 served by this 5G RG
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| ***Summary of change:*** | 1. The W-CP and W-UP protocols shall be able to manage multiple separate connections for different subscribers (the 5G RG itself and the different AUN3 devices) between the same pair of 5G-RG and W-AGF
2. § 4.10c The same W-AGF shall serve a 5G-RG and all AUN3 devices served by this 5G-RG.
3. § 4.10c: W-AGF checks if there is an existing N2 connection for a 5G-RG connected to the same GLI/GCI (instead of line) (to ensure the specifications are equally valid for BRG and CRG)
4. § 7.2.8.X: When a W-AGF receives a N2 UE Context Release Command for a N2 connection related with a 5G -RG, the W-AGF identifies if there exist any AUN3 device connected to the 5G-RG through the W-AGF. For each identified AUN3 device, the W-AGF invokes step 5; and 6. of Figure 7.2.8.3-1.
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| ***Consequences if not approved:*** | Incorrect specifications that may confuse BBF and CableLabs |
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| ***Clauses affected:*** | 4.10c; 7.8.2.1 ; 7.8.2.2 ; 7.2.8.X (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  |  |
| ***affected:*** |  | **x** |  Test specifications |  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Done* ULI 🡪 GCI for CRG case
* a N2 UE Context Release Complete
* The W-AGF uses dedicated W-CP AN information to determine that a W-CP connection is for an AUN3 device and to apply corresponding policies. The W-AGF indicates to the AMF when an N2 connection relates to an AUN3 device.
* 7.2.8.3(5G-RG Deregistration via W-5GAN when it is also serving AUN3 devices) removed: to be merged in 11500
* Cover sheet update
* About the realm, now put all this in the Note for the Note not to contradict the bullet text

How the 5G-RG is triggered to apply procedures for AUN3 devices is defined by BBF and/or CableLabs. For example, the realm of the NAI used by AUN3 device to contact the 5G-RG can be used as a trigger for 5G-RG to apply procedures for AUN3 devices.* No more subrealm
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*FIRST CHANGE*

## 4.10c Authenticable Non-3GPP devices behind 5G-RG

This clause defines the support of AUN3 devices, i.e. Authenticable Non-3GPP devices (AUN3) as defined in clause 3.1, behind a 5G-RG. This clause applies only to 5G-RG connected via wireline access.

Figure 4.10c-1 shows the architecture for support of AUN3 device.



Figure 4.10c-1: AUN3 device behind 5G-RG

Differentiated services for AUN3 devices behind 5G-RG are provided as specified below:

- Each AUN3 device has its own UDM/UDR subscription data including its own SUPI and policy control subscription data.

- The interface between 5G-RG and AUN3 devices is out of scope of 3GPP.

- In order to serve the AUN3 device in 5GC, a 5G-RG issues a NAS register and handles RM and CM related signalling on behalf of an AUN3 device that it is requesting to be served and relays EAP signalling between the AUN3 device and the 5GC.

- A 5G-RG serving an AUN3 device establishes a single PDU Session on behalf on this AUN3 device.

- The AMF and the 5G-RG maintain a separate NAS connection per AUN3 device. This includes maintaining a GUTI and NAS (RM, CM, security, etc.) context per AUN3 device.

- A 5G-RG shall be connected to the 5GC (be in RM-REGISTERED and CM-CONNECTED mode) over Wireline access to serve an AUN3 device: the 5G-RG shall not issue a NAS register or service request on behalf of an AUN3 device if it is itself not registered and connected to the 5GC.

- The 5G-RG is configured with URSP for each AUN3 devices it serves. The UE PCF selected by the AMF at the registration of an AUN3 device sends this URSP to 5G-RG via the AMF and the NAS connection of the AUN3 device.

- The AUN3 devices and the 5G-RG belong to the same PLMN.

- A 5G-RG uses default values, which are the same for all AUN3 devices it serves, to populate the parameters in the Registration Request message built on behalf of an AUN3 device. For example, the 5G-RG issues the Registration Request with no S-NSSAI and the AMF selects the default S-NSSAI in the subscription of the AUN3 device.

- There shall be a separate N2 connection per AUN3 device that is in state CM-CONNECTED.

- The W-AGF uses dedicated W-CP AN information to determine that a W-CP connection is for an AUN3 device and to apply corresponding policies. The W-AGF indicates to the AMF when an N2 connection relates to an AUN3 device.

- The same W-AGF shall serve a 5G-RG and all AUN3 devices connected via this 5G-RG.

- The W-CP and W-UP protocols shall be able to manage multiple connections for different subscribers (the 5G-RG itself and the different AUN3 devices) between the same pair of 5G-RG and W-AGF. In particular, W-CP needs to be able to differentiate NAS messages related to a 5G-RG and to each different AUN3 device served by this 5G-RG and W-UP needs to distinguish between user plane packets for a 5G-RG and user plane packets for each different AUN3 device served by this 5G-RG.

- When the registration of an AUN3 device has successfully completed, the 5G-RG establishes a PDU Session on behalf of the AUN3 device. This PDU Session is handled by 5GC as part of the AUN3 subscription and is associated with the SUPI of AUN3 device. An AUN3 device can at a given time only use a single PDU Session. The parameters to establish this PDU session are based on the URSP (if any) for the AUN3 device.

- Different QoS parameters may apply to PDU sessions of different AUN3 devices.

- Roaming is not applicable to subscriptions for AUN3 devices.

*NEXT CHANGES*

#### 7.2.8.1 AUN3 device Registration via W-5GAN

An authenticable non-3GPP devices (AUN3) may get connected behind 5G-RG as defined in clause 4.10c.

This clause specifies how an AUN3 device can be registered via 5G-RG.



Figure 7.2.8.1-1: 5GC registration of AUN3 device

1. The 5G-RG registers to 5GC as specified in clause 7.2.1.1:

 Any AUN3 device connection request prior to step 1 shall be rejected by the 5G-RG.

2. The AUN3 device connects to the 5G-RG via non-3GPP access network (e.g., WLAN). An authentication procedure is triggered. This can be done either by AUN3 device sending a EAPOL-start frame to the 5G-RG or 5G-RG receives a frame from an unknown MAC address. The 5G-RG receives a permanent identifier from the AUN3 device (e.g. an NAI in form of username@realm). If the realm part is different from the realm associated with the PLMN that the 5G-RG belongs to, the 5G-RG stops performing following procedure and reject the AUN3 device.

NOTE: How the 5G-RG is triggered to apply procedures for AUN3 devices is defined by BBF and/or CableLabs. For example, tcan

3. This shall be same as step 3 of 7.2.1.1-1 with the following addition:

- W-CP AN parameters may contain an indicator that the W-CP connection is for an AUN3 device;

- The 5G-RG always provides a SUCI as AUN3 device identity information in the registration request and constructs the SUCI from the NAI received within EAP-Identity issued by the AUN3 device as defined in TS 33.501 [11];

- The 5G-RG uses default values, which are the same for all AUN3 devices it serves, to populate the parameters in the Registration Request message built on behalf of an AUN3 device. For example, the 5G-RG issues the Registration Request with no S-NSSAI; and

- When W-AGF provides (over N2) ULI to be associated with an AUN3 device, if the AUN3 device is connected behind a 5G-BRG, the W-AGF builds the AUN3's ULI using the ULI of the 5G-BRG connecting the AUN3 device. If AUN3 device is connected behind the 5G-CRG, the W-AGF builds the ULI using the GCI of the 5G-CRG connecting the AUN3 device.

4. The W-AGF selects an AMF based on the received AN parameter provided by the 5G-RG and based on local policy, as specified in clause 6.3.5 of TS 23.501 [2]. The W-AGF uses dedicated W-CP AN information to determine that a W-CP connection is for an AUN3 device and to apply corresponding policies. The W-AGF indicates to the AMF when an N2 connection relates to an AUN3 device.

 The W-AGF sends an NGAP INITIAL UE message to the selected AMF.For an AUN3 device, the W-AGF indicates to AMF if there is an existing N2 connection for a 5G-RG connected to the same GLI/GCI (where the initial NAS message related with NGAP INITIAL UE message has been received).

If the W-AGF indicated for an AUN3 device that there is no existing 5G-RG N2 connection for a 5G-RG connected to the same GLI/GCI, then the AMF rejects the registration request and further steps of this procedure are skipped. Otherwise, the procedure continues.

5. AMF selects AUSF as specified in clause 6.3.4 of TS 23.501 [2].

6. The AUSF executes the authentication of the AUN3 device following TS 33.501 [11]. The AUSF selects the UDM as described in clause 6.3.8 of TS 23.501 [2] and gets the authentication data of the AUN3 device, from UDM. EAP based authentication defined in TS 33.501 [11] is performed between the AUSF and the AUN3 device. Once the AUN3 device has been authenticated, the AUSF provides relevant security related information to the AMF. AUSF shall return the SUPI corresponding to the AUN3 device to AMF only after the authentication is successful.

7. Same as step 8 to 12 of figure 7.2.1.1-1 with following modifications

- The 5G RG uses the MAC address of the AUN3 device as a PEI;

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8. The AMF sends the Registration Accept message related to the AUN3 device to the 5G-RG. This step is executed over the NAS signalling connection and the N2 connection related to the AUN3 device.

9. The 5G-RG sends the Registration Complete message related to the AUN3 device to the AMF, when the procedure is completed. This step is executed over NAS signalling connection and N2 connection related to the AUN3 device. The 5G-RG shall store the 5G-GUTI of AUN3 device to be able to use it potential later NAS procedures related with the AUN3 device.

10. The 5G-RG receives the URSP corresponding to the AUN3 device and continues by requesting the establishment of a PDU Session on behalf of the AUN3 device as specified in clause 7.3.1.

#### 7.2.8.2 AUN3 device De-registration via W-5GAN

AUN3 device may get connected behind 5G-RG as defined in clause 4.10c. This clause specifies how an AUN3 device can be de-registered via 5G-RG.



Figure 7.2.8.2-1: De-registration of an AUN3 device

1a. The AUN3 device triggers a disconnection request to the 5G-RG.

NOTE: Detail procedures how AUN3 device triggers the de-registration request is out of scope of 3GPP.

1a. The 5G-RG sends a De-registration request on behalf of the AUN3 device. This triggers step 1a of Figure 7.2.1.2-1 with the deregistration targeting the AUN3 device and not the 5G-RG. This step is executed over the AUN3 device's NAS signalling connection and AUN3 device's N2 connection.

1b. The network (AMF or UDM) may determine to de-register an AUN3. This triggers step 1b of Figure 7.2.1.2-1 with the deregistration targeting the AUN3 device and not the 5G-RG.

2. AMF to W-AGF: The AMF sends a N2 UE Context Release Command message to the W-AGF as defined in step 2 of Figure 7.2.1.2-1 but for the N2 connection related with the AUN3 device. W-AGF removes W-CP AN context information for the AUN3 device.

3. As defined in step 3 of Figure 7.2.1.2-1 but for the signalling connection related with the AUN3 device.

4. The W-AGF sends a N2 UE Context Release Complete message to the AMF

*NEXT CHANGE*

#### 7.2.8.X N2 release related with a 5G-RG also serving AUN3 devices

When a W-AGF receives a N2 UE Context Release Command for a N2 connection related with a 5G -RG, the W-AGF identifies if there exist any AUN3 device connected to the 5G-RG through the W-AGF. For each identified AUN3 device, the W-AGF invokes step 5 and 6 of Figure 7.2.8.3-1.

*END OF CHANGES*