**3GPP TSG-WG SA2 Meeting #156-e *S2-2304480r11***

**Elbonia, April 17 – 21, 2023 (revision of S2-230xxxx)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.316** | **CR** | **2091** | **rev** | **-** | **Current version:** | **18.1.0** |  |
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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 | **X** | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Support of AUN3 device | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon, | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5WWC\_Ph2 | | | | |  | ***Date:*** | | | 2023-04-07 |
|  |  | | | |  | |  | | |  |
| ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | FS 5WWC\_Ph2 has concluded the KI#1 about Providing differentiated service for UE and Non-3GPP devices (i.e. AUN3 device and NAUN3 device) connected behind a 5G RG, which has been captured in the objective of WID 5WWC\_Ph2. This CR aims to update TS 23.316 to support of AUN3 device. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Two new subclauses are added to provide the architecture for support of AUN3 device and a call flow to describe the registration and PDU session establishment for AUN3 device. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The specification does not include the features of AUN3 device, which is not aligned with the objectives in 5WWC\_Ph2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.7.11, 4.10c (new), 7.2.1.x (new), 7.2.1.y (new), 7.2.1.z (new), 7.3.1.x (new), 7.3.1.y (new), 7.3.2.x (new), 9.5.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

\* \* \* \* First change \* \* \* \*

### 4.7.11 SUPI and SUCI for N5GC device or AUN3 device support

The SUPI for non-5G capable (N5GC) device or AUN3 device connecting via RG shall contain a network-specific identifier. A SUPI containing a network-specific identifier takes the form of a Network Access Identifier (NAI) as defined in TS 23.003 [14].

The SUCI provided by the W-AGF to the AMF is derived from the EAP-Identity message received from the N5GC device or AUN3 device, as defined in TS 33.501 [11]. The format of this SUCI is defined in TS 23.003 [14].

\* \* \* First change \* \* \* \* All text is new

## 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 handle RM and CM related signaling on behalf of an AUN3 device that it is requesting to be served and may relay EAP siganling 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 registered over Wireline access to serve an AUN3 device: the 5G-RG shall not issue a NAS register on behalf of an AUN3 device if it is itself not registered.
* 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.
* 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.

Editoir’s Notes: default values, to populate the parameters in the Registration Request may need further considerations

* There shall be a separate N2 connection per AUN3 device that is in state CM-CONNECTED;
* 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-AGF. In particular, W-CP needs to be able to differentiate NAS messages related to 5G-RG and different AUN3 devices and W-UP needs to distinguish between user plane packets for 5G-RG and different AUN3 devices.
* AUN3 devices are served by the same AMF which is serving the 5G-RG. This is ensured by the W-AGF using the GUAMI of the 5G-RG to select an AMF for an AUN3 being registered to the network.
* the 5G-RG provides its own GUTI together with a NAS registration request sent on behalf of an AUN3 device in order for the 5GC to check whether the 5G-RG being used is actually registered The common AMF (for both 5G-RG and AUN3 devices served by this 5G-RG) locally checks whether the 5G-RG being used is registered over Wireline access.

Editor’s Note: the bullet above is FFS

* 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 AUN3 SUPI; 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.
* The PCF is able to control the aggregate traffic of all the PDU Sessions that are using a wireline access of a 5G-RG, ensuring that the sum of the session MBR of these PDU Sessions remains below a subscribed maximum value for the 5G-RG.
* In case multiple PCFs are involved (for the 5g-RG and for the AUN3 devices this 5G-RG serves), the aggregate traffic is controlled by storing the cumulative traffic usage MBR over the wireline access of a 5G-RG in an UDR: and comparing cumulative traffic usage to the subscribed maximum value for the line of the 5G-RG.

Editor’s note: Whenever a 5G-RG is deregistered, it is FFS how any associated AUN3 devices shall also be deregistered.

\* \* \* \* Second change \* \* \* \* All text is new

## 7.2.1.x 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 7.2.1.x-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). The realm of the NAI used by AUN3 device to contact the 5G-RG may be used as a trigger for 5G-RG to apply procedures for AUN3 devices. 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 PLMN that the 5G-RG belongs to, the 5G-RG stops performing following procedure.

NOTE 2: How the 5G-RG is triggered to apply procedures for AUN3 devices is defined by BBF and/or CableLabs.

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 and the 5G-RG’s own GUTI.

- The 5G-RG uses default values to populate the parameters in the Registration Request message, which are the same for all AUN3 devices it serves. The Requested NSSAI is built based on the URSP for AUN3 devices that has been configured on the 5G-RG.

- 5G-RG provides the GUAMI to W-AGF. The W-AGF selects the same serving AMF for the AUN3 device based on the GUAMI provided by the 5G-RG.

When W-AGF provides (over N2) ULI to be associated with a 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 GCI (see clause 4.7.9) of the 5G-CRG and the ULI of the 5G-CRG connecting the AUN3 device.

4. The W-AGF shall select an AMF based on the received AN parameter including the 5G-RG GUTI or GUAMI provided by the 5G-RG and based on local policy, as specified in clause 6.3.5 of TS 23.501 [1].

The W-AGF sends an NGAP INITIAL UE message to the selected AMF that contains the NAS Registration Request message, an indicator that the device is AUN3and the 5G-RG GUTI.

The AMF shall reject the AUN3 registration request if the 5G-RG is Not registered over wireline access

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

Editor’s Note: it is FFS what PEI is provided for an AUN3 device

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

9. The 5G-RG sends the Registration Complete message related to the AUN3 to the AMF, when the procedure is completed. 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. This step is executed over NAS signalling connection and N2 connection related to the AUN3 device.

10. The AMF performs steps 23-24 in clause 4.2.2.2.2 of TS 23.502 [2].

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

\* \* \* \* Third change \* \* \* \* all text is new

## 7.2.1.y 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 7.2.1.y-1: 5GC De-registration of an AUN3 device

1a. The AUN3 device triggers a de-registration 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 1a 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 signaling connection related with the AUN3 device

## 7.2.1.z AUN3 device De-registration due to 5G-RG deregistration

Editor’s Note: Whenever a 5G-RG is deregistered, any associated AUN3 devices is also deregistered.

In case de-registration of a 5G-RG, the 5GC shall first deregister in the network (i.e. without signalling to the 5G RG) all the AUN3 devices supported by the 5G-RG.

Then 5GC shall de-register the 5G-RG as defined in clause 7.2.1.2.

When the 5G-RG determines it is un-registered it shall locally (i.e. without signalling to the network) all resources associated with the AUN3 devices it is serving.

\* \* \* \* 4th change \* \* \* \* All text is new

### 7.3.X Session Management Procedures for AUN3 devices

#### 7.3.x.1 PDU Session Establishment of AUN3 device behind 5G-RG

This clause specifies the PDU Session Establishment for an AUN3 device served by a 5G-RG as defined in clause 4.10c.

A distinct PDU session is established for each AUN3 device.

After the registration from the AUN3 device, the 5G-RG initiates the establishment of a PDU Session on behalf of the AUN3 device

The PDU Session is established as specified in clause 7.3.1.1 with following differences:

* Steps 1a, 1b and 2b are executed over the AUN3 device’s NAS signalling connection and AUN3 device’s N2 connection
* At step 3 of TS 23.502 figure 4.3.2.2.1 [3], the AMF sends the AUN3 SUPI as the SUPI of the PDU session and includes also the 5G-RG’s SUPI in the Nsmf\_PDUSession\_CreateSMContext Request sent to the SMF
* Steps 5 and 6 are executed over the AUN3 device’s N2 connection and AUN3 device’s NAS signallingg connection
* At step 7b of TS 23.502 figure 4.3.2.2.1 [3], the SMF sends in the Npcf\_SMPolicyControl\_Create Request the 5G-RG SUPI along with the SUPI of the PDU session (i.e. the AUN3 SUPI)
* The PCF determines a proper session MBR for the AUN3 device and checks that the sum of the session MBR of all PDU sessions involving a 5G-RG (including the PDU Sessions of the 5G-RG itself and the PDU Session of each AUN3 device served by that 5G-RG) does not go beyond the session MBR subscribed for the 5G-RG).

Editor’s note: Further details on how this is done is FFS e.g. whether this uses 5G-RG and AUN3 device SUPIs to

#### 7.3.2.x PDU Session Modification of AUN3 device behind 5G-RG

This clause specifies the PDU Session Modification for an AUN3 device served by a 5G-RG as defined in clause 4.X.z.

The PDU Session modification procedure shall use clause 7.3.2 with following differences:

* Step 1 is executed over the AUN3 device’s NAS signalling connection and AUN3 device’s N2 connection
* At step 1a of TS 23.502 figure 4.3.3.2-1 [3], the AMF sends the AUN3 SUPI as the SUPI of the PDU session
* At step 2 of TS 23.502 figure 4.3.3.2-1 [3], the SMF sends in the Npcf\_SMPolicyControl\_Update Request the the SUPI of the PDU session (i.e. the AUN3 SUPI)
* Steps 3 and 5 are executed over the AUN3 device’s N2 connection
* Steps 7 and 8 are executed over the AUN3 device’s N2 connection and AUN3 device’s NAS signallingg connection
* The PCF may determine a proper session MBR for the AUN3 device and to check that the sum of the session MBR of all PDU sessions involving a 5G-RG (including the PDU Sessions of the 5G-RG itself and the PDU Session of each AUN3 device served by that 5G-RG) does not go beyond the session MBR subscribed for the 5G-RG).
* Only 5GC initiated PDU Session modification is supported in this release

#### 7.3.3.y PDU Session Release of AUN3 device behind 5G-RG

This clause specifies the PDU Session Release for an AUN3 device served by a 5G-RG as defined in clause 4.10c. This clause applies only to 5G-RG.

AUN3 device may trigger explicit request for service release, or it may be unreachable (on the 5G-RG to AUN3 device interface) or switched off. In such scenarios 5G-RG may need to release the PDU session of the AUN3 device.

NOTE: how an AUN3 device can trigger the release of a PDU Session is out of scope of 3GPP specifications

PDU session release for a specific AUN3 device can also be initiated by the 5GC (e.g., the subscription of the AUN3 device expires).

The PDU Session release procedure shall use clause 7.3.3 with following differences:

- Step 1 is executed over the AUN3 device’s NAS signalling connection and AUN3 device’s N2 connection

In step 1a of fig. 4.3.4.2-1 of TS 23.502 [3], the 5G-RG sends the PDU Session Release message on the AUN3’s NAS connection

* Steps 4 and 6 are executed over the AUN3 device’s N2 connection
* Steps 8-10 are executed over the AUN3 device’s N2 connection and AUN3 device’s NAS signallingg connection

\* \* \* \* 5th change \* \* \* \*

#### 9.5.2.1 5G-RG

This clause specifies the delta related to UE policy distribution defined in TS 23.503 [4] clause 6.1.2.2 and related to URSP defined in TS 23.503 [4] clause 6.6. for 5G-RG.

If the PCF provides the URSP policy to the 5G-RG, the PCF should neither include NSWO indication nor any ANDSP policies. The 5G-RG shall ignore any NSWO indication or any ANDSP policies if received from the 5GC. The 5G-RG shall use the URSP policy as specified in TS 23.503 [4], for example for the association of application and PDU session, slices, etc.

The URSP indicates for the application of Auto-Configuration Server (ACS) which PDU session type, NSSAI and/or DNN is to be used. The 5G-RG establishes the connectivity to the management entity (e.g. ACS) via user plane connection on a PDU session according to the URSP.

UE Policy procedures defined in clause 6.1.2.2 of TS 23.503 [4] are applicable as follows:

- Roaming is not applicable to W-5GAN access in this release of specification.In order to support the case when AUN3 devices may be connected via 5G-RG, specific URSP rules may be configured by the PCF for the SUPI associated with the AUN3 device.

UE Route Selection Policy information targetting an AUN3 device (i.e. sent to a 5G-RG in the NAS connection corresponding to an AUN3 device) follows the structure defined in clause 6.2.2 of TS 23.503 [4] with following differences:

- As an AUN3 can have only one PDU Session, its unique URSP has a match all TD

\* \* \* \* End of changes \* \* \* \*