**SA WG2 Meeting #137E (e-meeting) S2-2001823**

**Feb 24 - 27, 2020, Elbonia (revision of S2-2001823, merged with S2-2001954)**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **23.316** | **CR** | **1835** | **rev** | **-** | **Current version:** | **16.2.0** |  |
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| *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)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | Cable access related corrections |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, CableLabs, Charter, Telecom Italia, Broadcom, Orange |
| ***Source to TSG:*** | S2 |
|  |  |
| ***Work item code:*** | 5WWC |  | ***Date:*** | 2020-02-04 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | *Rel-16* |
|  | *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-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | Specification is missing on some aspects of the support of Non-5G capable (N5GC) device behind CRG e.g. on the number of PDU Sessions per N5GC device.In addition SA3 is developing in TS 33.501 a new Annex “Authentication for non-5G capable devices behind residential gateway”.The procedure documented in that Annex deals with non-5G capable devices behind a generic FN-RG or a 5G-RG, making no distinction between FN-BRG/FN-CRG or 5G-CRG/5G-BRG.On the contrary clause 4.10a in TS 23.316 deals with non-5G capable devices only in the case they are behind a FN-CRG or a 5G-CRG. |
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| ***Summary of change:*** | Alignment with the SA3 by generalizing the procedure in clause 4.10a to all types of residential gateway, i.e. both CableLabs and BBF RGs.Clarify the behavior to support Non-5G capable device behind RG e.g. * Only one PDU Session per N5GC device.
* Over N2 there is a separate NGAP connection per N5GC device served by the W-AGF.

Cleaning the description of SUPI/SUCI for cable access. |
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| ***Consequences if not approved:*** | Non-5G capable device behind CRG cannot be supported. Misalignment between SA2 and SA3 specifications. |
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| ***Clauses affected:*** | 4.7.4 ; 4.10a ; 2 |
|  |  |
|  | **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:*** |  |

*FIRST CHANGE*

### 4.7.4 SUPI and SUCI for 5G-CRG and FN-CRG support

The SUPI for a FN-CRG subscription shall, contain a GCI (Global Cable identifier defined in clause 4.7.9).

The SUPI for a 5G-CRG subscription shall, based on operator configuration, contain either an IMSI, as described in clause 5.9.2 of TS 23.501 [2], or a GCI (Global Cable identifier defined in clause 4.7.9).

Only 5G-CRG whose SUPI corresponds to an IMSI may use 3GPP access to connect to 5GC.

A SUPI containing a GCI takes the form of a NAI where the user part is the GCI and the realm part is an identifier of the operator managing the subscription.

Editor's note: The use of non-IMSI based SUPI and associated credentials and authentication method needs to be specified by SA WG3.

The SUCI provided by the 5G-CRG to the network contains the concealed SUPI, as described in TS 33.501 [11].

As described in TS 23.003 [14], for both cases where the SUCI contains an IMSI or contains a GCI, the SUCI contains an identifier of the Home network i.e. an identifier of the operator managing the subscription.

NOTE 1: In case the SUCI contains an IMSI, the identifier of the operator managing the subscription is carried in the MCC/MNC part of the IMSI as in the case of a 3GPP UE.

Editor's note: Additional details regarding SUCI, including whether or not a HFC\_Identifier in SUCI is concealed, is to be determined by SA WG3. The text above about SUCI for wireline access may need to be updated based on SA WG3 outcome.

*NEXT CHANGE (2)*

## 4.10a Non-5G capable device behind 5G-RG and FN-RG.

For isolated 5G networks (i.e. roaming is not considered) with wireline access, non-5G capable (N5GC) devices connecting via W-5GAN can be authenticated by the 5GC using EAP based authentication method(s) as defined in TS 33.501 [11]. The following call flow describes the overall registration procedureof such a device.

Each such N5GC device has its own subscription record in UDM/UDR. The 5GC is not aware which N5GC devices are served by a given RG apart from the fact that the RG and all N5GC devices this RG is connecting correspond to the same ULI.



Figure 4.10a-1: 5GC registration of Non-5GC device

1. The W-AGF registers the FN-RG to 5GC as defined in clause 7.2.1.3 or the 5G-RG registers to 5GC as defined in clause 7.2.1.1.

2. The RG is configured as L2 bridge mode and forwards any L2 frame to W-AGF. 802.1x authentication is triggered. This can be done either by N5GC device sending an EAPOL-start frame to W-AGF or W-AGF receives a frame from an unknown MAC address.

How a CRG is configured to work in L2 bridge mode and how the W-AGF is triggered to apply procedures for N5GC devices is defined in CableLabs WR-TR-5WWC-ARCH [27]. How a BRG is configured to work in L2 bridge mode is defined in BBF TR-124 [5].

3. W-AGF, on behalf of the N5GC device, issues a N1: Registration Request message to AMF with a device capability indicator that the device is non-5G capable. For this purpose, the W-AGF acts as if it was serving a FN-RG e.g. it builds a NAS Register message containing a SUCI as defined TS 33.501 [11].

 Over N2 there is a separate NGAP connection per N5GC device served by the W-AGF.

When it provides (over N2) ULI to be associated with a N5GC device, the W-AGF builds the same ULI than that of the RG connecting the N5GC device (using the GCI of the RG as defined in clause 4.7.9).

4. AMF selects a suitable AUSF as specified in TS 23.501 [2] clause 6.3.4.

5. EAP based authentication defined in TS 33.501 [11] is performed between the AUSF and N5GC device.

 Once the N5GC device has been authenticated, the AUSF provides relevant security related information to the AMF. AUSF shall return the SUPI (this SUPI corresponds to a NAI that contains the username of the N5GC device and a realm as defined in TS 33.501 [11]) to AMF only after the authentication is successful.

NOTE: Each N5GC device is registered to 5GC with its own unique SUPI.

6 The AMF performs other registration procedures as required (see TS 23.502 [3] clause 4.2.2.2.2).

The W-AGF shall provide a PEI containing the MAC address of the N5GC device. The W-AGF may, based on operator policy, encode the MAC address of the N5GC device using the IEEE Extended Unique Identifier EUI-64[xx] format.

7. The AMF sends Registration Accept message to W-AGF.Then the W-AGF requests the establishment of a PDU Session on behalf of the N5GC device. Only one PDU session per N5GC device is supported.

Secondary authentication/authorization by a DN-AAA server during the establishment of such a PDU Session is not applicable.

The W-AGF shall request the release of the NGAP connection for each N5GC device served by a RG whose NGAP connection has been released.

Roaming is not supported.

5G-RG behaves as FN-RG (i.e. L2 bridge mode) when handling N5GC devices.

*NEXT CHANGE (3)*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G system, Stage 2".

[4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System".

[5] BBF TR-124 issue 5: "Functional Requirements for Broadband Residential Gateway Devices".

[6] BBF TR-101 issue 2: "Migration to Ethernet-Based Broadband Aggregation".

[7] BBF TR-178 issue 1: "Multi-service Broadband Network Architecture and Nodal Requirements".

[8] CableLabs DOCSIS MULPI: "Data-Over-Cable Service Interface Specifications DOCSIS 3.1, MAC and Upper Layer Protocols Interface Specification".

[9] BBF WT-456: "AGF Functional Requirements".

[10] BBF WT-457: "FMIF Functional Requirements".

Editor's note: The references to BBF WT-456 and WT-457 will be revised when finalized by BBF.

[11] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[12] BBF TR-177 Issue 1 Corrigendum 1: "IPv6 in the context of TR-101".

[13] IETF RFC 6788: "The Line-Identification Option".

[14] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[15] IETF RFC 3315: "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[16] IETF RFC 6603: "Prefix Exclude Option for DHCPv6-based Prefix Delegation".

[17] IETF RFC 3633: "IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6".

[18] BBF TR-069: "CPE WAN Management Protocol".

[19] BBF TR-369: "User Services Platform (USP)".

[20] IETF RFC 3046: "DHCP Relay Agent Information Option".

[21] IETF RFC 4604: "Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast".

[22] 3GPP TR 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[23] 3GPP TS 38.413: "NG RAN; NG Application Protocol (NGAP)".

[24] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[25] 3GPP TS 22.011: "Service accessibility".

[26] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".

[27] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".

[28] IETF RFC 3376: "Internet Group Management Protocol, Version 3".

[29] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS)".

[30] BBF TR-198: "DQS:DQM systems functional architecture and requirements".

[31] 3GPP TS 23.203: "Policy and charging control architecture".

[32] 3GPP TS 33.126: "Lawful Interception Requirements".

[33] IETF RFC 2236: "Internet Group Management Protocol, Version 2".

[34] IETF RFC 4861: "Neighbor Discovery for IP version 6 (IPv6)".

[35] IETF RFC 1112: "Internet Group Management Protocol".

[36] IETF RFC 2710: "Multicast Listener Discovery Version for IPv6".

[37] IETF RFC 2010: "Operational Criteria for Root Name Servers".

[xx] IEEE: "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)", <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/tutorials/eui.pdf>.

*NEXT CHANGE (4)*

*NEXT CHANGE (5)*

*END OF CHANGES*