**3GPP TSG-CT WG1 Meeting #123-eC1-202793**

**Electronic meeting, 16-24 April 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.122** | **CR** | **0509** | **rev** | **1** | **Current version:** | **16.5.0** |  |
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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:*** | Modification of exchanges between SOR-AF and UDM | | | | | | | | | |
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| ***Source to WG:*** | Orange, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GProtoc16 | | | | |  | ***Date:*** | | | 2020-04-16 |
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| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | CT1 received and LS from CT4 in C1-202041/C4-201221 on subscribe/notify for 5G Steering of Roaming. One of the CT4 question is linked to the subscribe/notify scheme:  **CT4 question Q2:** […] As an alternative to the subscribe/notify scheme, is the solution reusing the Nudm\_ParameterProvision service as described in C4-200474 which allows the SOR-AF to update the UDM with steering information at any time acceptable to CT1?  The drawback of using Nsoraf\_SoR\_Subscribe / Nsoraf\_SoR\_Notify scheme is that the UDM cannot be notified about the change in the list of preferred PLMN/access technology combinations or a secured packet in case it is to be updated, but the subscription request has not yet been received by SOR-AF.  With Nudm\_ParameterProvision\_Update service operation the advantage is also that the new steering of roaming data could also be provided from the SOR-AF to the UDM after UE registration not only in VPLMN, but also in HPLMN if required, without the need for the UDM to subscribe in SOR-AF each time the UE registers in the HPLMN. | | | | | | | | |
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| ***Summary of change:*** | | This CR proposes to replace the subscribe/notify scheme enabling updating the UDM with the new steering of roaming data for the UE after its registration with a solution that covers both needs (e.g., relying on Nudm\_ParameterProvision\_Update service operation).  The step 5a in clause C.2 is removed, since no subscription is needed.  In step 0 in clause C.3, the Nsoraf\_SoR\_Notify service operation is replaced with another message.  This CR enables also the SOR-AF with the possibility to subscribe to the UDM (e.g., using Nudm\_EventExposure\_Subscribe service operation) to be notified about the changes of the roaming status of the UE identified by SUPI.  Editorial corrections in clause C.0. | | | | | | | | |
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| ***Consequences if not approved:*** | | Providing new steering of roaming data to the UDM for the UE after registration will require that the UDM subscribes in the SOR-AF to receive such notifications. This would keep preventing updating the steering of roaming information after registration in case of UE being in the HPLMN. | | | | | | | | |
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| ***Clauses affected:*** | | C.0, C.2, C.3 | | | | | | | | |
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|  | | **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 modifies figure C.3.1, which is also modified by CR in C1-202068 (CR#0508). In case both CRs are agreed, the figure C.3.1 from this CR shall be used as a basis, and the only additional modification to be made is the change of the "VPLMN AMF" to "AMF". | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

# C.0 Requirements for 5G steering of roaming over the control plane

In addition to the requirements specified in 3GPP TS 22.011 [9] subclause 3.2.2.8, the requirements in this subclause apply.

The UE supporting N1 mode shall support the control plane solution for steering of roaming in 5GS. If the HPLMN supports and wants to use the control plane solution for steering of roaming in 5GS, then the HPLMN shall provide the steering of roaming information to the UE using the control plane mechanism defined in this annex.

The VPLMN shall transparently relay the steering of roaming information received from the HPLMN to the UE. The UE shall be able to detect whether the VPLMN removed the steering of roaming information during the initial registration procedure in the VPLMN. The UE shall be able to detect whether the VPLMN altered the steering of roaming information. If the UE detects that the VPLMN altered or removed the steering of roaming information then the UE shall consider the current VPLMN as the lowest priority PLMN and perform PLMN selection as defined in this annex.

\* \* \* Next Change \* \* \* \*

# C.2 Stage-2 flow for steering of UE in VPLMN during registration

The stage-2 flow for the case when the UE registers with VPLMN AMF is described below in figure C.2.1:



Figure C.2.1: Procedure for providing list of preferred PLMN/access technology combinations

For the steps below, security protection is described in 3GPP TS 33.501 [24].

1) The UE to the VPLMN AMF: The UE initiates initial registration, emergency registration or mobility registration update procedure to the VPLMN AMF by sending REGISTRATION REQUEST message with the 5GS registration type IE indicating "initial registration", "emergency registration" or "mobility registration updating";

2) Upon receiving REGISTRATION REQUEST message, the VPLMN AMF executes the registration procedure as defined in subclause 4.2.2.2.2 of 3GPP TS 23.502 [63]. As part of the registration procedure;

a) if the VPLMN AMF does not have subscription data for the UE, the VPLMN AMF invokes Nudm\_SDM\_Get service operation to the HPLMN UDM to get amongst other information the Access and Mobility Subscription data for the UE (see step 14b in subclause 4.2.2.2.2 of 3GPP TS 23.502 [63]); or

b) if the VPLMN AMF already has subscription data for the UE and

i) the 5GS registration type IE in the received REGISTRATION REQUEST message indicates "initial registration" and the "SoR Update Indicator for Initial Registration" field in the UE context is set to 'the UDM requests the AMF to retrieve SoR information when the UE performs NAS registration type "initial registration"' as specified in table 5.2.2.2.2-1 of 3GPP TS 23.502 [63]); or

ii) the 5GS registration type IE in the received REGISTRATION REQUEST message indicates "emergency registration" and the "SoR Update Indicator for Emergency Registration" field in the UE context is set to 'the UDM requests the AMF to retrieve SoR information when the UE performs NAS registration type "emergency registration"' as specified in table 5.2.2.2.2-1 of 3GPP TS 23.502 [63]);

then the VPLMN AMF invokes Nudm\_SDM\_Get service operation message to the HPLMN UDM to retrieve the steering of roaming information (see step 14b in subclause 4.2.2.2.2 of 3GPP TS 23.502 [63]);

otherwise the VPLMN AMF sends a REGISTRATION ACCEPT message without the steering of roaming information to the UE and steps 3a, 3b, 3c, 3d, 4, 5, 5a, 6 are skipped;

3a) If the user subscription information indicates to send the steering of roaming information due to initial registration in a VPLMN, then the HPLMN UDM shall provide the steering of roaming information to the UE when the UE performs initial registration in a VPLMN, otherwise the HPLMN UDM may provide the steering of roaming information to the UE, based on operator policy.

If the HPLMN UDM is to provide the steering of roaming information to the UE when the UE performs the registration in a VPLMN, and the HPLMN policy for the SOR-AF invocation is absent then steps 3b and 3c are not performed.

If the HPLMN UDM is to provide the steering of roaming information to the UE when the UE performs the registration in a VPLMN, and the HPLMN policy for the SOR-AF invocation is present, then the HPLMN UDM obtains the list of preferred PLMN/access technology combinations or the secured packet from the SOR-AF using steps 3b and 3c.

3b) The HPLMN UDM to the SOR-AF: Nsoraf\_SoR\_Obtain request (VPLMN ID, SUPI of the UE, access type, RAT type). The VPLMN ID is the PLMN ID of the VPLMN where the UE is registering, as stored in the HPLMN UDM. The access type is the access type where the UE is registering, as stored in the HPLMN UDM. The RAT type is the RAT type where the UE is registering, as stored in the HPLMN UDM.

3c) The SOR-AF to the HPLMN UDM: Nsoraf\_SoR\_Obtain response (the list of preferred PLMN/access technology combinations, or the secured packet, or neither of them).

Based on the information received in step 3b and any operator specific criteria, the SOR-AF may include the list of preferred PLMN/access technology combinations or the secured packet in the Nsoraf\_SoR\_Obtain response or may provide the Nsoraf\_SoR\_Obtain response with neither a list of preferred PLMN/access technology combinations nor a secured packet.

NOTE 1: Based on operator deployment and policy, if the UDM receives the list of preferred PLMN/access technology combinations in the Nsoraf\_SoR\_Obtain response from the SOR-AF, and the UDM supports communication with OTAF, it can send this list to OTAF requesting it to provide this information in a secured packet as defined in 3GPP TS 29.544 [71].

Editor's note: How the UDM is configured to perform such an operation is to be specified by CT4.

NOTE 2: The SOR-AF can include a different list of preferred PLMN/access technology combinations or a different secure packet for each Nsoraf\_SoR\_Obtain request even if the VPLMN ID, the SUPI of the UE, the access type, and the RAT type are the same.

NOTE 2a: The SOR-AF can subscribe to the HPLMN UDM to be notified about the changes of the roaming status of the UE identified by SUPI.

3d) The HPLMN UDM forms the steering of roaming information as specified in 3GPP TS 33.501 [66] from the list of preferred PLMN/access technology combinations or the secured packet obtained in step 3a or the list of preferred PLMN/access technology combinations or the secured packet, obtained in step 3c. If:

- neither the list of preferred PLMN/access technology combinations nor the secured packet was obtained in steps 3a or 3c; or

- the SOR-AF has not sent to the HPLMN UDM an Nsoraf\_SoR\_Obtain response (step 3c) within an operator defined time after the HPLMN UDM sending to the SOR-AF an Nsoraf\_SoR\_Obtain request (step 3b);

NOTE 3: Stage 3 to define the timer needed for the SOR-AF to respond to the HPLMN UDM. The max time needs to be defined considering that this procedure is part of the Registration procedure.

and the UE is performing initial registration in a VPLMN and the user subscription information indicates to send the steering of roaming information due to initial registration in a VPLMN, then the HPLMN UDM forms the steering of roaming information as specified in 3GPP TS 33.501 [66] from the HPLMN indication that 'no change of the "Operator Controlled PLMN Selector with Access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided'.

4) The HPLMN UDM to the VPLMN AMF: The HPLMN UDM sends a response to the Nudm\_SDM\_Get service operation to the VPLMN AMF, which includes the steering of roaming information within the Access and Mobility Subscription data. The Access and Mobility Subscription data type is defined in subclause 5.2.3.3.1 of 3GPP TS 23.502 [63]). The HPLMN may also request the UE to acknowledge the successful security check of the received steering of roaming information, by providing the indication as part of the steering of roaming information in the Nudm\_SDM\_Get response service operation;

5) The VPLMN AMF to the HPLMN UDM: As part of the registration procedure, the VPLMN AMF also invokes Nudm\_SDM\_Subscribe service operation to the HPLMN UDM to subscribe to notification of changes of the subscription data received in step 4) including notification of updates of the steering of roaming information included in the Access and Mobility Subscription data (see step 14c in subclause 4.2.2.2.2 of 3GPP TS 23.502 [63]);

6) The VPLMN AMF to the UE: The VPLMN AMF shall transparently send the received steering of roaming information to the UE in the REGISTRATION ACCEPT message;

7) If the steering of roaming information is received and the security check is successful, then:

a) if the steering of roaming information contains a secured packet (see 3GPP TS 31.115 [67]):

- if the UDM has not requested an acknowledgement from the UE the UE shall send the REGISTRATION COMPLETE message without including an SOR transparent container;

- the ME shall upload the secured packet to the USIM using procedures in 3GPP TS 31.111 [41].

NOTE 5: How the ME handles UICC responses and failures in communication between the ME and UICC is implementation specific and out of scope of this release of the specification.

- if the UDM has not requested an acknowledgement from the UE and the ME receives a USAT REFRESH command qualifier (3GPP TS 31.111 [41]) of type "Steering of Roaming" it shall perform items a), b) and c) of the procedure for steering of roaming in subclause 4.4.6 and if the UE has a list of available and allowable PLMNs in the area and based on this list the UE determines that there is a higher priority PLMN than the currently camped chosen VPLMN and the UE is in automatic network selection mode, then the UE shall either:

i) release the current N1 NAS signalling connection locally and then attempt to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired. In this case, steps 8 to 11 are skipped. If the UE has an established emergency PDU session (see 3GPP TS 24.501 [64]), the receipt of the steering of roaming information shall not trigger the release of the N1 NAS signalling connection. The UE shall release the current N1 NAS signalling connection locally subsequently after the emergency PDU session is released; or

ii) not release the current N1 NAS signalling connection locally and skip steps 8 to 10;

b) if the steering of roaming information contains the list of preferred PLMN/access technology combinations, the ME shall replace the highest priority entries in the "Operator Controlled PLMN Selector with Access Technology" list stored in the ME with the received list of preferred PLMN/access technology combinations. Additionally, if the UDM has not requested an acknowledgement from the UE and if the UE has a list of available and allowable PLMNs in the area and based on this list the UE determines that there is a higher priority PLMN than the currently camped chosen VPLMN and the UE is in automatic network selection mode, then the UE shall send the REGISTRATION COMPLETE message to the serving AMF without including an SOR transparent container and then either:

i) release the current N1 NAS signalling connection locally and then attempt to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired. In this case, steps 8 to 11 are skipped. If the UE has an established emergency PDU session (see 3GPP TS 24.501 [64]), the receipt of the steering of roaming information shall not trigger the release of the N1 NAS signalling connection. The UE shall release the current N1 NAS signalling connection locally subsequently after the emergency PDU session is released; or

ii) not release the current N1 NAS signalling connection locally and skip steps 8 and 10;

8) If:

a) the UE's USIM is configured with indication that the UE is to receive the steering of roaming information due to initial registration in a VPLMN, but neither the list of preferred PLMN/access technology combinations nor the secured packet nor the HPLMN indication that 'no change of the "Operator Controlled PLMN Selector with Access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided' is received in the REGISTRATION ACCEPT message, when the UE performs initial registration in a VPLMN or if the steering of roaming information is received but the security check is not successful; and

b) the current chosen VPLMN is not contained in the list of "PLMNs where registration was aborted due to SOR", not part of "User Controlled PLMN Selector with Access Technology" list, the UE is not in manual mode of operation;

then the UE shall send the REGISTRATION COMPLETE message to the serving AMF without including an SOR transparent container, release the current N1 NAS signalling connection locally, store the PLMN identity in the list of "PLMNs where registration was aborted due to SOR" and attempt to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired, with an exception that the current PLMN is considered as lowest priority, and skip steps 9 to 12. If the UE has an established emergency PDU session (see 3GPP TS 24.501 [64]), the UE shall release the current N1 NAS signalling connection locally after the release of the emergency PDU session;

NOTE 6: When the UE is in the manual mode of operation or the current chosen VPLMN is part of the "User Controlled PLMN Selector with Access Technology" list, the UE stays on the VPLMN.

9) The UE to the VPLMN AMF: If the UDM has requested an acknowledgement from the UE:

the UE verified that the steering of roaming information has been provided by the HPLMN in step 7, the UE sends the REGISTRATION COMPLETE message to the serving AMF with an SOR transparent container including the UE acknowledgement; and

if the steering of roaming information contained a secured packet and the security check was successful, then when the UE receives the USAT REFRESH command qualifier of type "Steering of Roaming", it performs items a), b) and c) of the procedure for steering of roaming in subclause 4.4.6.

10) The VPLMN AMF to the HPLMN UDM: If an SOR transparent container is received in the REGISTRATION COMPLETE message, the AMF uses the Nudm\_SDM\_Info service operation to provide the received SOR transparent container to the UDM. If the HPLMN decided that the UE is to acknowledge the successful security check of the received steering of roaming information in step 4, the UDM verifies that the acknowledgement is provided by the UE as specified in 3GPP TS 33.501 [66];

10a) The HPLMN UDM to the SOR-AF: Nsoraf\_SoR\_Info (SUPI of the UE, successful delivery). If the HPLMN policy for the SOR-AF invocation is present and the HPLMN UDM received and verified the UE acknowledgement in step 10, then the HPLMN UDM informs the SOR-AF about successful delivery of the list of preferred PLMN/access technology combinations, or of the secured packet to the UE;

11) If the UE has a list of available PLMNs in the area and based on this list the UE determines that there is a higher priority PLMN than the currently camped chosen VPLMN and the UE is in automatic network selection mode, then the UE shall attempt to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired after the release of the N1 NAS signalling connection. If the N1 NAS signaling connection is not released after implementation dependent time, the UE may locally release the N1 signaling connection except when the UE has an established emergency PDU session (see 3GPP TS 24.501 [64]); and

12) The UE deletes the list of "PLMNs where registration was aborted due to SOR".

The list of "PLMNs where registration was aborted due to SOR" is deleted when the UE is switched off or the USIM is removed.

When the UE performs initial registration for emergency services (see 3GPP TS 24.501 [64] and 3GPP TS 23.502 [63]) while the UE has a valid USIM and the AMF performs the authentication procedure, then based on HPLMN policy, the SOR procedure described in this subclause may apply.

If:

- the UE in manual mode of operation encounters scenario mentioned in subclause 8(a) above; and

- upon switching to automatic network selection mode the UE remembers that it is still registered on the PLMN where the missing or security check failure of SOR information was encountered as described in subclause 8(a);

the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3, by acting as if timer T that controls periodic attempts has expired, with an exception that the current registered PLMN is considered as lowest priority. If the UE has an established emergency PDU session then the UE shall attempt to perform the PLMN selection subsequently after the emergency PDU session is released.

NOTE 7: The receipt of the steering of roaming information by itself does not trigger the release of the emergency PDU session.

\* \* \* Next Change \* \* \* \*

# C.3 Stage-2 flow for steering of UE in VPLMN after registration

The stage-2 flow for the steering of UE in VPLMN after registration is indicated in figure C.3.1. The flow is triggered:

- When the SOR-AF provides the HPLMN UDM with a new list of preferred PLMN/access technology combinations or a secured packet for a UE identified by SUPI; or

- When a new list of preferred PLMN/access technology combinations or a secured packet becomes available in the HPLMN UDM.

NOTE: Before notifying the HPLMN UDM, the SOR-AF, based on operator policies or criteria, can obtain the user location information by triggering the unified location service exposure procedure as defined in 3GPP TS 23.273 [70] subclause 6.5, or additionally based on implementation specific criteria, by requesting the UE location information from other application function using implementation specific method. This user location information can then be used in the SOR-AF algorithms.

Editor's Note: If the SOR-AF requests the user location information by triggering the unified location service exposure procedure as defined in 3GPP TS 23.273 [70], the impact on CT4 specification is FFS.

Figure C.3.1: Procedure for providing list of preferred PLMN/access technology combinations after registration

For the steps below, security protection is described in 3GPP TS 33.501 [24].

0) The SOR-AF to the HPLMN UDM: Update request is sent to the HPLMN UDM to trigger the update of the UE with the new list of preferred PLMN/access technology combinations or a secured packet for a UE identified by SUPI.

1) The HPLMN UDM to the VPLMN AMF: The UDM notifies the changes of the user profile to the affected AMF by the means of invoking Nudm\_SDM\_Notification service operation. The Nudm\_SDM\_Notification service operation contains the steering of roaming information that needs to be delivery transparently to the UE over NAS within the Access and Mobility Subscription data. If the HPLMN decided that the UE is to acknowledge successful security check of the received steering of roaming information, the Nudm\_SDM\_Notification service operation also contains an indication that the UDM requests an acknowledgement from the UE as part of the steering of roaming information;

2) The VPLMN AMF to the UE: the AMF sends a DL NAS TRANSPORT message to the served UE. The AMF includes in the DL NAS TRANSPORT message the steering of roaming information received from the UDM.

3) Upon receiving the steering of roaming information, the UE shall perform a security check on the list of preferred PLMN/access technology combinations included in the DL NAS TRANSPORT message to verify that the list of preferred PLMN/access technology combinations is provided by HPLMN, and:

a) if the security check is successful and:

- if the steering of roaming information contains a secured packet (see 3GPP TS 31.115 [67]), the ME shall upload the secured packet to the USIM using procedures in 3GPP TS 31.111 [41];

NOTE 1: How the ME handles UICC responses and failures in communication between the ME and UICC is implementation specific and out of scope of this release of the specification.

When the ME receives a USAT REFRESH command qualifier (see 3GPP TS 31.111 [41]) of type "Steering of Roaming" it performs the procedure for steering of roaming in subclause 4.4.6 with an exception that if the UE is in automatic network selection mode, then the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority PLMN (specified in subclause 4.4.6 bullet d);

- otherwise, the ME shall replace the highest priority entries in the "Operator Controlled PLMN Selector with Access Technology" list stored in the ME with the received list of preferred PLMN/access technology combinations. If the UE is in automatic network selection mode, then the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired.

If the UE has an established emergency PDU session then the UE shall attempt to perform the PLMN selection subsequently after the emergency PDU session is released.

NOTE 2: The receipt of the steering of roaming information by itself does not trigger the release of the emergency PDU session.

If the UDM has not requested an acknowledgement from the UE then steps 4 and 5 are skipped; and

b) if the security check is not successful and the UE is in automatic network selection mode, then the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3 by acting as if timer T that controls periodic attempts has expired, with an exception that the current PLMN is considered as lowest priority. If the UE has an established emergency PDU session then the UE shall attempt to perform the PLMN selection after the emergency PDU session is released.

NOTE 3: The receipt of the steering of roaming information by itself does not trigger the release of the emergency PDU session.

If the UDM has not requested an acknowledgement from the UE then steps 4 and 5 are skipped;

NOTE 4: When the UE is in the manual mode of operation or the current chosen VPLMN is part of the "User Controlled PLMN Selector with Access Technology" list, the UE stays on the VPLMN.

4) The UE to the VPLMN AMF: if the UDM has requested an acknowledgement from the UE in the DL NAS TRANSPORT message and the security check in step 2 was successful, the UE sends an UL NAS TRANSPORT message to the serving AMF with an SOR transparent container including the UE acknowledgement; and

5) The VPLMN AMF to the HPLMN UDM: If the UL NAS TRANSPORT message with an SOR transparent container is received, the AMF uses the Nudm\_SDM\_Info service operation to provide the received SOR transparent container to the UDM. If the HPLMN decided that the UE is to acknowledge successful security check of the received list of preferred PLMN/access technology combinations in step 1, the UDM verifies that the acknowledgement is provided by the UE.

If the present flow was invoked by the HPLMN UDM being notified by the SOR-AF about a change in the list of preferred PLMN/access technology combinations or a secured packet for a UE identified by SUPI using an Nsoraf\_SoR\_Notify service operation, and the HPLMN UDM verification of the UE acknowledgement is successful, then the HPLMN UDM informs the SOR-AF about successful delivery of the list of preferred PLMN/access technology combinations, or of the secured packet to the UE, using Nsoraf\_SoR\_Info (SUPI of the UE, successful delivery).

6) The HPLMN UDM to the SOR-AF: Nsoraf\_SoR\_Info (SUPI of the UE, successful delivery). If the HPLMN policy for the SOR-AF invocation is present and the HPLMN UDM received and verified the UE acknowledgement in step 5, then the HPLMN UDM informs the SOR-AF about successful delivery of the list of preferred PLMN/access technology combinations, or of the secured packet to the UE.

If:

- the UE in manual mode of operation encounters security check failure of SOR information in DL NAS TRANSPORT message; and

- upon switching to automatic network selection mode the UE remembers that it is still registered on the PLMN where the security check failure of SOR information was encountered;

the UE shall wait until it moves to idle mode or 5GMM-CONNECTED mode with RRC inactive indication (see 3GPP TS 24.501 [64]) before attempting to obtain service on a higher priority PLMN as specified in subclause 4.4.3.3, by acting as if timer T that controls periodic attempts has expired, with an exception that the current registered PLMN is considered as lowest priority. If the UE has an established emergency PDU session then the UE shall attempt to perform the PLMN selection after the emergency PDU session is released.

NOTE 5: The receipt of the steering of roaming information by itself does not trigger the release of the emergency PDU session.

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