**3GPP TSG-CT WG1 Meeting #130-eC1-21xxxx was C1-212951**

**Electronic meeting, 20-28 May 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.122** | **CR** | **0708** | **rev** | **1** | **Current version:** |  **17.2.0** |  |
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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 |  | Core Network | **x** |

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| ***Title:***  | PLMN selection triggered by V2X communication over PC5 |
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| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | eV2XARC |  | ***Date:*** | 2021-05-06 |
|  |  |  |  |  |
| ***Category:*** | **A** |  | ***Release:*** | Rel-17 |
|  | *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)Rel-17 (Release 17)* |
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| ***Reason for change:*** | V2X communication for E-UTRA-PC5 and NR-PC5 are supported in both 4G V2X and 5G V2X. In other word, if UE finds a cell belongs to a PLMN authorized for V2X communications over E-UTRA-PC5, NR-PC5 or both referecne points and provided radio resources for V2X servcie over E-UTRA-PC5, NR-PC5, or both reference pointsthe UE may have access to the PLMN over E-UTRAN if EPS services is allowed, or over 5GCN if the UE’s N1 mode is not disabled. But in current PLMN selection triggered by V2X communication over PC5, the following information is missing:1. E-UTRA-PC5 and NR-PC5 reference points are not specified.
2. The case that UE can select a PLMN where UE’s N1 mode is not disabled to be authorized V2X communications when other conditions are satisfied.
3. If the conditions 1), 2) and 3) of subclause iii) are satisfied and registration to EPC the PLMN fails due to “PLMN not allowed” or “EPS service not allowed”, but the condition 1), 2) and 4) of subclause iii) are satisfied, the UE still may initiate the registration to the 5GCN of the PLMN. So further descrption in subcluase iv) and C1) should be done only after the failue of both EPC and 5GCN of the PLMN if 1) through 4) of subclause iii) are all satisfied.
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| ***Summary of change:*** | 1. Specify PC5 reference point means E-UTRA-PC5, or NR-PC5, or both
2. Add the case UE may select a PLMN if the UE’s N1 mode is not disabled in the PLMN.
3. Take into account the case that 1) through 4) of subclause iii) are all satisfied. In this case, only after the failure of registration in both EPC due to "PLMN not allowed" or "EPS services not allowed" and 5GCN due to "PLMN not allowed" or "5GS services not allowed", should the UE behave further according to subclause iv) and C1).
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| ***Consequences if not approved:*** | The description to the supporting of 5G V2X is not exhaustive.  |
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| ***Clauses affected:*** | 3.1C  |
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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:*** |  |
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| ***This CR's revision history:*** |  |

\*\*\*\*\* change \*\*\*\*\*

##  3.1C PLMN selection triggered by V2X communication over PC5

If the MS supports V2X communication over E-UTRA-PC5 or NR-PC5 and needs to perform PLMN selection for V2X communication over PC5 as specified in 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75], then the MS shall proceed as follows:

i) the MS shall store a duplicate value of the RPLMN and a duplicate of the PLMN selection mode that were in use before PLMN selection due to V2X communication over PC5 was initiated, unless this PLMN selection due to V2X communication over PC5 follows another PLMN selection due to V2X communication over PC5 or a manual CSG selection as specified in subclause 4.4.3.1.3.3;

 ii) the MS shall enter into Automatic mode of PLMN selection as specified in subclause 4.4 taking into account the additional requirements in items iii) to x) below;

iii) Among the PLMNs advertised by the E-UTRA cell or NG-RAN operating in the radio resources provisioned to the MS for V2X communication over PC5 as specified in 3GPP TS 24.385 [60], 3GPP TS 24.587 [75] or 3GPP TS 31.102 [40], the MS shall choose one allowable PLMN which meets:

1) the following:

- provides radio resources for V2X communication over PC5;

- is in the list of authorised PLMNs for V2X communication over PC5 as specified in 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75]; and

- is not in the list of "PLMNs with E-UTRAN not allowed" as specified in subclause 3.1; or

2) the following:

- provides radio resources for V2X communication over PC5;

- is in the list of authorised PLMNs for V2X communication over PC5 as specified in 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75];

- is not in the list of PLMNs where the N1 mode capability was disabled due to IMS voice not available and the MS’s usage setting was "voice centric" as PLMNs where voice service was not possible; and

- is not in the list of PLMNs where the N1 mode capability was disabled due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed" in N1 mode as specified in subclause 3.1;

 if condition 1) or 2) above are met then the MS shall attempt to register on that PLMN. If none of the PLMNs meet condition 1) or 2) above, the MS shall return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action;

iv) if the registration fails due to "PLMN not allowed" or "EPS services not allowed" as specified in 3GPP TS 24.386 [59], or due to "PLMN not allowed" or "5GS services not allowed" as specified in 3GPP TS 24.587 [75], or both, then the MS shall update the appropriate list of forbidden PLMNs as specified in subclause 3.1, and shall:

A) if the PLMN provides common radio resources needed by the MS to do V2X communication over PC5 as specified in 3GPP TS 36.331 [42] or 3GPP TS 38.331 [65], perform V2X communication over PC5 on the selected PLMN in limited service state. In this case the MS shall not search for available and allowable PLMNs during the duration of V2X communication over PC5;

B) return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action; or

C) perform the action described in iii) again with the choice of PLMNs further excluding the PLMNs on which the MS has failed to register.

 Whether the MS performs A), B) or C) above is left up to MS implementation.

v) if the registration fails due to causes other than "PLMN not allowed" or "EPS services not allowed" or "5GS services not allowed", the MS shall:

- if the handling of the failure requires updating a list of forbidden PLMNs, update the appropriate list (as specified in 3GPP TS 24.301 [23A] or 3GPP TS 24.501 [64]); and

- if the handling of the failure does not require updating a list of forbidden PLMNs (as specified in 3GPP TS 24.301 [23A] or 3GPP TS 24.501 [64]), remember the PLMN as a PLMN on which the MS has failed to register;

NOTE 1: How long the MS memorizes the PLMNs on which it has failed to register is implementation dependent.

 and the MS shall:

A1) return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action;

B1) perform the action described in iii) again with the choice of PLMNs further excluding the PLMNs on which the MS has failed to register; or

C1) perform V2X communication over PC5 in limited service state on a PLMN advertised by the cell operating in the radio resources provisioned to the MS for V2X communication over PC5 as specified in 3GPP TS 24.385 [60], 3GPP TS 24.587 [75] or 3GPP TS 31.102 [40], if registration on this PLMN has previously failed due to "PLMN not allowed" or "EPS services not allowed" as specified in 3GPP TS 24.386 [59], or due to "PLMN not allowed" or "5GS services not allowed", or both, as specified in 3GPP TS 24.587 [75], and if this PLMN provides common radio resources needed by the MS to do V2X communication over PC5 as specified in 3GPP TS 36.331 [42] or 3GPP TS 38.331 [65]. In this case the MS shall not search for available and allowable PLMNs during the duration of V2X communication over PC5;

 Whether the MS performs A1), B1) or C1) above is left up to MS implementation.

vi) if the MS is no longer in the coverage of the selected PLMN, then the MS shall:

A2) perform V2X communication over PC5 procedures for MS to use provisioned radio resources as specified in 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75]; or

B2) return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action.

 Whether the MS performs A2) or B2) above is left up to MS implementation.

vii) if the MS is unable to find a suitable cell on the selected PLMN as specified in 3GPP TS 24.386 [59] or 3GPP TS 24.587 [75], then the MS shall:

A3) if the PLMN provides common radio resources needed by the MS to do V2X communication over PC5 as specified in 3GPP TS 36.331 [42] or 3GPP TS 38.331 [65], perform V2X communication over PC5 on the selected PLMN in limited service state. In this case the MS shall not search for available and allowable PLMNs during the duration of V2X communication over PC5; or

B3) return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action.

 Whether the MS performs A3) or B3) above is left up to MS implementation.

viii) if the MS is switched off while on the selected PLMN and switched on again, the MS shall use the stored duplicate value of RPLMN as RPLMN and behave as specified in subclause 4.4.3.1;

ix) if the user initiates a PLMN selection while on the selected cell, the MS shall delete the stored duplicate value of PLMN selection mode, use the stored duplicate value of RPLMN as RPLMN and follow the procedures (as specified for switch-on or recovery from lack of coverage) in subclause 4.4.3.1. The MS shall delete the stored duplicate value of RPLMN once the MS has successfully registered to the selected PLMN; and

x) if the MS no longer needs to perform V2X communication over PC5, the MS shall return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action.

NOTE 2: If the MS returns to the RPLMN due to a failure to register in the selected PLMN, the upper layers of the MS can trigger PLMN selection again to initiate V2X communication over PC5.

If the PLMN selected for V2X communication over PC5 is a VPLMN, the MS shall not periodically scan for higher priority PLMNs during the duration of V2X communication over PC5.

The solution to prevent potential ping-pong between the RPLMN and the PLMN selected for V2X communication over PC5 is MS implementation specific.

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