**3GPP TSG-RAN5 Meeting #92-e *R5-21????***

**Electronic Meeting, 16th Aug– 27th Aug 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.523-1** | **CR** | **????** | **rev** | **-** | **Current version:** | **16.8.0** |  |
|  | | | | | | | | |
| *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 |  |

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| ***Title:*** | Correction to NR TC 6.4.1.2-Cell reselection of ePLMN in manual mode | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GS\_NR\_LTE-UEConTest | | | | |  | ***Date:*** | | | 2021-08-18 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1, step 6A-6D called the step 5-8 of generic procedure in Table 4.5.4.2-3 of TS 38.508-1. However, no Service Request procedure occurred in this test case, the SERVICE ACCEPT msg in step 7 of Table 4.5.4.2-3 should be excluded when called for this TC.  No service Accept msg should be included | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1, Add a note to say: No SERVICE ACCEPT message should be included in step 6C (corresponding to step 7 of Table 4.5.4.2-3 in TS 38.508-1 [4]). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | A Conformant UE may fail the TC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.4.1.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

**<Start of modified section 1>**

#### 6.4.1.2 Cell reselection of ePLMN in manual mode

6.4.1.2.1 Test Purpose (TP)

(1)

**with** { UE in NR RRC\_INACTIVE state on a NR cell in manual PLMN Selection mode and network has downloaded a list of equivalent PLMNs during the Registration procedure }

**ensure that** {

**when** { Higher ranked cell is a cell of a PLMN in the downloaded equivalent PLMN list }

**then** { UE reselects to the equivalent PLMN cell , and attempts Registration with mobility on the selected cell. }

}

(2)

**with** { UE in NR RRC\_INACTIVE state on a cell and network has downloaded a list of equivalent PLMNs during Registration procedure for mobility }

**ensure that** {

**when** { Highest ranked cell is a cell of a PLMN not in the downloaded equivalent PLMN list }

**then** { UE does not reselect to the cell. }

}

6.4.1.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 23.122 clauses 4.4.3.1.2 and TS 38.304, clauses 4.1 and clauses 4.2. Unless otherwise stated these are Rel-15 requirements.

[TS 23.122, clause 4.4.3.1.2]

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list, "forbidden PLMNs for GPRS service" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;

ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);

iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

iv)- other PLMN/access technology combinations with received high quality signal in random order;

v)- other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, an MS using a SIM without access technology information storage (i.e. the "User Controlled PLMN Selector with Access Technology" and the "Operator Controlled PLMN Selector with Access Technology" data files are not present) shall instead present the PLMNs contained in the "PLMN Selector" data file in the SIM (in priority order).

In v, requirement h) in subclause 4.4.3.1.1 applies.

In i to v, requirements j), k) and l) in subclause 4.4.3.1.1 apply.

In GSM COMPACT, the non support of voice services shall be indicated to the user.

The HPLMN may provide on the SIM additional information on the available PLMNs. If this information is provided then the MS shall indicate it to the user. This information, provided as free text may include:

- preferred partner,

- roaming agreement status,

- supported services

Furthermore, the MS may indicate whether the available PLMNs are present on the EHPLMN list, the Forbidden list, the User Controlled PLMN List or the Operator Controlled PLMN List. The MS may also indicate that the PLMN is not present on any of these lists.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden location areas for roaming", "forbidden tracking areas for roaming", "5GS forbidden tracking areas for roaming", "forbidden location areas for regional provision of service", "forbidden tracking areas for regional provision of service", "5GS forbidden tracking areas for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

NOTE 1: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology selected by the user is only used for initial registration on the selected PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order, and is only used for initial registration.

Once the MS has registered on a PLMN selected by the user, the MS shall not automatically register on a different PLMN unless:

i) the new PLMN is declared as an equivalent PLMN by the registered PLMN;

ii) the user selects automatic mode;

iii) the user initiates an emergency call while the MS is in limited service state and either the network does not broadcast the indication of support of emergency calls in limited service state, the registration request for emergency services is rejected by the network or the attach request for emergency bearer services is rejected by the network; or

iv) the user initiates access to RLOS, while the MS is in limited service state and either the network does not broadcast the indication of support of RLOS in limited service state, or the EPS attach request for access to RLOS is rejected by the network.

NOTE 2: If case iii) or iv) occurs, the MS can provide an indication to the upper layers that the MS has exited manual network selection mode.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE 3: High quality signal is defined in the appropriate AS specification.

[TS 38.304, clause 4.1]

The RRC\_IDLE state and RRC\_INACTIVE state tasks can be subdivided into three processes:

- PLMN selection;

- Cell selection and reselection;

- Location registration and RNA update.

PLMN selection, cell reselection procedures, and location registration are common for both RRC\_IDLE state and RRC\_INACTIVE state. RNA update is only applicable for RRC\_INACTIVE state. When UE selects a new PLMN, UE transitions from RRC\_INACTIVE to RRC\_IDLE, as specified in TS 24.501 [14].

When a UE is switched on, a public land mobile network (PLMN) is selected by NAS. For the selected PLMN, associated RAT(s) may be set, as specified in TS 23.122 [9]. The NAS shall provide a list of equivalent PLMNs, if available, that the AS shall use for cell selection and cell reselection.

With cell selection, the UE searches for a suitable cell of the selected PLMN, chooses that cell to provide available services, and monitors its control channel. This procedure is defined as "camping on the cell".

The UE shall, if necessary, then register its presence, by means of a NAS registration procedure, in the tracking area of the chosen cell. As an outcome of a successful Location Registration, the selected PLMN then becomes the registered PLMN, as specified in TS 23.122 [9].

If the UE finds a more suitable cell, according to the cell reselection criteria, it reselects onto that cell and camps on it. If the new cell does not belong to at least one tracking area to which the UE is registered, location registration is performed. In RRC\_INACTIVE state, if the new cell does not belong to the configured RNA, an RNA update procedure is performed.

If necessary, the UE shall search for higher priority PLMNs at regular time intervals as described in TS 23.122 [9] and search for a suitable cell if another PLMN has been selected by NAS.

If the UE loses coverage of the registered PLMN, either a new PLMN is selected automatically (automatic mode), or an indication of available PLMNs is given to the user so that a manual selection can be performed (manual mode).

Registration is not performed by UEs only capable of services that need no registration.

The purpose of camping on a cell in RRC\_IDLE state and RRC\_INACTIVE state is fourfold:

a) It enables the UE to receive system information from the PLMN.

b) When registered and if the UE wishes to establish an RRC connection or resume a suspended RRC connection, it can do this by initially accessing the network on the control channel of the cell on which it is camped.

c) If the network needs to send a message or deliver data to the registered UE, it knows (in most cases) the set of tracking areas (in RRC\_IDLE state) or RNA (in RRC\_INACTIVE state) in which the UE is camped. It can then send a "paging" message for the UE on the control channels of all the cells in the corresponding set of areas. The UE will then receive the paging message and can respond.

d) It enables the UE to receive ETWS and CMAS notifications.

When the UE is in RRC\_IDLE state, upper layers may deactivate AS layer when MICO mode is activated as specified in TS 24.501 [14]. When MICO mode is activated, the AS configuration (e.g. priorities provided by dedicated signalling) is kept and all running timers continue to run but the UE need not perform any idle mode tasks. If a timer expires while MICO mode is activated it is up to the UE implementation whether it performs the corresponding action immediately or the latest when MICO mode is deactivated. When MICO mode is deactivated, the UE shall perform all idle mode tasks.

[TS 38.304, clause 4.2]

Table 4.2-1 presents the functional division between UE non-access stratum (NAS) and UE access stratum (AS) in RRC\_IDLE state and RRC\_INACTIVE states. The NAS part is specified in TS 23.122 [9] and the AS part in the present document.

Table 4.2-1: Functional division between AS and NAS in RRC\_IDLE state and RRC\_INACTIVE state

| RRC\_IDLE and RRC\_INACTIVE state Process | UE Non-Access Stratum | UE Access Stratum |
| --- | --- | --- |
| PLMN Selection | Maintain a list of PLMNs in priority order according to TS 23.122 [9]. Select a PLMN using automatic or manual mode as specified in TS 23.122 [9] and request AS to select a cell belonging to this PLMN. For each PLMN, associated RAT(s) may be set.  Evaluate reports of available PLMNs from AS for PLMN selection.  Maintain a list of equivalent PLMN identities. | Search for available PLMNs.  If associated RAT(s) is (are) set for the PLMN, search in this (these) RAT(s) and other RAT(s) for that PLMN as specified in TS 23.122 [9].  Perform measurements to support PLMN selection.  Synchronise to a broadcast channel to identify found PLMNs.  Report available PLMNs with associated RAT(s) to NAS on request from NAS or autonomously. |
| Cell  Selection | Control cell selection for example by indicating RAT(s) associated with the selected PLMN to be used initially in the search of a cell in the cell selection.  Maintain a list of "Forbidden Tracking Areas" and provide the list to AS. | Perform measurements needed to support cell selection.  Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.  Search for a suitable cell. The cells broadcast one or more 'PLMN identity' in the system information. Respond to NAS whether such cell is found or not.  If associated RATs is (are) set for the PLMN, perform the search in this (these) RAT(s) and other RATs for that PLMN as specified in TS 23.122 [9].  If a cell is found which satisfies cell selection criteria, camp on that cell. |
| Cell  Reselection | Maintain a list of equivalent PLMN identities and provide the list to AS.  Maintain a list of "Forbidden Tracking Areas" and provide the list to AS. | Perform measurements needed to support cell reselection.  Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.  Change cell if a more suitable cell is found. |
| Location registration | Register the UE as active after power on.  Register the UE's presence in a registration area, for instance regularly or when entering a new tracking area.  Deregister UE when shutting down.  Maintain a list of "Forbidden Tracking Areas". | Report registration area information to NAS. |
| RAN Notification Area Update | Not applicable. | Register the UE's presence in a RAN-based notification area (RNA), periodically or when entering a new RNA. |

6.4.1.2.3 Test description

6.4.1.2.3.1 Pre-test conditions

System Simulator:

- NR Cell 1, NR Cell 12 and NR Cell 13 are configured according to TS 38.508-1, Table 4.4.2-3.

- System information combination NR-4 as defined in TS 38.508-1 [4] clause 4.4.3.1.2-1 is used in NR cell 1 and NR cell 12.

- System information combination NR-1 as defined in TS 38.508-1 [4] clause 4.4.3.1.2-1 is used in NR cell 13.

UE:

- The UE is in Manual PLMN selection mode.

Preamble:

- The UE is registered on NR Cell 1 except that the REGISTRATION ACCEPT message indicates the PLMN of NR Cell 12 in the Equivalent PLMN list as described in Table 6.4.1.2.3.3-4.

- The UE is in state 2N-A as defined in TS 38.508-1 [4], Table 4.4A.2-2 on NR Cell 1.

6.4.1.2.3.2 Test procedure sequence

Table 6.4.1.2.3.2-1 for FR1 and Table 6.4.1.2.3.2-2 for FR2 illustrates the downlink power levels and other changing parameters to be applied for the cells at various time instants of the test execution. Row marked "T0" denotes the initial conditions after preamble, while columns marked "T1", "T2" and "T3" are to be applied subsequently in the Main behaviour. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 6.4.1.2.3.2-1: Cell configuration changes over time for FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | NR Cell 13 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -99 | -88 | -78 |  |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | “Off” | “Off” | “Off” | Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.1-3 |

Table 6.4.1.2.3.2-2: Cell configuration changes over time for FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | NR Cell 13 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | FFS | FFS | FFS |  |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | “Off” | “Off” | “Off” | Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.2-2 |

Table 6.4.1.2.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | SS adjusts cell levels according to row T0 of table 6.4.1.2.3.2-1/2. | - | - | - | - |
| 2 | Check: Does the UE transmit an *RRCResumeRequest* message on NR Cell 12? | --> | NR RRC: *RRCResumeRequest* | 1 | P |
| 3-6 | Steps 2 to 5 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 with condition MOBILITY are performed. (Note 1) | - | - | - | - |
| 6A-6D | Steps 5 to 8 of the generic test procedure in TS 38.508-1 Table 4.5.4.2-3. (Note 3) | - | - | - | - |
| 7 | The SS transmits an *RRCRelease* message with suspend. | --> | NR RRC:RRCRelease | - | - |
| 8 | Check: Does the UE send an *RRCResumeRequest* on NR Cell 13 and NR Cell 1 within 60s? | --> | NR RRC: *RRCResumeRequest* | 2 | F |
| 9 | SS adjusts cell levels according to row T1 of table 6.4.1.2.3.2-1/2. | - | - | - | - |
| 10 | Set UE to Automatic PLMN selection mode. (Note 2) | - | - | - | - |
| Note 1: The REGISTRATION REQUEST is accepted with the PLMN of NR Cell 1 listed as an Equivalent PLMN.  Note 2: Steps 10 is to ensure UE is set back to automatic PLMN selection mode for the next test case.  Note 3: No SERVICE ACCEPT message should be included in step 6C (corresponding to step 7 of Table 4.5.4.2-3 in TS 38.508-1 [4]). | | | | | |

6.4.1.2.3.3 Specific message contents

Table 6.4.1.2.3.3-1: *SIB4* for NR Cell 1 (preamble and all steps, Table 6.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 38.508-1 [4] Table 4.6.2-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| SIB4 ::= SEQUENCE { |  |  |  |
| interFreqCarrierFreqList SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo { | 2 entries |  |  |
| InterFreqCarrierFreqInfo[1] SEQUENCE { |  | entry 1 |  |
| dl-CarrierFreq | Same downlink NR ARFCN as used for NR Cell 12 |  |  |
| cellReselectionPriority | 4 |  |  |
| } |  |  |  |
| InterFreqCarrierFreqInfo[2] SEQUENCE { |  | entry 2 |  |
| dl-CarrierFreq | Same downlink NR ARFCN as used for NR Cell 13 |  |  |
| cellReselectionPriority | 4 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 6.4.1.2.3.3-2: *SIB4* for NR Cell 12 (preamble and all steps, Table 6.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 38.508-1 [4] Table 4.6.2-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| SIB4 ::= SEQUENCE { |  |  |  |
| interFreqCarrierFreqList SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo { | 2 entries |  |  |
| InterFreqCarrierFreqInfo[1] SEQUENCE { |  | entry 1 |  |
| dl-CarrierFreq | Same downlink NR ARFCN as used for NR Cell 1 |  |  |
| cellReselectionPriority | 4 |  |  |
| } |  |  |  |
| InterFreqCarrierFreqInfo[2] SEQUENCE { |  | entry 2 |  |
| dl-CarrierFreq | Same downlink NR ARFCN as used for NR Cell 13 |  |  |
| cellReselectionPriority | 4 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 6.4.1.2.3.3-3: REGISTRATION ACCEPT for NR Cell 1 (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 38.508-1 [4] Table 4.7.1-7 | | | |
| **Information Element** | **Value/Remark** | **Comment** | **Condition** |
| Equivalent PLMNs | The PLMN of NR Cell 12 |  |  |

Table 6.4.1.2.3.3-4: REGISTRATION ACCEPT for NR Cell 12 (step 5, Table 6.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 38.508-1 [4] Table 4.7.1-7 | | | |
| **Information Element** | **Value/Remark** | **Comment** | **Condition** |
| Equivalent PLMNs | The PLMN of NR Cell 1 |  |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0010’B |  |  |
| Mapped HPLMN SST | Same as SST |  |  |

Table 6.4.1.2.3.3-4A: RRCReconfiguration for NR Cell 12 (step 6C, Table 6.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 38.508-1 [4] Table 4.6.1-13 with condition NR | | | |
| **Information Element** | **Value/Remark** | **Comment** | **Condition** |
| dedicatedNAS-MessageList | Not Present |  |  |

Table 6.4.1.2.3.3-5: *RRCRelease* (step 7, Table 6.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [4], Table 4.6.1-4B | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| suspendConfig SEQUENCE { |  |  | NR\_RRC\_INACTIVE |
| ran-NotificationAreaInfo CHOICE { |  |  |  |
| cellList SEQUENCE { |  |  |  |
| plmn-Identity |  | PLMN ID of NR Cell 12 |  |
| ran-AreaCells SEQUENCE { |  |  |  |
| cellIdentity | See Table 4.4.2-2 and 4.4.2-3 in TS 38.508-1 [4] | Cell Identity of NR Cell 12 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

**<End of modified section 1>**