**3GPP TSG-RAN2 Meeting #118-e *R2-2206825***

**Electronic meeting, 9th - 20th May, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **2872** | **rev** | **2** | **Current version:** | **17.0.0** |  |
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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 | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Early Measurements for EPS fallback |
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| ***Source to WG:*** |  vivo, China Telecom, CMCC, SoftBank, China Unicom, Vodafone |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | TEI17 |  | ***Date:*** | 2022-05-27 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | In order to support various deployment scenarios for obtaining IMS voice service, the UE and NG-RAN may support RAT fallback or EPS Fallback. And the EPS/RAT Fallback procedure may be triggered when the request for establishing the QoS flow for IMS voice reaches the supported NG-RAN. However, in the real network, the delay of IMS voice based on EPS Fallback is around 2s to 4s, which highly impacts the user experience.This CR captures the note for UE implementation and indication for early measurement for EPS fallback based on the below RAN2 agreements in RAN2#118-e meeting. * P1: Note: When idleModMeasVoiceFallback is included in SIB5, UE is allowed to measure and report idle/inactive measurements for EUTRA carrier frequencies included in SIB5 even if it does not support NE-DC between the serving carrier and the EUTRA carrier frequencies.
* P2: One bit “idleModeMeasVoiceFallback” is broadcasted in SIB5 and indicates whether the cell supports to use E-UTRA idle/inactive measurements and reporting for EPS fallback.

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| ***Summary of change:*** | * In 5.7.8.2a, add a Note.
* In 6.3.1, introducing an indication in SIB5 to indicate early measurement for EPS/RAT Fallback.

**Impact analysis****Impacted 5G architecture options:** NR SA, NR-DC, NE-DC**Impacted functionality:**Idle/inactive measurement  **Inter-operability analysis:**1. If the network is implemented according to the CR and the UE is not, no inter-operability issues are expected.2. If the UE is implemented according to the CR and the network is not, no inter-operability issues are expected. |
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| ***Consequences if not approved:*** | The latency may be too long for IMS voice |
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| ***Clauses affected:*** | 5.7.8, 6.3.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  |   |
| ***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's revision history:*** |  |

Start of change

5.7.8 Idle/inactive Measurements

5.7.8.2a Performing measurements

When performing measurements on NR carriers according to this clause, the UE shall derive the cell quality as specified in 5.5.3.3 and consider the beam quality to be the value of the measurement results of the concerned beam, where each result is averaged as described in TS 38.215 [9].

While in RRC\_IDLE or RRC\_INACTIVE, and T331 is running and and T319a is not running, the UE shall:

1> perform the measurements in accordance with the following:

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListEUTRA* and the *SIB1* contains *idleModeMeasurementsEUTRA*:

3> for each entry in *measIdleCarrierListEUTRA* within *VarMeasIdleConfig*:

4> if UE supports NE-DC between the serving carrier and the carrier frequency indicated by *carrierFreqEUTRA* within the corresponding entry:

5> perform measurements in the carrier frequency and bandwidth indicated by *carrierFreqEUTRA* and *allowedMeasBandwidth* within the corresponding entry;

5> if the *reportQuantitiesEUTRA* is set to *rsrq*:

6> consider RSRQ as the sorting quantity;

5> else:

6> consider RSRP as the sorting quantity;

5> if the *measCellListEUTRA* is included:

6> consider cells identified by each entry within the *measCellListEUTRA* to be applicable for idle/inactive mode measurement reporting;

5> else:

6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;

5> for all cells applicable for idle/inactive measurement reporting, derive measurement results for the measurement quantities indicated by *reportQuantitiesEUTRA;*

5> store the derived measurement results as indicated by *reportQuantitiesEUTRA* within the *measReportIdleEUTRA* in *VarMeasIdleReport* in decreasing order of the sorting quantity, i.e. the best cell is included first, as follows:

6> if *qualityThresholdEUTRA* is configured:

7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThresholdEUTRA;*

6> else:

7> include the measurement results from all cells applicable for idle/inactive measurement reporting;

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and the SIB1 contains *idleModeMeasurementsNR*:

3> for each entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* that contains *ssb-MeasConfig*:

4> if UE supports carrier aggregation or NR-DC between serving carrier and the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry:

5> perform measurements in the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry;

5> if the *reportQuantities* is set to rsrq:

6> consider RSRQ as the cell sorting quantity;

5> else:

6> consider RSRP as the cell sorting quantity;

5> if the *measCellListNR* is included:

6> consider cells identified by each entry within the *measCellListNR* to be applicable for idle/inactive measurement reporting;

5> else:

6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;

5> for all cells applicable for idle/inactive measurement reporting, derive cell measurement results for the measurement quantities indicated by *reportQuantities;*

5> store the derived cell measurement results as indicated by *reportQuantities* for cells applicable for idle/inactive measurement reporting within *measResultsPerCarrierListIdleNR* in the *measReportIdleNR* in *VarMeasIdleReport* in decreasing order of the cell sorting quantity, i.e. the best cell is included first, as follows:

6> if *qualityThreshold* is configured:

7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold;*

6> else:

7> include the measurement results from all cells applicable for idle/inactive measurement reporting;

5> if *beamMeasConfigIdle* is included in the associated entry in *measIdleCarrierListNR* and if UE supports *idleInactiveNR-MeasBeamReport* for the FR of the carrier frequency indicated by *carrierFreq* within the associated entry, for each cell in the measurement results:

6> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];

6> if the *reportQuantityRS-Indexes* is set to rsrq:

7> consider RSRQ as the beam sorting quantity;

6> else:

7> consider RSRP as the beam sorting quantity;

6> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:

7> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;

6> if the *includeBeamMeasurements* is set to *true*:

7> include the beam measurement results as indicated by *reportQuantityRS*-*Indexes*;

2> if, as a result of the procedure in this clause, the UE performs measurements in one or more carrier frequency indicated by *measIdleCarrierListNR* or *measIdleCarrierListEUTRA*:

3> store the cell measurement results for RSRP and RSRQ for the serving cell within *measResultServingCell* in the measReportIdleNR in *VarMeasIdleReport*.

3> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and it contains an entry with *carrierFreq* set to the value of the serving frequency:

4> if *beamMeasConfigIdle* is included in that entry, and if the UE supports *idleInactiveNR- MeasBeamReport* for the FR of the serving cell:

5> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];

5> if the *reportQuantityRS-Indexes* is set to rsrq:

6> consider RSRQ as the beam sorting quantity;

5> else:

6> consider RSRP as the beam sorting quantity;

5> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:

6> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included in *SIB2* of serving cell, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;

5> if the *includeBeamMeasurements* is set to true:

6> include the beam measurement results as indicated by *reportQuantityRS-Indexes*;

NOTE 1: How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 38.133 [14] are met for measurement reporting.

NOTE 2: The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier provided via dedicated signaling is different from the SSB configuration broadcasted in the serving cell, if any.

NOTE 3: How the UE prioritizes which frequencies to measure or report (in case it is configured with more frequencies than it can measure or report) is left to UE implementation.

NOTE 4: When idleModMeasVoiceFallback is included in SIB5, UE is allowed to measure and report idle/inactive measurements for EUTRA carrier frequencies included in SIB5 even if it does not support NE-DC between the serving carrier and the EUTRA carrier frequencies.

## 6.3 RRC information elements

### 6.3.1 System information blocks

#### – *SIB5*

*SIB5* contains information relevant only for inter-RAT cell re-selection i.e. information about E-UTRA frequencies and E-UTRAs neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

*SIB5* information element

-- ASN1START

-- TAG-SIB5-START

SIB5 ::= SEQUENCE {

 carrierFreqListEUTRA CarrierFreqListEUTRA OPTIONAL, -- Need R

 t-ReselectionEUTRA T-Reselection,

 t-ReselectionEUTRA-SF SpeedStateScaleFactors OPTIONAL, -- Need S

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[

 carrierFreqListEUTRA-v1610 CarrierFreqListEUTRA-v1610 OPTIONAL -- Need R

 ]],

 [[

 carrierFreqListEUTRA-v1700 CarrierFreqListEUTRA-v1700 OPTIONAL -- Need R

]],

 [[

 idleModeMeasVoiceFallback-v17xy ENUMERATED{true} OPTIONAL -- Need R

 ]]

}

CarrierFreqListEUTRA ::= SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA

CarrierFreqListEUTRA-v1610 ::= SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1610

CarrierFreqListEUTRA-v1700 ::= SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1700

CarrierFreqEUTRA ::= SEQUENCE {

 carrierFreq ARFCN-ValueEUTRA,

 eutra-multiBandInfoList EUTRA-MultiBandInfoList OPTIONAL, -- Need R

 eutra-FreqNeighCellList EUTRA-FreqNeighCellList OPTIONAL, -- Need R

 eutra-ExcludedCellList EUTRA-FreqExcludedCellList OPTIONAL, -- Need R

 allowedMeasBandwidth EUTRA-AllowedMeasBandwidth,

 presenceAntennaPort1 EUTRA-PresenceAntennaPort1,

 cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

 threshX-High ReselectionThreshold,

 threshX-Low ReselectionThreshold,

 q-RxLevMin INTEGER (-70..-22),

 q-QualMin INTEGER (-34..-3),

 p-MaxEUTRA INTEGER (-30..33),

 threshX-Q SEQUENCE {

 threshX-HighQ ReselectionThresholdQ,

 threshX-LowQ ReselectionThresholdQ

 } OPTIONAL -- Cond RSRQ

}

CarrierFreqEUTRA-v1610 ::= SEQUENCE {

 highSpeedEUTRACarrier-r16 ENUMERATED {true} OPTIONAL -- Need R

}

CarrierFreqEUTRA-v1700 ::= SEQUENCE {

 eutra-FreqNeighHSDN-CellList-r17 EUTRA-FreqNeighHSDN-CellList-r17 OPTIONAL -- Need R

}

EUTRA-FreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-PhysCellIdRange

EUTRA-FreqExcludedCellList ::= SEQUENCE (SIZE (1..maxEUTRA-CellExcluded)) OF EUTRA-PhysCellIdRange

EUTRA-FreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-FreqNeighCellInfo

EUTRA-FreqNeighCellInfo ::= SEQUENCE {

 physCellId EUTRA-PhysCellId,

 dummy EUTRA-Q-OffsetRange,

 q-RxLevMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

 q-QualMinOffsetCell INTEGER (1..8) OPTIONAL -- Need R

}

-- TAG-SIB5-STOP

-- ASN1STOP

| *SIB5* field descriptions |
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| ***carrierFreqListEUTRA***List of carrier frequencies of E-UTRA. If the *carrierFreqListEUTRA-v1610/ carrierFreqListEUTRA-v1700* is present, it shall contain the same number of entries, listed in the same order as in the *carrierFreqListEUTRA* (without suffix). |
| ***dummy***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***idleModeMeasVoiceFallback***indicates whether the cell supports to use E-UTRA idle/inactive measurements and reporting for EPS fallback. |
| ***eutra-ExcludedCellList***List of exclude-listed E-UTRA neighbouring cells. |
| ***eutra-FreqNeighHSDN-CellList***List of neighbouring EUTRA HSDN cells as specified in TS 36.304 [27]. |
| ***eutra-multiBandInfoList***Indicates the list of frequency bands in addition to the band represented by *carrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission* values, as defined in TS 36.101 [22], table 6.2.4-1, for the frequency bands in *eutra-multiBandInfoList* |
| ***highSpeedEUTRACarrier***If the field is present, the UE shall apply the enhanced NR-EUTRA inter-RAT measurement requirements to support high speed up to 500 km/h as specified in TS 38.133 [14] to the E-UTRA carrier. |
| ***p-MaxEUTRA***The maximum allowed transmission power in dBm on the (uplink) carrier frequency, see TS 36.304 [27]. |
| ***q-QualMin***Parameter "Q*qualmin*" in TS 36.304 [27]. Actual value Qqualmin = field value [dB]. |
| ***q-QualMinOffsetCell***Parameter "*Qqualminoffsetcell*" in TS 36.304 [27]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMin***Parameter "Q*rxlevmin*" in TS 36.304 [27]. Actual value Qrxlevmin = field value \* 2 [dBm]. |
| ***q-RxLevMinOffsetCell***Parameter "*Qrxlevminoffsetcell*" in TS 36.304 [27]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***t-ReselectionEUTRA***Parameter "TreselectionEUTRA" in TS 38.304 [20]. |
| ***threshX-High***Parameter "ThreshX, HighP" in TS 38.304 [20]. |
| ***threshX-HighQ***Parameter "ThreshX, HighQ" in TS 38.304 [20]. |
| ***threshX-Low***Parameter "ThreshX, LowP" in TS 38.304 [20]. |
| ***threshX-LowQ***Parameter "ThreshX, LowQ" in TS 38.304 [20]. |
| ***t-ReselectionEUTRA-SF***Parameter "Speed dependent ScalingFactor for TreselectionEUTRA" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20]. |

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| Conditional Presence | Explanation |
| *RSRQ* | The field is mandatory present if the *threshServingLowQ* is present in *SIB2*; otherwise it is absent. |

End of change