**3GPP TSG-RAN WG2 Meeting #128 *R2-2409986***

**Orlando, USA, 18 – 22 November 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  |
| *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 | **x** | Core Network |  |

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|  |
| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | Nokia |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_ENDC\_SON\_MDT\_enh2-Core |  | ***Date:*** | 2024-11 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** | Rel-18 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | In Rel-18 the SON/MDT functionality was enhanced to support NR-U (LBT) related enhancements. As a part of this work new IEs, *numberOfLBT-Failures* and *PerRAInfoList-v1800*, were added to the RA report to facilitate the root cause analysis in the network when LBT is applied.These parameters have not been added to the SCGFailureInformation message even if the procedure (clause 5.7.10.5) used when the SCGFailureInformation message is created refers to them:1> if at least one LBT failure indication has been received from lower layers during the random-access procedure:2> set the *numberOfLBT-Failures* to indicate the total number of random-access attempts for which LBT failure indications have been received from lower layers in the random-access procedure.[...]3> if all preamble transmissions for the successive random-access attempts associated to this CSI-RS were blocked by LBT:4> include *allPreamblesBlocked*;3> else:4> if LBT failure indication was received from lower layers for the last random-access preamble transmission attempt in the CSI-RS associated to the *csi-RS-Index*, before changing the CSI-RS for random access preamble transmission:5> include *lbt-Detected;* |
|  |  |
| ***Summary of change:*** | The SCGFailureInformation is extended with the *PerRAInfoList-v1800.*It is clarified that the *numberOfLBT-Failures* is not used in *SCGFailureInformation* message.**Impact analysis**Architecture options:NR-DCImpacted functionality: SCG failure information reporting and NR-UInter-operability: 1. If the network is implemented according to the CR and the UE is not then there is no no backward compatibility issue, as the new IEs will not be sent to the network.
2. If the UE is implemented according to the CR and the network is not then there is no backward compatibility issue, as the network will ignore the new IEs.
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| ***Consequences if not approved:*** | The UE will not be able to report the LBT related parameters with the RA parameters when the SCG failure is related to RA. This would make difficult to the network to identify the root cause of the problem.The specification remains inconsistent, as procedure description for RA information determination refers to non-existent information elements. |
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| ***Clauses affected:*** | 5.7.10.5, 6.2.2 |
|  |  |
|  | **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:*** |  |

*First Modified Subclause*

#### 5.7.10.5 RA information determination

The UE shall, for the last successfully completed or last failed random-access procedure, set the content in *ra-InformationCommon* as follows:

1> set the *absoluteFrequencyPointA* to indicate the absolute frequency of the reference resource block associated to the random-access resources used in the random-access procedure;

1> set the *locationAndBandwidth* and *subcarrierSpacing* associated to the UL BWP of the random-access resources used in the random-access procedure;

1> if contention based random-access resources are used in the random-access procedure:

2> set the *msgA\_RO-FrequencyStart* and *msgA-RO-FDM* and *msgA-SubcarrierSpacing* associated to the 2 step random- access resources if used in the random-access procedure;

2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:

3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;

2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:

3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

2> set the *msg1-FrequencyStart* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FrequencyStart* if it is included in the *ra-InformationCommon*;

2> set the *msg1-FDM* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FDMCFRA* if it is included in the *ra-InformationCommon;*

2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available, and if its value is different from the value of *msgA-SubcarrierSpacing* if it is included in the *ra-InformationCommon*:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

2> else:

3> set the *msg1-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4-step random-access procedure, and if its value is different from the value of *msgA-SCS-From-prach-ConfigurationIndex* if it is included in the *ra-InformationCommon*;

1> if contention free random-access resources are used in the random-access procedure:

2> set the *msg1-FrequencyStartCFRA* and *msg1-FDMCFRA* associated to the 4 step random-access resources if used in the random-access procedure;

2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available:

3> set the *msg1-SubcarrierSpacingCFRA* associated to the 4 step random-access resources used in the random-access procedure;

2> else:

3> set the *msg1-SCS-From-prach-ConfigurationIndexCFRA* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4 step random-access procedure;

2> set the *msgA-RO-FrequencyStartCFRA* and *msgA-RO-FDMCFRA* associated to the 2 step contention free random access resources if used in the random-access procedure;

2> set the *msgA-MCS*, the *nrofPRBs-PerMsgA-PO*, the *msgA-PUSCH-TimeDomainAllocation*, the *frequencyStartMsgA-PUSCH*, the *nrofMsgA-PO-FDM* associated to the 2 step random-access resources if used in the random-access procedure;

2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:

3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;

2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:

3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

1> if the random access procedure is initialized with *RA\_TYPE* set to *2-stepRA* as described in TS 38.321 [3]:

2> set the *dlPathlossRSRP* to the measeured RSRP of the DL pathloss reference obtained at the time of *RA\_Type* selection stage of the initialization of the RA procedure as captured in TS 38.321 [3];

2> if the configuration for the random access *msgA-TransMax* was configured in *RACH-ConfigDedicated* for this random access procedure, and *raPurpose* is set to *reconfigurationWithSync*:

3> set *msgA-TransMax* to the value of *msgA-TransMax* in *RACH-ConfigDedicated*;

2> else if *msgA-TransMax* was configured in *RACH-ConfigCommonTwoStepRA*:

3> set *msgA-TransMax* to the value of *msgA-TransMax* in *RACH-ConfigCommonTwoStepRA*;

2> set the *msgA-PUSCH-PayloadSize* to the size of the overall payload available in the UE buffer at the time of initiating the 2 step RA procedure;

1> if the purpose of the random access procedure is to request on-demand system information (i.e., if the *raPurpose* is set to *requestForOtherSI* or *msg3RequestForOtherSI*):

2> set the *intendedSIBs* to indicate the SIB(s) the UE wanted to receive as a result of the SI request;

2> set the *ssbsForSI-Acquisition* to indicate the SSB(s) used to receive the SI message;

2> if the on-demand system information acquisition was successful:

3> set the *onDemandSISuccess* to *true*;

1> if one or more of the features including RedCap and/or Slicing and/or SDT and/or MSG3 repetitions and/or MSG1 repetitions and/or eRedCap are applicable for this random-access procedure as specified in clause 5.1.1b of TS 38.321[3]:

2> set the *triggeredFeatureCombination* to indicate all the features triggering this random-access procedure as below:

3> if this random-access procedure is triggered by RedCap, include *redCap*;

3> if this random-access procedure is triggered by SDT, include *smallData*;

3> if this random-access procedure is triggered by Msg3 repetitions, include *msg3-Repetitions*;

3> if this random-access procedure is triggered by Msg1 repetitions, include *msg1-Repetitions*;

3> if this random-access procedure is triggered by eRedCap, include *eRedCap*;

3> if this random-access procedure is triggered by slicing, set *nsag* to the NSAG-ID(s) applied in the random-access procedure and set the *triggered-S-NSSAI-List* to include all the *S-NSSAI(s)* associated to the slices triggering the access attempt in the random-access procedure;

2> if the value of used feature or combination of features is different from the *triggeredFeatureCombination*:

3> set the *usedFeatureCombination* to indicate one or more features of *FeatureCombination* associated to the random-access resource used in the random-access procedure as below:

4> if RedCap is part of the used *FeatureCombination*, include *redCap*;

4> if SDT is part of the used *FeatureCombination*, include *smallData*;

4> if Msg3 repetitions is part of the used *FeatureCombination*, include *msg3-Repetitions*;

4> if Msg1 repetitions is part of the used *FeatureCombination*, include *msg1-Repetitions*;

4> if *eRedCap* is part of the used *FeatureCombination*, include *eRedCap*;

4> if NSAG(s) is part of the used *FeatureCombination*, set *nsag* to include the *NSAG-ID(s)* configured for the used *FeatureCombination*;

2> set the *startPreambleForThisPartition* to the value of *startPreambleForThisPartition* in *FeatureCombinationPreambles* associated to the used *FeatureCombination*;

2> set the *numberOfPreamblesPerSSB-ForThisPartition* to the value of *numberOfPreamblesPerSSB-ForThisPartition* in *FeatureCombinationPreambles* associated to the used *FeatureCombination*;

1> set the parameters associated to the successive random-access attempts associated to the selected beam in the *perRAInfoList* as follows:

2> if the random-access resource used is associated to a SS/PBCH block, set the associated random-access parameters for the successive random-access attempts associated to the same SS/PBCH block for one or more random-access attempts as follows:

3> set the *ssb-Index* to include the SS/PBCH block index associated to the used random-access resource;

3> set the *numberOfPreamblesSentOnSSB* to indicate the number of successive random-access attempts associated to the SS/PBCH block;

3> if all preamble transmissions for the successive random-access attempts associated to this SS/PBCH block were blocked by LBT:

4> include *allPreamblesBlocked*;

3> else:

4> if LBT failure indication was received from lower layers for the last random-access preamble transmission attempt in the SS/PBCH block associated to the *ssb-Index*, before changing the SS/PBCH block for random access preamble transmission:

5> include *lbt-Detected*;

3> for each random-access attempt performed on the random-access resource, except the random-access attempts for which LBT failure indication was received from lower layers, include the following parameters in the chronological order of the random-access attempt:

4> if the random-access attempt is performed on the contention based random-access resource and if *raPurpose* is not equal to '*requestForOtherSI*', include *contentionDetected* as follows:

5> if contention resolution was not successful as specified in TS 38.321 [6] for the transmitted preamble:

6> set the *contentionDetected* to *true*;

5> else:

6> set the *contentionDetected* to *false*;

4> if the random access attempt is a 2-step random access attempt:

5> if fallback from 2-step random access to 4-step random access occurred during the random access attempt:

6> set *fallbackToFourStepRA* to *true*;

4> if the random-access attempt is performed on the contention based random-access resource; or

4> if the random-access attempt is performed on the contention free random-access resource and if the random-access procedure was initiated due to the PDCCH ordering:

5> if the random access attempt is a 4-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *rsrp-ThresholdSSB*; or

5> if the random access attempt is a 2-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *msgA-RSRP-ThresholdSSB*:

6> set the *dlRSRPAboveThreshold* to *true*;

5> else:

6> set the *dlRSRPAboveThreshold* to *false*;

2> else if the random-access resource used is associated to a CSI-RS, set the associated random-access parameters for the successive random-access attempts associated to the same CSI-RS for one or more random-access attempts as follows:

3> set the *csi-RS-Index* to include the CSI-RS index associated to the used random-access resource;

3> set the *numberOfPreamblesSentOnCSI-RS* to indicate the number of successive random-access attempts associated to the CSI-RS;

3> if all preamble transmissions for the successive random-access attempts associated to this CSI-RS were blocked by LBT:

4> include *allPreamblesBlocked*;

3> else:

4> if LBT failure indication was received from lower layers for the last random-access preamble transmission attempt in the CSI-RS associated to the *csi-RS-Index*, before changing the CSI-RS for random access preamble transmission:

5> include *lbt-Detected;*

1> if the procedure is not invoked to include the *ra-InformationCommon* in the *SCGFailureInformation* message and if at least one LBT failure indication has been received from lower layers during the random-access procedure:

2> set the *numberOfLBT-Failures* to indicate the total number of random-access attempts for which LBT failure indications have been received from lower layers in the random-access procedure.

The UE shall, for all the BWPs in which consistent LBT failures are triggered and not cancelled (according to TS 38.321 [3]) prior to successful RA completion or prior to RLF/HOF, set the below parameters in *attemptedBWP-InfoList* in the chronological order of BWP selection:

1> set the *locationAndBandwidth* and *subcarrierSpacing* associated to the UL BWP.

NOTE 1: Void.

NOTE 2: If *allPreamblesBlocked* is included, it is left to UE implementation how to set the *numberOfPreamblesSentOnSSB-r16*, *numberOfPreamblesSentOnCSI-RS-r16* and the *perRAAttemptInfoList-r16*.

*Nex Modified Subclause*

### 6.2.2 Message definitions

*<text omitted>*

#### *– SCGFailureInformation*

The *SCGFailureInformation* message is used to provide information regarding NR SCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

*SCGFailureInformation* message

-- ASN1START

-- TAG-SCGFAILUREINFORMATION-START

SCGFailureInformation ::= SEQUENCE {

 criticalExtensions CHOICE {

 scgFailureInformation SCGFailureInformation-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

SCGFailureInformation-IEs ::= SEQUENCE {

 failureReportSCG FailureReportSCG OPTIONAL,

 nonCriticalExtension SCGFailureInformation-v1590-IEs OPTIONAL

}

SCGFailureInformation-v1590-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

FailureReportSCG ::= SEQUENCE {

 failureType ENUMERATED {

 t310-Expiry, randomAccessProblem,

 rlc-MaxNumRetx,

 synchReconfigFailureSCG, scg-ReconfigFailure,

 srb3-IntegrityFailure, other-r16, spare1},

 measResultFreqList MeasResultFreqList OPTIONAL,

 measResultSCG-Failure OCTET STRING (CONTAINING MeasResultSCG-Failure) OPTIONAL,

 ...,

 [[

 locationInfo-r16 LocationInfo-r16 OPTIONAL,

 failureType-v1610 ENUMERATED {scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,

 t312-Expiry-r16, bh-RLF-r16, beamFailure-r17, spare3, spare2, spare1} OPTIONAL

 ]],

 [[

 previousPSCellId-r17 SEQUENCE {

 physCellId-r17 PhysCellId,

 carrierFreq-r17 ARFCN-ValueNR

 } OPTIONAL,

 failedPSCellId-r17 SEQUENCE {

 physCellId-r17 PhysCellId,

 carrierFreq-r17 ARFCN-ValueNR

 } OPTIONAL,

 timeSCGFailure-r17 INTEGER (0..1023) OPTIONAL,

 perRAInfoList-r17 PerRAInfoList-r16 OPTIONAL

 ]],

 [[

 perRAInfoList-v18XX PerRAInfoList-v1800 OPTIONAL

 ]]

}

MeasResultFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2NR

-- TAG-SCGFAILUREINFORMATION-STOP

-- ASN1STOP

| *SCGFailureInformation field descriptions* |
| --- |
| ***measResultFreqList***The field contains available results of measurements on NR frequencies the UE is configured to measure by *measConfig*. |
| ***measResultSCG-Failure***The field contains the *MeasResultSCG-Failure* IE which includes available results of measurements on NR frequencies the UE is configured to measure by the NR SCG *RRCReconfiguration* message.  |
| ***previousPSCellId***This field indicates the physical cell id and carrier frequency of the cell that is the source PSCell of the last PSCell change. In case of PSCell addition failure, this field is absent. |
| ***failedPSCellId***This field indicates the physical cell id and carrier frequency of the cell in which SCG failure is detected or the target PSCell of the failed PSCell change or failed PSCell addition. |
| ***timeSCGFailure***This field is used to indicate the time elapsed since the last execution of *RRCReconfiguration* with *reconfigurationWithSync* for the SCG until the SCG failure. Actual value = field value \* 100ms. The maximum value 1023 means 102.3s or longer. |

*<text omitted>*

*End of Changes*