**3GPP TSG-RAN WG2 Meeting #110 electronic R2-20**

**Online, June 1 – June 12 2020**

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| *CR-Form-v11.4* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** |  | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  |
| *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 | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Introduction of UE capabilities for inter-frequency measurement without gap  |
|  |  |
| ***Source to WG:*** | CMCC, [Huawei, HiSilicon] |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_RRM\_Enh\_Core |  | ***Date:*** | 2020-05-19 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***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 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)* |
|  |  |
| ***Reason for change:*** | Inter-frequency measurement requirement without MG is one objective in the R16 work item NR RRM requirements enhancement. RAN4 had sufficient discussion on the topic and made the following agreements:* The UE can perform inter-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE.* The capability of supporting Inter-frequency measurements without gap shall be introduced in R16.
* Option1: optional with UE capability signalling
* Option 2: mandatory with UE capability signalling
* Synchronization is always assumed for partial and fully overlapped TDD carriers that to be measured for inter-frequency measurement without MG. It means that UE assumes SFN and frame boundary across serving cell and inter-frequency neighbour cells is aligned, and the timing of SSBs across serving cell and inter-frequency neighbour cells are aligned
* When UE performs inter-frequency SSB based measurements without measurement gaps, if the SCS of the inter-frequency SSB is different with the SCS of serving cell PDCCH or PSDCH, whether UE can perform measurements and data reception depends on UE capability. From RAN4 point of view, both options listed below are feasible:
* Option A: update the UE capability *simultaneousRxDataSSB-DiffNumerology* to indicate whether the UE supports concurrent intra-frequency measurement on serving cell or neighbouring cell or inter-frequency measurement without measurement gap and PDCCH or PDSCH reception from the serving cell with a different numerology;
* Option B: introduce a new UE capability to indicate whether the UE supports concurrent inter-frequency measurement without measurement gap and PDCCH or PDSCH reception from the serving cell with a different numerology as defined in clause 8 and 9 of TS 38.133
* RAN4 also discussed how to handle the backward compatible issue for network. RAN4 agreed to explicitly enable “inter-frequency measurement without MG” feature with a release 16 configuration flag.
	+ If network configures the flag, when SMTC is partially overlapped with network configured MG, UE perform inter-frequency without MG measurement outside gap
	+ If network does not configure the flag, when SMTC is partially overlapped with network configured MG, UE perform inter-frequency measurement within gap.
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| ***Summary of change:*** | 1. In 6.3.3, add the capability to indicate whether the UE supports inter-frequency measurement without gap
2. In 6.3.3, add the capability to indicate whether the UE supports concurrent inter-frequency measurement without measurement gap and PDCCH or PDSCH reception from the serving cell with a different numerology as defined in clause 8 and 9 of TS 38.133
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| ***Consequences if not approved:*** | UE always use gap for inter-frequency measurement. It will result in performance lost. |
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| ***Clauses affected:*** | 6.3.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.306 CR TS 38.300 CR  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |

1st change

### 6.3.3 UE capability information elements

<Skip unrelated parts>

– *MeasAndMobParameters*

The IE *MeasAndMobParameters* is used to convey UE capabilities related to measurements for radio resource management (RRM), radio link monitoring (RLM) and mobility (e.g. handover).

***MeasAndMobParameters* information element**

-- ASN1START

-- TAG-MEASANDMOBPARAMETERS-START

MeasAndMobParameters ::= SEQUENCE {

 measAndMobParametersCommon MeasAndMobParametersCommon OPTIONAL,

 measAndMobParametersXDD-Diff MeasAndMobParametersXDD-Diff OPTIONAL,

 measAndMobParametersFRX-Diff MeasAndMobParametersFRX-Diff OPTIONAL

}

MeasAndMobParametersCommon ::= SEQUENCE {

 supportedGapPattern BIT STRING (SIZE (22)) OPTIONAL,

 ssb-RLM ENUMERATED {supported} OPTIONAL,

 ssb-AndCSI-RS-RLM ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 eventB-MeasAndReport ENUMERATED {supported} OPTIONAL,

 handoverFDD-TDD ENUMERATED {supported} OPTIONAL,

 eutra-CGI-Reporting ENUMERATED {supported} OPTIONAL,

 nr-CGI-Reporting ENUMERATED {supported} OPTIONAL

 ]],

 [[

 independentGapConfig ENUMERATED {supported} OPTIONAL,

 periodicEUTRA-MeasAndReport ENUMERATED {supported} OPTIONAL,

 handoverFR1-FR2 ENUMERATED {supported} OPTIONAL,

 maxNumberCSI-RS-RRM-RS-SINR ENUMERATED {n4, n8, n16, n32, n64, n96} OPTIONAL

 ]],

 [[

 nr-CGI-Reporting-ENDC ENUMERATED {supported} OPTIONAL

 ]],

[[

 interFrequencyMeas-Nogap-r16 ENUMERATED {supported} OPTIONAL

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}

MeasAndMobParametersXDD-Diff ::= SEQUENCE {

 intraAndInterF-MeasAndReport ENUMERATED {supported} OPTIONAL,

 eventA-MeasAndReport ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 handoverInterF ENUMERATED {supported} OPTIONAL,

 handoverLTE-EPC ENUMERATED {supported} OPTIONAL,

 handoverLTE-5GC ENUMERATED {supported} OPTIONAL

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 sftd-MeasNR-Neigh ENUMERATED {supported} OPTIONAL,

 sftd-MeasNR-Neigh-DRX ENUMERATED {supported} OPTIONAL

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 eutra-AutonomousGaps-r16 ENUMERATED {supported} OPTIONAL,

 nr-AutonomousGaps-r16 ENUMERATED {supported} OPTIONAL,

 nr-AutonomousGaps-ENDC-r16 ENUMERATED {supported} OPTIONAL,

 handoverUTRA-FDD-r16 ENUMERATED {supported} OPTIONAL

 ]]

}

MeasAndMobParametersFRX-Diff ::= SEQUENCE {

 ss-SINR-Meas ENUMERATED {supported} OPTIONAL,

 csi-RSRP-AndRSRQ-MeasWithSSB ENUMERATED {supported} OPTIONAL,

 csi-RSRP-AndRSRQ-MeasWithoutSSB ENUMERATED {supported} OPTIONAL,

 csi-SINR-Meas ENUMERATED {supported} OPTIONAL,

 csi-RS-RLM ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 handoverInterF ENUMERATED {supported} OPTIONAL,

 handoverLTE-EPC ENUMERATED {supported} OPTIONAL,

 handoverLTE-5GC ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxNumberResource-CSI-RS-RLM ENUMERATED {n2, n4, n6, n8} OPTIONAL

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 [[

 simultaneousRxDataSSB-DiffNumerology ENUMERATED {supported} OPTIONAL

 ]],

 [[

 nr-AutonomousGaps-r16 ENUMERATED {supported} OPTIONAL,

 nr-AutonomousGaps-ENDC-r16 ENUMERATED {supported} OPTIONAL,

 handoverUTRA-FDD-r16 ENUMERATED {supported} OPTIONAL

 ]] ,

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simultaneousRxDataSSB-DiffNumerology-Inter-r16 ENUMERATED {supported} OPTIONAL

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}

-- TAG-MEASANDMOBPARAMETERS-STOP

-- ASN1STOP