**3GPP TSG-RAN WG2 Meeting #125 R2-2401565**

**Athens, Greece, February 26th – March 1st, 2024**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **4428** | **Rev** | **2** | **Current version:** | **18.0.0** |  |
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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:***  | Introduction of Rel-18 HST FR2 RRM enhancements |
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| ***Source to WG:*** | Samsung, Qualcomm, Ericsson |
| ***Source to TSG:*** | RAN2 |
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| ***Work item code:*** | NR\_HST\_FR2\_Enh |  | ***Date:*** | 2024-02-18 |
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| ***Category:*** | **B** |  | ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | Based on RAN4 LS (R4-2317342), RAN4 made the following agreements to support Rel-18 FR2 HST RRM enhancements.* For Rel-18 inter-frequency measurement enhancement for FR2 HST
* RAN4 made the agreement as below:

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| * + Reuse Rel-17 IE highSpeedMeasFlagFR2-r17 in SIB to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in idle/inactive mode.
	+ Reuse Rel-17 signalling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for inter-frequency measurement for FR2 HST in Connected mode.
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* For CA enhancement
	+ For Rel-18 intra-frequency measurement on SCC for FR2 HST

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| * + Reuse Rel-17 signalling highSpeedMeasFlagFR2 to inform UE whether to apply the enhanced RRM requirements for intra-frequency measurement on SCC for FR2 HST in Connected mode.
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In Rel-17, FR2 HST RRM requirement is applied to only intra-frequency in PSCell. |
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| ***Summary of change:*** | The following changes are introduced for highSpeedMeasFlagFR2. * Enable inter-frequency RRM requirements for idle and inactive mode UE.
* Enable inter-frequency RRM requirements and intra-frequency measurement on SCC in connected mode.

 Some minor clarifications are included for Rel-17.* Change from intra-NR to intra-frequency
* Add “to the serving frequency of SpCell”
* Add UE capability (ue-PowerClass-v1700 set to '*pc6)* for Rel17 FR2 HST RRM requirement
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| ***Consequences if not approved:*** | Rel-18 HST FR2 RRM enhancement is not supported. |
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| ***Clauses affected:*** | 6.3.2 |
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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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### 6.3.2 Radio resource control information elements

……….omitted……………..

#### – *HighSpeedConfig*

The IE *HighSpeedConfig* is used to configure parameters for high speed scenarios.

*HighSpeedConfig* information element

-- ASN1START

-- TAG-HIGHSPEEDCONFIG-START

HighSpeedConfig-r16 ::= SEQUENCE {

 highSpeedMeasFlag-r16 ENUMERATED {true} OPTIONAL, -- Cond SpCellOnly

 highSpeedDemodFlag-r16 ENUMERATED {true} OPTIONAL, -- Need R

 ...

}

HighSpeedConfig-v1700 ::= SEQUENCE {

 highSpeedMeasCA-Scell-r17 ENUMERATED {true} OPTIONAL, -- Cond SCellOnly

 highSpeedMeasInterFreq-r17 ENUMERATED {true} OPTIONAL, -- Cond SpCellOnly2

 highSpeedDemodCA-Scell-r17 ENUMERATED {true} OPTIONAL, -- Need R

 ...

}

HighSpeedConfigFR2-r17 ::= SEQUENCE {

 highSpeedMeasFlagFR2-r17 ENUMERATED {set1, set2} OPTIONAL, -- Need R

 highSpeedDeploymentTypeFR2-r17 ENUMERATED {unidirectional, bidirectional} OPTIONAL, -- Need R

 highSpeedLargeOneStepUL-TimingFR2-r17 ENUMERATED {true} OPTIONAL, -- Need R

 ...

}

-- TAG-HIGHSPEEDCONFIG-STOP

-- ASN1STOP

| *HighSpeedConfig* field descriptions |
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| ***HighSpeedDemodCA-Scell***If the field is present and UE supports *demodulationEnhancementCA-r17*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SCell. |
| ***highSpeedDemodFlag***If the field is present and UE supports *demodulationEnhancement-r16*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SpCell. |
| ***highSpeedDeploymentTypeFR2***If the field is present, and field value is *unidirectional*, the UE shall assume uni-directional deployment or if field value is *birectional* the UE shall assume bidirectional deployment for FR2 up to 350km/h as specified in TS 38.133 [14]. |
| ***highSpeedLargeOneStepUL-TimingFR2***If the field is present, large one step UE autonomous uplink transmit timing adjustment for FR2 up to 350km/h as specified in TS 38.133 [14] is enabled. |
| ***highSpeedMeasCA-Scell***If the field is present and UE supports *measurementEnhancementCA-r17*, the UE shall apply the enhanced RRM requirements to the serving frequency of SCell for carrier aggregation to support high speed up to 500 km/h as specified in TS 38.133 [14]. |
| ***highSpeedMeasFlag***If the field is present and UE supports *measurementEnhancement-r16*, the UE shall apply the enhanced intra-NR and inter-RAT EUTRAN RRM requirements to support high speed up to 500 km/h as specified in TS 38.133 [14].If the field is present and UE supports *intraNR-MeasurementEnhancement-r16*, the UE shall apply enhanced intra-NR RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].If the field is present and UE supports *interRAT-MeasurementEnhancement-r16*, the UE shall apply enhanced inter-RAT EUTRAN RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].This parameter only applies to the serving frequency of SpCell. |
| ***highSpeedMeasFlagFR2***If the field is present and UE supports *ue-PowerClass-v1700* set to *pc6*, the UE shall apply enhanced intra-frequency RRM requirement to the serving frequency of SpCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14].If the field is present and the UE supports enhanced inter-frequency RRM requirements for FR2 HST in RRC\_IDLE and RRC\_INACTIVE, the UE shall apply enhanced inter-frequency RRM requirement to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC\_IDLE and RRC\_INACTIVE.If the field is present and the UE supports *measEnhCAInterFreqFR2-r18*, the UE shall apply enhanced inter-frequency RRM requirement and enhanced intra-frequency RRM requirements to the serving frequency of SCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC\_CONNECTED.The field value, *set1* or *set2*, is applied as specified in TS38.133 [14]. |
| ***highSpeedMeasInterFreq***If the field is present and UE supports *measurementEnhancementInterFreq-r17*, the UE shall apply the enhanced RRM requirements for inter-frequency measurement in RRC\_CONNECTED to support high speed up to 500 km/h as specified in TS 38.133 [14]. |

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| Conditional Presence | Explanation |
| *SCellOnly* | The field is optionally present, Need R, in *ServingCellConfigCommon* of an SCell. It is absent otherwise. |
| *SpCellOnly* | The field is optionally present, Need R, in *ServingCellConfigCommonSIB* or in the *ServingCellConfigCommon* of an SpCell. It is absent otherwise. |
| *SpCellOnly2* | The field is optionally present, Need R, in *ServingCellConfigCommon* of an SpCell. It is absent otherwise. |