**3GPP TSG-RAN WG1 Meeting #102-e *R1-200xxxx***

**e-meeting, 17th – 28th August, 2020**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **38.214** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **16.2.0** |  |
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| *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 flexible TRS bandwidth for BWP of 52 RBs |
|  |  |
| ***Source to WG:*** | Moderator (NTT DOCOMO, INC.) |
| ***Source to TSG:*** | RAN WG1 |
|  |  |
| ***Work item code:*** | TEI16 |  | ***Date:*** | 25/08/2020 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | 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)* |
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| ***Reason for change:*** | In the RAN #88 e-meeting, it was agreed to introduce Flexible TRS Bandwidth Operation as below: * *Task RAN1 (cc: RAN2) to define TRS bandwidth sizes of 28, 32, 36, 40, 44, 48 RBs.*
	+ *All TRS configured for a given BWP with the newly defined TRS bandwidth sizes for a UE span the same set of RBs.*
	+ *All allocated PDSCH RBs are confined within the bandwidth spanned by TRS + up to 3RBs beyond either/both of the highest RB and lowest RB of the TRS.*
	+ *Only supported for 10MHz UE channel bandwidth, 52 RB BWP size, and 15kHz SCS, in FDD bands.*
	+ *Note: No new performance requirement on UE is introduced here.*
* *A “per-band” UE capability is to be defined for this optional UE feature, that indicates per band support for one of:*
	+ *“All newly defined TRS bandwidth sizes”.*
	+ *“All newly defined TRS bandwidth sizes except 28 RB size”.*
* *Introduce from Release 16 as part of TEI16.*

This CR introduces the physical layer specification changes to incorporate that agreement and following agreement made at RAN1#102-e.* *Clarify that all allocated RBs for DL transmissions are confined within the bandwidth spanned by TRS + up to X RBs beyond the highest RB and/or Y RBs beyond the lowest RB of the TRS, where X+Y<5, i.e., total number of RBs outside TRS bandwidth is up to 4 and RBs outside TRS can be on both sides.*

*Note that the RRC IEs referred to in this CR assumes that the same names are used in RAN2 specifications.* |
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| ***Summary of change:*** | 5.1.6.1.1: Introduce the new CSI-RS Resource Bandwidth sizes and the restriction on frequency resource allocation for DL transmissions for 10MHz UE channel bandwidth, 52 RB BWP size, and 15kHz SCS in FDD bands. |
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| ***Consequences if not approved:*** | Operators will not be able to operate their networks with a smaller TRS bandwidth than the bandwidth part configured in the required scenarios to coexist with other RATs in a 10MHz channel bandwidth |
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| ***Clauses affected:*** | 5.1.6.1.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **x** |  |  Other core specifications  | TS 38.306, TS 38.331 |
| ***affected:*** |  | **x** |  Test specifications |  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications |  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<<START OF CHANGES>>

### 5.1.6 UE procedure for receiving reference signals

<<SECTIONS SKIPPED>>

##### 5.1.6.1.1 CSI-RS for tracking

A UE in RRC connected mode is expected to receive the higher layer UE specific configuration of a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info*.

For a *NZP-CSI-RS-ResourceSet* configured with the higher layer parameter *trs-Info*, the UE shall assume the antenna port with the same port index of the configured NZP CSI-RS resources in the *NZP-CSI-RS-ResourceSet* is the same.

- For frequency range 1, the UE may be configured with one or more NZP CSI-RS set(s), where a *NZP-CSI-RS-ResourceSet* consists of four periodic NZP CSI-RS resources in two consecutive slots with two periodic NZP CSI-RS resources in each slot. If no two consecutive slots are indicated as downlink slots by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigDedicated*, then the UE may be configured with one or more NZP CSI-RS set(s), where a *NZP-CSI-RS-ResourceSet* consists of two periodic NZP CSI-RS resources in one slot.

- For frequency range 2 the UE may be configured with one or more NZP CSI-RS set(s), where a *NZP-CSI-RS-ResourceSet* consists of two periodic CSI-RS resources in one slot or with a *NZP-CSI-RS-ResourceSet* of four periodic NZP CSI-RS resources in two consecutive slots with two periodic NZP CSI-RS resources in each slot.

A UE configured with *NZP-CSI-RS-ResourceSet(s)* configured with higher layer parameter *trs-Info* may have the CSI-RS resources configured as:

- Periodic, with the CSI-RS resources in the *NZP-CSI-RS-ResourceSet* configured with same periodicity, bandwidth and subcarrier location

- Periodic CSI-RS resource in one set and aperiodic CSI-RS resources in a second set, with the aperiodic CSI-RS and periodic CSI-RS resource having the same bandwidth (with same RB location) and the aperiodic CSI-RS being 'QCL-Type-A' and 'QCL-TypeD', where applicable, with the periodic CSI-RS resources. For frequency range 2, the UE does not expect that the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources is smaller than the UE reported *ThresholdSched-Offset*. The UE shall expect that the periodic CSI-RS resource set and aperiodic CSI-RS resource set are configured with the same number of CSI-RS resources and with the same number of CSI-RS resources in a slot. For the aperiodic CSI-RS resource set if triggered, and if the associated periodic CSI-RS resource set is configured with four periodic CSI-RS resources with two consecutive slots with two periodic CSI-RS resources in each slot, the higher layer parameter *aperiodicTriggeringOffset* indicates the triggering offset for the first slot for the first two CSI-RS resources in the set.

A UE does not expect to be configured with a *CSI-ReportConfig* that is linked to a *CSI-ResourceConfig* containing an *NZP-CSI-RS-ResourceSet* configured with *trs-Info* and with the *CSI-ReportConfig* configured with the higher layer parameter *timeRestrictionForChannelMeasurements* set to 'configured'.

A UE does not expect to be configured with a *CSI-ReportConfig* with the higher layer parameter *reportQuantity* set to other than 'none' for aperiodic NZP CSI-RS resource set configured with *trs-Info.*

A UE does not expect to be configured with a *CSI-ReportConfig* for periodic NZP CSI-RS resource set configured with *trs-Info*.

A UE does not expect to be configured with a *NZP-CSI-RS-ResourceSet* configured both with *trs-Info* and *repetition*.

Each CSI-RS resource, defined in Clause 7.4.1.5.3 of [4, TS 38.211], is configured by the higher layer parameter *NZP-CSI-RS-Resource* with the following restrictions:

- the time-domain locations of the two CSI-RS resources in a slot, or of the four CSI-RS resources in two consecutive slots (which are the same across two consecutive slots), as defined by higher layer parameter *CSI-RS-resourceMapping*, is given by one of

- , , or for frequency range 1 and frequency range 2,

- , , , , ,  or  for frequency range 2.

- a single port CSI-RS resource with density  given by Table 7.4.1.5.3-1 from [4, TS 38.211] and higher layer parameter *density* configured by *CSI-RS-ResourceMapping.*

- if carrier $N\_{grid}^{size,μ}=52$, $N\_{BWP,i}^{size}=52$, $μ=0$ and the carrier is configured in paired spectrum, the bandwidth of the CSI-RS resource, as given by the higher layer parameter *freqBand* configured by *CSI-RS-ResourceMapping*, is *X* resource blocks, where $X \geq 28$ resources if the UE indicates *trs-AddBW-Set1* for the *trs-AdditionalBandwidth-r16* capability and $X \geq 32$ if the UE indicates *trs-AddBW-Set2* for the *AdditionalBandwidth-r16* capability; in these cases, if the UE is configured with CSI-RS comprising X<52 resource blocks, the UE does not expect that the total number of PRBs allocated for DL transmissions but not overlapped with the PRBs carrying CSI-RS for tracking is more than 4 and all CSI-RS resource configurations shall span the same set of resource blocks. Otherwise, the bandwidth of the CSI-RS resource, as given by the higher layer parameter *freqBand* configured by *CSI-RS-ResourceMapping*, is the minimum of 52 and $N\_{BWP,i}^{size}$ resource blocks, or is equal to $N\_{BWP,i}^{size}$ resource blocks. For operation with shared spectrum channel access, *freqBand* configured by *CSI-RS-ResourceMapping*, is the minimum of 48 and $N\_{BWP,i}^{size}$ resource blocks, or is equal to $N\_{BWP,i}^{size}$ resource blocks.

- the UE is not expected to be configured with the periodicity of  slots if the bandwidth of CSI-RS resource is larger than 52 resource blocks.

- the periodicity and slot offset for periodic NZP CSI-RS resources, as given by the higher layer parameter *periodicityAndOffset* configured b*y NZP-CSI-RS-Resource*, is one of slots where 10, 20, 40, or 80 and where µ is defined in Clause 4.3 of [4, TS 38.211].

- same *powerControlOffset* and *powerControlOffsetSS* given by*NZP-CSI-RS-Resource* value across all resources.

<<END OF CHANGES>>