**Rel-18 TEI agreements by RAN1#114**

1. Periodicity of the scheduling request

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| Agreement (RAN1#112)Introduce 5 and 10 slot periodicities to the periodicityAndOffset in SchedulingRequestResourceConfig for 120 kHz and 5 slot for 30 kHz SCSSent LS to RAN2 about the introduction of these parameters - Mattias (Ericsson)**Decision:** The draft LS [R1-2302152](file:///C%3A%5CUsers%5C5173832%5CAppData%5CLocal%5CTemp%5CDocs%5CR1-2302152.zip) is endorsed in principle with removing repeated “in” the action. Final LS is approved in [R1-2302187](file:///C%3A%5CUsers%5C5173832%5CAppData%5CLocal%5CTemp%5CDocs%5CR1-2302187.zip). (RAN1#112) |

1. 1-symbol PRS

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| Agreement (RAN1#112)Introduce 1-symbol PRS with legacy comb sizes. * UE expects the suitable expected RSTD windows provided by LMF such that peak ambiguity is addressed. Otherwise no measurement accuracy requirements are expected to be met.
* Not to define RAN4 RRM requirement, including core/performance in Rel-18
* Send an LS to RAN2 and RAN3 to ask necessary signalling enhancements

**Decision:** The draft LS [R1-2302200](file:///C%3A%5CUsers%5C5173832%5CAppData%5CLocal%5CTemp%5CDocs%5CR1-2302200.zip) is endorsed in principle. Final LS is approved in [R1-2302201](file:///C%3A%5CUsers%5C5173832%5CAppData%5CLocal%5CTemp%5CDocs%5CR1-2302201.zip). (RAN1#112)**Agreement** (RAN1#113)Send the following to RAN2 in response to R1-2304328. Final LS in R1-2306212.

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| RAN1 would like to thank RAN2’s reply R2-2304510(R1-2304328) on 1-symbol PRS.With regard to RAN2’s question, RAN1 thinks the changes to DL PRS configuration used for RTT-based Propagation Delay Compensation are needed. In addition, RAN1 proposes the following note to be added in the *numSymbols* field description:* Note: The UE does not expect to be configured for PDC with a PRS with *numSymbols* equals to n1 unless an SSB index is provided as a Type-C or Type-C & Type-D QCL source, or another PRS resource with *numSymbols* more than 1 is provided as QCL source.

Furthermore, RAN1 does not expect RRM requirements to be defined for 1-symbol PRS in PDC. |

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1. Multi-PUSCH scheduling with single DCI

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| Agreement (RAN1#112bis-e)Introduce UE feature(s) for multi-PUSCH scheduling with single DCI 0\_1 for non-contiguous slots in FR1 for all defined SCSs* Note: there is no RAN1 impact
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1. Enhancement for HARQ multiplexing on PUSCH

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| **Agreement** (RAN1#113)If UCI multiplexing of different priorities is not enabled, the restriction on scheduling PDSCH after UL grant is removed for the case of PUSCH with repetitions except the first repetition* UE generates Type-1 HARQ-ACK codebook according to the existing specification with the modification of setting the actual ‘ACK/NACK’ value corresponding to PDSCH(s) scheduled after the UL grant.
* UE generates Type-2/3 HARQ-ACK codebook according to the existing specification.
	+ For Type-2 CB, UL DAI is used for generating HARQ CB.
* This feature is subject to separate UE capabilities for type-1, type-2, and type-3 codebooks.
* RRC parameter(s) to configure the function of scheduling PDSCH after a UL DCI format and multiplexing associated HARQ on a PUSCH repetition except the first repetition are introduced in Rel-18.
* Note: the number of PUSCH repetitions can be scheduled/configured by gNB.
* Note: same principle of current specification which UL DAI in UL grant is applied to each PUSCH repetition is reused.
* The timeline specified in TS 38.213 Clause 9.2.5 are satisfied, i.e. $T\_{proc,1}^{mux}$between the last PDSCH and PUCCH, $T\_{proc,2}^{mux}$ between the last PDCCH among UL grant /DL grant(s) and the earliest PUCCH or PUSCH
* Additional UE capabilities are introduced to support the following functions (UE will be configured by gNB to use the following features via RRC)
	+ HARQ-ACK codebook size change on a PUCCH slot
	+ PUCCH resource change on a PUCCH slot
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1. Pathloss RS for Type 1 CG-PUSCH

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| **Agreement** (RAN1#113)Rel-18 TEI proposal on pathloss RS for Type 1 CG-PUSCH is agreed. Relevant TP for clause 7.1.1 in TS 38.213 is endorsed in principle* Note: Corresponding UE capability and RRC configuration will be introduced and discussed in future meetings.

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| 7.1.1 UE behaviour……**<Unchanged parts are omitted>**- For a PUSCH transmission configured by *ConfiguredGrantConfig,* if *rrc-ConfiguredUplinkGrant* is included in *ConfiguredGrantConfig*, * if the UE is provided [*enablePL-RS-UpdateForType1CG-PUSCH-SRS*]*,* the UE determines a RS resource index *qd* from the value of *PUSCH-PathlossReferenceRS-Id* that is mapped to the *sri-PUSCH-PowerControlId* indicated by the *srs-ResourceIndicator* value included in *rrc-ConfiguredUplinkGrant*
* if the UE is not provided [*enablePL-RS-UpdateForType1CG-PUSCH-SRS*]*,* a RS resource index *qd* is provided by a value of *pathlossReferenceIndex* included in *rrc-ConfiguredUplinkGrant* where the RS resource is either on serving cell *c* or, if provided, on a serving cell indicated by a value of *pathlossReferenceLinking*
* ……

**<Unchanged parts are omitted>** |

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1. Enhanced PDCCH reception for mDCI based mTRP

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| **Agreement** (RAN1#114)* For multi-DCI based multi-TRP operation, support the following:
	+ QCL-TypeD prioritization rules for overlapping CORESETs is performed per coresetPoolIndex value.
		- Adopt following TP in Clause 10.1 in TS 38.213.

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| --Unchanged part omitted------------------------If a UE - is configured for single cell operation or for operation with carrier aggregation in a same frequency band, and- monitors PDCCH candidates in overlapping PDCCH monitoring occasions in multiple CORESETs that have been configured with same or different *qcl-Type* set to 'typeD' properties on active DL BWP(s) of one or more cellsthe UE monitors PDCCHs only in a CORESET, and in any other CORESET from the multiple CORESETs that have been configured with *qcl-Type* set to same 'typeD' properties as the CORESET, on the active DL BWP of a cell from the one or more cells - the CORESET corresponds to the CSS set with the lowest index in the cell with the lowest index containing CSS, if any; otherwise, to the USS set with the lowest index in the cell with lowest index- the lowest USS set index is determined over all USS sets with at least one PDCCH candidate in overlapping PDCCH monitoring occasionsIf a UE - is not provided *coresetPoolIndex* for first CORESETs, or is provided *coresetPoolIndex* with value 0 for first CORESETs, and - is provided *coresetPoolIndex* with value 1 for second CORESETs, and- is provided [*twoQCLTypeDforMulti-DCI*]the UE applies procedures described above independently across the first CORESETs and the second CORESETs.--Unchanged part omitted------------------------ |

* + Introduce a UE capability for the red part of the above text.
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1. RAN2 TEI for longer CG-SDT periodicities

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| **Agreement** (RAN1#114)The draft LS in R1-2308486 is endorsed. Final LS in R1-2308487. |

1. UE features list

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| Features | Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (Sidelink WI only)”. | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| 55. TEI18 | 55-1 | *additionalSR-Periodicities-r18* | Indicates whether the UE supports the following SR periodicities in the *periodicityAndOffset* parameter as specified in TS 38.331:-5sl for 30 kHz SCS-5sl and 10sl for 120 kHz SCSCandidate values {30 kHz SCS, 120 kHz SCS, both}  |  | Yes | N/A | If the network implements the TS 38.331 CR on new SR periodicities and the UE does not according to the capability indication, the network will not assign the new SR periodicities.Legacy behaviour applies.  | Per UE | No | No | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-2a | 1-symbol PRS for MG-based measurement in RRC\_CONNECTED state | 1. Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}2. Max number of single-symbol DL PRS resources it can process in a slot inside a MG in RRC\_CONNECTED stateFR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz | 13-1 | No | n/a | 1-symbol PRS is not supported for MG-based measurement in RRC\_CONNECTED state | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling |
| 55. TEI18 | 55-2b | 1-symbol PRS for outside MG in RRC\_CONNECTED state | 1. Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}2. Max number of single-symbol DL PRS resources it can process in a slot outside a MG in RRC\_CONNECTED stateFR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz | 27-3-3 | No | n/a | 1-symbol PRS is not supported for outside MG in RRC\_CONNECTED state | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling |
| 55. TEI18 | 55-2c | 1-symbol PRS in RRC\_INACTIVE state | 1. Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}2. Max number of single-symbol DL PRS resources it can process in a slot in RRC\_INACTIVE stateFR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz | 27-6 | No | n/a | 1-symbol PRS is not supported in RRC\_INACTIVE state | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling |
| 55. TEI18 | 55-2d | 1-symbol PRS for PDC | 1. Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}2. Max number of single-symbol DL PRS resources it can process in a slot for PDCFR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz | 25-19a | Yes | n/a | 1-symbol PRS is not supported for PDC | per band | n/a | n/a | n/a |  | Optional with capability signaling |
| 55. TEI18 | 55-3 | Multiple PUSCHs scheduling by single DCI for non-consecutive slots in FR1 | 1. Multi-PUSCH scheduling by single DCI format 0\_1 for the operation with non-contiguous allocation  | 10-17 | Yes | N/A | For operation on FR1, scheduling multiple PUSCHs by a DCI format 0\_1 in non-contiguous slots is not supported. | Per Band | N/A | N/A | N/A |  | Optional with capability signalling |
| 55. TEI18 | 55-4a | Multiplexing Type-1 HARQ-ACK codebook for PDSCH scheduling after UL grant on PUSCH | 1. UE multiplexes Type-1 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where ACK/NACK is generated for the HARQ-ACK codebook including HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmission. FFS dependency between 55-4d/55-4e | 4-1, 4-11, one of {5-17, 11-5, 11-6} | Yes | N/A | UE does not support to multiplex Type-1 HARQ-ACK codebook on non-initial a PUSCH repetition when the Type-1 codebook includes HARQ-ACK information for PDSCH scheduling after a UL grant. | Per Band | N/A | N/A | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-4b | Multiplexing Type-2 HARQ-ACK codebook for PDSCH scheduling after UL grant on PUSCH | 1. UE multiplexes Type-2 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where the HARQ-ACK codebook includes HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmission. FFS dependency between 55-4d/55-4e | 4-1, 4-10, one of {5-17, 11-5, 11-6} | Yes | N/A | UE does not support to multiplex Type-2 HARQ-ACK codebook on non-initial a PUSCH repetition when the Type-1 codebook includes HARQ-ACK information for PDSCH scheduling after a UL grant. | Per Band | N/A | N/A | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-4c | Multiplexing Type-3 HARQ-ACK codebook for PDSCH scheduling after UL grant on PUSCH | 1. UE multiplexes Type-3 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where the HARQ-ACK codebook includes HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmissionFFS dependency between 55-4d/55-4e | 4-1, 10-16, one of {5-17, 11-5, 11-6} | Yes | N/A | UE does not support to multiplex Type-3 HARQ-ACK codebook on non-initial a PUSCH repetition when the Type-1 codebook includes HARQ-ACK information for PDSCH scheduling after a UL grant. | Per Band | N/A | N/A | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-4d | Determining a different PUCCH resource to transmit HARQ-ACK for PDSCH scheduled after UL grant | 1. Support determining a different PUCCH resource in a slot from the PUCCH resource indicated by the last DCI format before a UL grant in the slot, to include HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling a PUSCH transmission with repetitions and the HARQ-ACK information are multiplexed on a repetition of the PUSCH transmission other than a first repetition in the same slot. | 4-1, 4-10 | Yes | N/A | UE does not support to determine a different PUCCH resource to transmit HARQ-ACK for PDSCH scheduled after UL grant. | Per Band | N/A | N/A | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-4e | Determining different codebook size to transmit HARQ-ACK for PDSCH scheduled after UL grant | 1. Support determining different codebook size in a PUCCH slot from the size determined based on HARQ-ACK information associated with PDSCH reception(s) scheduled before a UL grant, to include HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling a PUSCH transmission with repetitions and the HARQ-ACK information are multiplexed on a repetition of the PUSCH transmission other than a first repetition in the same slot. | 4-1, 4-10 | Yes | N/A | UE does not support to determine different codebook size to transmit HARQ-ACK for PDSCH scheduled after UL grant. | Per Band | N/A | N/A | N/A |  | Optional with capability signaling |
| 55. TEI18 | 55-5 | Enable MAC CE based pathloss RS updates for Type 1 CG-PUSCH | Support configuration of *enablePL-RS-UpdateForType1CG-PUSCH-SRS-r18* | 5-19, 16-1e | Yes  | N/A | MAC CE based pathloss RS updates for Type 1 CG-PUSCH is not supported | Per UE | No | No |  |  | Optional with capability signalling |
| 55. TEI18 | 55-6 | (2, 2) span-based PDCCH monitoring with additional restriction(s) | Support of (2, 2) span-based PDCCH monitoring as per FG11-2 with the following additional restriction(s)There is at least one OFDM symbol gap between two PDCCH monitoring occasions |  | Yes  | N/A |  | Per FS | N/A | N/A |  | This capability is signalled for SCS 15 kHz and 30 kHzThis capability is reported for processing capability #1 and for processing capability #2 respectively | Optional with capability signalling |

1. Higher layers parameter list

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| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** | **Comment** |
| TEI18 | Support 1-symbol PRS for PRS configuration | 　 | 　 | NR-DL-PRS-ResourceSet | dl-PRS-NumSymbols | dl-PRS-NumSymbols  | existing | 　 | In 37.355, PRS configuration can include the case of 1-symbol PRS | n1 | 　 | 　 | 　 |  37.355 | 　 |
|  TEI18 | Support PRS symbol offset 13 | 　 | 　 | NR-DL-PRS-Resource | 　 | dl-PRS-ResourceSymbolOffset-r18 | new | 　 | In 37.355, PRS configuration can include the case of PRS symbol offset 13 | 13 | 　 | 　 | 　 |  37.355 | 　 |
|  TEI18 | Support 1-symbol PRS for on-demand PRS | 　 | 　 | NR-On-Demand-DL-PRS-PerFreqLayer | dl-prs-NumSymbolsReq | 　 | existing | 　 | In 37.355, on-demand PRS request can include the case of 1-symbol PRS | n1 | 　 | 　 | 　 |  37.355 | 　 |
|  TEI18 | Support 1-symbol PRS | 　 | 　 | NR-DL-PRS-PDC-ResourceSet | numSymbols | numSymbols  | existing | 　 | In 38.331, *NR-DL-PRS-PDC-Info* defines downlink PRS configuration for PDC, where 1-symbol PRS is included | n1 | 　 | 　 | 　 |  38.331 | 　 |
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|  TEI18 | Support PRS symbol offset 13 | 　 | 　 | NR-DL-PRS-Resource | 　 | dl-PRS-ResourceSymbolOffset-r18 | new | 　 | In 38.331, PRS configuration can include the case of PRS symbol offset 13 | 13 | 　 | 　 | 　 |  38.331 | 　 |  |
| TEI18 | Multiple PUSCHs scheduling by single DCI for non-consecutive slots in FR1 | 38.214 | 　 |  PUSCH-TimeDomainResourceAllocationList | 　 | extendedK2 | Up to RAN2 | 　 | See comment in Column (P). |  {0, .., 32} | 　 | Per UE | 　 | 38.331 | Multiple PUSCHs scheduled by a single DCI format 0\_1 in Rel-17 is enabled on non-consecutive slots by extendedK2-r17. However, the applicability to non-consecutive slots is permitted in Rel-17 only in FR2-1/FR2-2.Based on the Rel-18 TEI agreement below , this feature is addiitonally enabled this for FR1 in Rel-18.It is up to RAN2 how to implement the agreement below.Please note that this row suggests a smaller range value, i.e. {0, ... . 32} for extendedK2 for FR1 as compared to Rel-17.**Agreement**Introduce UE feature(s) for multi-PUSCH scheduling with single DCI 0\_1 for non-contiguous slots in FR1 for all defined SCSs- Note: there is no RAN1 impact  |  |