■ Signaling Implemented

■ No need to implement signaling due to mandatory w/o capability

■ Not implemented due to FFS

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| WI | # | Feature group | Components | Prerequisite feature groups  | Need for gNB to know whether thefeature is supported by the UE(what happens if gNB does not know?) | Consequences if the feature is not supported by the UE | Type (See R4-17121 19) | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | RAN5 implication | Remarks | Responsible WG | Recommendation for TSG-RAN | TSG-RAN decision |
| System parameter | 1-1 | 60kHz of subcarrier spacing for FR1 | 1) 60kHz subcarrier spacing for data channel in FR1 |  | Yes | UE does not support 60kHz of subcarrier spacing for data channel in FR1 | Type 4 | No Need | Applicable only to FR1 |  |  | RAN4 | TBD |  |
| 1-2 | 64QAM modulation for FR2 PDSCH | 1) 64QAM modulation for FR2 PDSCH |  | Yes | 64QAM for PUSCH is not possible |  | No need | Applicable only to FR2 |  | Capability can be discussed in future, e.g. when low cost device (e.g. IoT) and/or higher frequency band in FR2 are introduced | RAN4 | Mandatory without capability  |  |
| 1-3 | 64QAM for PUSCH | 1) 64QAM for PUSCH |  | Yes | 64QAM for PUSCH is not possible |  | No need | No need |  | Capability can be discussed in future, e.g. when low cost device (e.g. IoT) and/or higher frequency band in FR2 are introduced | RAN4 | Mandatory without capability |  |
| 1-4 | 256QAM for PDSCH | 1) 256QAM for PDSCH |  | Yes | 256QAM for PDSCH is not possible | Type 4 for FR1Type 1 for FR2 | No need | Yes |  | For FR1, it can be revisited in the future whether the 256QAM is mandated in all UE types or categoriesFor FR2, RAN4 will continue to discuss whether to introduce the requirements. | RAN4 | Mandatory with capability for FR1TBD for FR2 |  |
| 1-5 | 256QAM for PUSCH | 1) 256QAM for PUSCH |  | Yes | 256QAM for PUSCH is not possible | Type1 for FR1Type 1 for FR2 | No need | Yes |  | For FR1, RAN4 can further discuss to mandate 256QAM for PUSCH for FR1 in future release.For FR2, RAN4 will continue to discuss whether to introduce the requirements. | RAN4 | Optional for FR1TBD for FR2 |  |
| 1-6 | pi/2-BPSK for PUSCH | 1) pi/2-BPSK for PUSCH |  | Yes | pi/2-BPSK for PUSCH is not possible | Type 4 | No need | Yes |  | RAN4 will define the same minimum requirements for pulse-shaped pi/2 BPSK and non pulse-shaped pi/2 BPSK for FR2. | RAN4 | Optional for FR1TBD for FR2 |  |
| 1-7 | pi/2-BPSK for PUCCH format 3/4 | 1) pi/2-BPSK for PUCCH format 3/4 |  | Yes | pi/2-BPSK for PUCCH format 3/4 is not possible | Type 4 | No need | Yes |  |  | RAN4 | Optional for FR1TBD for FR2 |  |
| 1-8 | BWP switching delay | 1) Support BWP switching delay specified in TS38.xxx, candidate values set: {type1, type2} |  | Yes | UE does not support BWP switching delay | Type 4 | No need | No need |  | For this feature, RAN4 also sent another LS (R4-1803283)Network cannot configure the shorter delay for certain UE type RAN4 may remove the capability signaling if RAN4 can agree single minimum delay for each scenario. | RAN4 | TBD |  |
| 1-9 | 1-symbol GP in unpaired spectrum | 1) Slot formats with 1-symbol GP(s) for 120KHz SCS in unpaired spectrum in FR22) Slot formats with 1-symbol GP(s) for 60KHz SCS in unpaired spectrum in FR1 |  | Yes | UE does not support 1 symbol GP in unpaired spectrum | Type 4 | Applicable only to TDD | Yes |  | RAN4 will further discuss whether it is feasible to support this feature or not in Rel-15. | RAN4 | TBD |  |
| 1-10 | Support of EN-DC with LTE-NR coexistence in UL sharing from UE perspective | 1) Support of EN-DC with LTE-NR coexistence in UL sharing from UE perspective |  | Yes | UE does not support of EN-DC with LTE-NR coexistence in UL sharing from UE perspective | Type 3 (per band combination) | No Need | Applicable only to FR1 |  |  | RAN4 | Optional |  |
| 1-11 | Switching time between LTE UL and NR UL for EN-DC with LTE-NR coexistence in UL sharing from UE perspective | Support of switching type between LTE UL and NR UL for EN-DC with LTE-NR coexistence in UL sharing from UE perspective. Type 1: ~0usType 2: <20us | 1-10 | Yes | UE does not support UL subcarrier alignment between LTE and NR for EN-DC with LTE-NR coexistence in UL | Type 3 (per band combination) | No Need | Applicable only to FR1 |  | This feature is the switching time between LTE UL and NR UL in the same carrierPer band combination signalling (Type 3)UE Capability signalling elements. 1: ~0us switching type.2: <20us switching type.  | RAN4 |  |  |
| 1-12 | 7.5kHz UL raster shift | 1) 7.5kHz UL raster shift |  | Yes | UE does not support 7.5kHz UL raster shift | N/A | N/A | No need |  |  | RAN4 | Mandatory in the SUL bands with uplink sharing either from UE perspective or from network perspective7.5KHz raster shift as mandatory without capability signalling. 7.5kHz UL raster shift is mandatory in Bands n1, n2, n3, n5, n7, n8, n20, n28, n66. RAN4 can revisit the above bands in the future release. 7.5KHz raster shift is not mandatory for other LTE refarming band except the bands which were agreed to support 7.5kHz UL raster shift as mandatory |  |
| UE RF | 2-1 | Maximum channel bandwidth supported in each band for DL and UL separately and for each SCS that UE supports within a single CC | 1) FR1 channel bandwidths in TS38.101-1 Table 5.3.5-12) FR2 channel bandwidths in TS38.101-2 Table 5.3.5-1 |  | Yes | For FR1, all the bandwidths listed in TS38.101-1 v15.0.0 Table 5.3.5-1 for each band shall be mandatory with a single CCFor FR2, UE does not support some UE channel bandwidths | Type 1 | No Need | 　No Need |  | UE capability signalling shall follow RP-172832 (Per-band capability signalling, separately for DL and UL and for each SCS)For FR1, all the bandwidths listed in TS38.101-1 v15.0.0 Table 5.3.5-1 for each band shall be mandatory with a single CCFor FR2, the set of mandatory CBW is FFS | RAN4 | TBD |  |
| 2-2 | Simultaneous reception or transmission with same or different numerologies in CA | 1) Support of simultaneous reception or transmission with same or different numerologies in CA  |  | Yes | UE does not support simultaneous reception or transmission with same or different numerologies in CA | Type 3 | No need | No need |  | From RAN4 perspective UE shall be able to signal the supported SCS per CC for each band combinationSame numerology for intra-band NR CA including both continuous and non-continuous is mandatory support for Rel15The capability of supporting SCS within the single carrier in the CA configuration will be signalled separately, i.e., there is no need to mandatory UE to support mixed numerologies in CA caseIf a UE supports inter-band NR CA including both FR1 band(s) and FR2 band(s), the UE shall support two mixed numerologies between FR1 band(s) and FR2 band(s) in DL and UL with or without capability signaling | RAN4 | TBD  |  |
| 2-3 | Non-contiguous intra-band CA frequency separation class for FR2 | 1) Support of frequency separation classes to handle the total frequency span for DL for intra-band non-contiguous CA2) Support of frequency separation classes to handle the total frequency span for UL for intra-band non-contiguous CA |  | Yes | UE does not support non-contiguous intra-band CA for FR2  | Type 1 | No need | Applicable only to FR2 |  | UE signals the supported Frequency separation classes with per band granularity (Type 1) based on R4-1803363Separate Frequency separation classes can be signalled for DL and UL | RAN4 | TBD  |  |
| 2-4 | Simultaneous reception and transmission for inter-band EN-DC (TDD-TDD or TDD-FDD) | 1) Simultaneous reception and transmission for inter-band EN-DC (TDD-TDD or TDD-FDD) | 　 | Yes | UE does not support simultaneous reception and transmission for inter-band EN-DC (TDD-TDD or TDD-FDD) | Type 3 (Per band combination) | No Need | No Need | 　 | Further discuss in RAN4 86bis whether to mandate this feature Whether to mandating this feature in certain band combinations will be FFS. | RAN4 | TBD |  |
| 2-5 | Simultaneous reception and transmission for inter band CA (TDD-TDD or TDD-FDD) | 1) Simultaneous reception and transmission for inter band CA (TDD-TDD or TDD-FDD) | 　 | Yes | UE does not support simultaneous reception and transmission for inter band CA (TDD-TDD or TDD-FDD) | Type 3 (Per band combination) | No Need | No Need | 　 | Further discuss in RAN4 86bis whether to mandate this featureWhether to mandating this feature in certain band combinations will be FFS. | RAN4 | TBD |  |
| 2-6 | Asynchronous FDD-FDD intra-band EN-DC DC | Asynchronous FDD-FDD intra-band EN-DC |  | Yes | UE does not support asynchronous FDD-FDD intra-band EN-DC | Type 3 (Per band combination) | Applicable only to FDD | Applicable only to FR1 |  |  | RAN4 | Optional |  |
| 2-7 | Almost contiguous UL CP-OFDM | 1) Support of almost contiguous UL CP-OFDM transmissions |  |  | UE does not support almost contiguous UL CP-OFDM | Type 4 | No need | Yes |  | RAN4 will continue to discuss whether to introduce the requirements. | RAN4 | TBD |  |
| 2-8 | PA calibration gap | 1) Support of PA calibration gap to implement PA digital pre-distortion techniques |  | Yes | UE does not support PA calibration gap  | Type 4 | No Need | Applicable only to FR2 |  | RAN4 will further discuss the UE capability in the future. We can revisit the need of calibration gap once RAN4 reach consensus.Introduce type 4 (per UE for FR2 only) UE capability signalling to inform network that the UE needs PA calibration gap for meeting the UE Tx requirements. If UE does not indicate this capability, the UE meets the UE Tx requirements without PA calibration gap  | RAN4 | TBD  |  |
| 2-9 | UE power class | 1) Support of [non-default] FR1 UE power class2) Support of FR2 UE power class3) Support of FR1 UE power class for EN-DC4) Support of FR1 UE power class for NR-CA |  | Yes | UE does not support UE power classes | Type 1 and Type 3 (see remarks column) | No Need | No Need |  | Capability signalling* FR1 UE power class ( Type 1 (per band))
* FR2 UE power class ( Type 1 (per band))
* FR1 UE power class for EN-DC (Type 3 (per band combination))
* FR1 UE power class for NR CA (Type 3 (per band combination))
 | RAN4 | TBD |  |
| Baseband | 3-1 | Independent measurement gap configurations for FR1 and FR2 | 1) measurement gaps for FR1 and FR2 are configured independently |  | Yes | UE does not support independent gap configuration between FR1 and FR2  | Type 4 | No Need | 　No Need |  |  | RAN4 | Optional |  |
| 3-2 | Simultaneous reception of data and SS block with different numerologies when UE conducts the serving cell measurement or intra-frequency measurement  | 1) Simultaneous reception of data and SS block with different numerologies when UE conducts the serving cell measurement or intra-frequency measurement | 　 | Yes | UE does not support simultaneous reception of data and SS block with different numerologies  | Type 4 | No Need | Yes |  |  | RAN4 | Optional | 　 |