**3GPP TSG RAN WG1 #107bis-e R1-200xxxx**

**e-Meeting, January 17th – 25th, 2022**

**Source: Ad-Hoc Chair (AT&T)**

**Title: Session Notes of AI 8.15.2**

**Agenda Item:** **8.15.2**

**Document for:** **Endorsement**



#### 8.15.2 UE features for supporting NR from 52.6 GHz to 71 GHz

[107bis-e-R17-UE-features-52-71GHz-01] Email discussion UE features for supporting NR from 52.6 GHz to 71 GHz – Ralf (AT&T)

* 1st check point: January 20
* Final check point: January 25

**Agreement: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 24. NR\_ext\_to\_71GHz | 24-1 | Basic FR2-2 DL support | 1. Support reception of 120kHz subcarrier spacing for DL data and control channels, SSB, and reference signals in FR2-2 for non-initial access |  | Yes | N/A | FR2-2 is not supported | ~~[per UE][~~per band~~]~~ | N/A | N/A | N/A |  | Optional with capability signalling  A UE that supports FR2-2 must indicate this FG is supported |

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| 24. NR\_ext\_to\_71GHz | 24-1a | Basic FR2-2 UL support | 1. PRACH with 120KHz SCS and length 139  2. Support transmission of 120kHz subcarrier spacing for UL data and control channels and reference signals in FR2-2 | ~~[~~24-1~~]~~ | Yes | N/A | UL in FR2-2 is not supported | ~~[per UE][~~per band~~]~~ | N/A | N/A | N/A |  | Optional with capability signalling  [A UE that supports FR2-2 must indicate this FG is supported] |

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| 24. NR\_ext\_to\_71GHz | 24-1c | Multi-RB support PUCCH format 0/1/4 for 120 kHz in FR2-2 ~~[with/without shared spectrum channel access]~~ | 1. Support multi-RB PUCCH format 4 for 120 kHz  2. Support multi-RB PUCCH format 0/1 for 120 kHz | ~~[~~24-1a~~]~~ | Yes | N/A | Multi-RB support  PUCCH format 0/1/4 for 120 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling  [A UE that supports [24-1a/24-2/FR2-2] must indicate this FG is supported]  This FG is only supported in bands under PSD limitation in shared spectrum operation |

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| 24. NR\_ext\_to\_71GHz | 24-4c | Multi-RB PUCCH format 0/1/4 for 480 kHz in FR2-2 ~~[with/without shared spectrum channel access]~~ | Support multi-RB PUCCH format 0/1/4 for 480 kHz | 24-4a | Yes | N/A | Multi-RB PUCCH format 0/1/4 for 480 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling  This FG is only supported in bands under PSD limitation in shared spectrum operation |

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| 24. NR\_ext\_to\_71GHz | 24-5c | Multi-RB PUCCH format 0/1/4 for 960 kHz in FR2-2 ~~[with/without shared spectrum channel access]~~ | Support multi-RB PUCCH format 0/1/4 for 960 kHz | 24-5a | Yes | N/A | Multi-RB PUCCH format 0/1/4 for 960 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling  This FG is only supported in bands under PSD limitation in shared spectrum operation |

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| 24. NR\_ext\_to\_71GHz | 24-1b | Wideband PRACH for 120 kHz in FR2-2 ~~[with/without shared spectrum channel access]~~ | Enhanced PRACH design for operation by adopting a single long ZC sequence, with ZC sequence equal to 1151 for 120kHz and ZC sequence equal to 571 for 120kHz | ~~[~~24-1a~~]~~ | Yes | N/A | Wideband PRACH for 120 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A | ~~FFS: whether to split this FG for SA and DC~~ | Optional ~~[~~with~~/without]~~capability signalling  [Note: This FG is only supported in bands for shared spectrum operation]  [A UE that supports 24-2 must indicate this FG is supported] |

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| 24. NR\_ext\_to\_71GHz | 24-4b | Wideband PRACH for 480 kHz in FR2-2 ~~[with/without shared spectrum channel access]~~ | PRACH with 480KHz and length 571 | 24-4a | Yes | N/A | Wideband PRACH for 480 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A | ~~FFS: whether to split this FG for SA and DC~~  ~~[Agreement:~~  ~~Do not support PRACH length L=571, 1151 for 960kHz PRACH and at least L =1151 for 480kHz PRACH]~~ | Optional with capability signalling  [Note: This FG is only supported in bands for shared spectrum operation] |

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| 24. NR\_ext\_to\_71GHz | 24-4 | 480KHz SCS support for DL | 1. 480KH SCS for DL data and control channels, SSB, and reference signal reception in FR2-2 for non-initial access  2. Multiple-slot PDCCH monitoring for 480KHz with ~~X=4 slots~~ (Xs,Ys) = (4,1)  FFS: 3. Multi- PDSCH scheduling by single DCI for the operation with 480 kHz SCS and corresponding HARQ enhancements  4. Within the Ys = 1 slot, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS with a maximum of two monitoring spans per slot ~~according to FG 3-5b~~ with set2 = (4, 3) and (7, 3) symbols where set2 is defined in FG3-5b (FFS: Monitoring capability within slots of type 1 CSS without dedicated RRC configuration and type0, 0A, and 2 CSS)  5. Processing one unicast DCI scheduling DL and one unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for FDD (This supersedes corresponding component of FG 3-5b)  6. Processing one unicast DCI scheduling DL and 2 unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for TDD (This supersedes corresponding component ~~6~~ of FG 3-5b) | 24-1 | Yes | N/A | 480KHz SCS for DL is not supported | ~~[~~Per ~~UE/~~band~~]~~ | N/A | N/A | N/A | FFS: component description without a reference to other R15 FGs | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-5 | 960KHz SCS support for DL | 1. 960KHz SCS for DL data and control channels, SSB, and reference signal reception in FR2-2 for non-initial access  2. Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)=(8,1) ~~slots~~  FFS: 3. Multi-PDSCH scheduling by single DCI for the operation with 960 kHz SCS and corresponding HARQ enhancements  3. Within the Ys = 1 slot, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS ~~according to FG 3-5b~~ with set1 = (7, 3) symbols where set1 is defined in FG3-5b (FFS: Monitoring capability within slots of type 1 CSS without dedicated RRC configuration and type0, 0A, and 2 CSS)  4. Processing one unicast DCI scheduling DL and one unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for FDD (This supersedes corresponding component of FG 3-5b)  5. Processing one unicast DCI scheduling DL and 2 unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for TDD (This supersedes corresponding component ~~6~~ of FG 3-5b) | 24-1 | Yes | N/A | 960KHz SCS support for DL is not supported | ~~[~~Per ~~UE/~~band~~]~~ | N/A | N/A | N/A | FFS: component description without a reference to other R15 FGs | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-4f | Enhanced PDCCH monitoring for 480KHz in FR2-2 | ~~[1.) Multiple-slot PDCCH monitoring for 480KHz with (Xs,Ys)=(2,1)]~~  1.) Multiple-slot PDCCH monitoring for 480KHz with (Xs,Ys)~~=[(4,2)] slots~~  2.) Within each of the Ys = 2 slots, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS in the first 3 OFDM symbols of each slot as in ~~according to~~ FG 3-1 (FFS: Monitoring capability within slots of type 1 CSS without dedicated RRC configuration and type0, 0A, and 2 CSS) | 24-4 | Yes | N/A | Enhanced PDCCH monitoring for 480KHz in FR2-2 is not supported | Per band | N/A | N/A | N/A | Component 1 candidate values: [one or more of] {[(2,1),] (4,2) }  Note: If (2,1) is not agreed, this FG will have no component candidate values and the component 1 description will be updated from (Xs,Ys) to (Xs,Ys)=(4,2) similar to FG 24-4 and 24-5  FFS: component description without a reference to other R15 FGs | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-5f | Enhanced PDCCH monitoring for 960KHz | ~~1.) Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)=(4,1)~~  ~~2.) Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)= (4,2)~~  1.) Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)~~=(8,4) slots~~  2.) Within each of the Ys = 2 or 4 slots, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS in the first 3 OFDM symbols of each slot as in ~~according to~~ FG 3-1 (FFS: Monitoring capability within slots of type 1 CSS without dedicated RRC configuration and type0, 0A, and 2 CSS) | 24-5 | Yes | N/A | Enhanced PDCCH monitoring for 960KHz is not supported | Per band | N/A | N/A | N/A | Component 1 candidate values: one or more of {(4,1), (4,2), (8,4)}  FFS: component description without a reference to other R15 FGs | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-1a | Basic FR2-2 UL support | 1. PRACH with 120KHz SCS and length 139  2. Support transmission of 120kHz subcarrier spacing for UL data and control channels and reference signals in FR2-2 | 24-1 | Yes | N/A | UL in FR2-2 is not supported | per band | N/A | N/A | N/A |  | Optional with capability signalling  ~~[A UE that supports FR2-2 must indicate this FG is supported]~~ |

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| 24. NR\_ext\_to\_71GHz | 24-1c | Multi-RB support PUCCH format 0/1/4 for 120 kHz in FR2-2 | 1. Support multi-RB PUCCH format 4 for 120 kHz  2. Support multi-RB PUCCH format 0/1 for 120 kHz | 24-1a | Yes | N/A | Multi-RB support  PUCCH format 0/1/4 for 120 kHz in FR2-2 is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling  ~~[A UE that supports [24-1a/24-2/FR2-2] must indicate this FG is supported]~~  This FG is only supported in bands under PSD limitation in shared spectrum operation |

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| 24. NR\_ext\_to\_71GHz | 24-1d | Multiple PDSCH scheduling by single DCI for 120kHz | 1. Multi-PDSCH scheduling by single DCI for the operation with 120 kHz SCS  2. HARQ enhancements | ~~[~~24-1~~]~~ | Yes | N/A | Multiple PDSCH scheduling by single DCI for 120kHz is not supported | Per band | N/A | N/A | N/A | FFS: to extend this FG to other frequency ranges such as FR1 and FR2-1 | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-1e | Multiple PUSCH scheduling by single DCI for 120kHz | 1. Multi-PUSCH scheduling by single DCI for the operation with 120 kHz SCS | ~~[~~24-1a~~]~~ | Yes | N/A | Multiple PUSCH scheduling by single DCI for 120kHz is not supported | Per band | N/A | N/A | N/A | FFS: to extend this FG to other frequency ranges such as FR1 and FR2-1 | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-2 | 120KHz SSB support for ~~SA/DC~~ initial access in FR2-2 | 1. Support 120KHz SSB for ~~SA/DC~~ initial access in FR2-2 | ~~[~~24-1, 24-1a~~]~~ | N/A | N/A | 120KHz SSB based ~~stand-alone~~ initial access in FR2-2 is not supported | ~~N/A~~ Per band | N/A | N/A | N/A | ~~per band~~  ~~FFS: whether to split this FG for SA and DC~~ | Optional ~~[~~with~~/without]~~ capability signalling  ~~[A UE that supports FR2-2 must indicate this FG is supported]~~ |

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| 24. NR\_ext\_to\_71GHz | 24-3 | 480KHz SSB support for ~~SA/DC~~ initial access in FR2-2 | 1. Support 480KHz SSB for ~~SA/DC~~ initial access in FR2-2 | ~~24-1[~~, 24-2, 24-4, 24-4a~~]~~ | ~~FFS~~ N/A | N/A | 480KHz SSB for initial access in FR2-2 is not supported | ~~[per UE][~~per band~~]~~ | N/A | N/A | N/A | ~~FFS: whether to split this FG for SA and DC~~ | Optional ~~[~~with~~/without]~~ capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-4a | 480KHz SCS support for UL | 1. PRACH with 480KHz and length 139  2. 480KHz SCS for UL data and control channels and reference signal transmission in FR2-2  3. Multi-PUSCH scheduling by single DCI for the operation with 480 kHz SCS | 24-1a, 24-4 | Yes | N/A | 480KHz SCS support for UL is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-5a | 960KHz SCS support for UL | 1. PRACH with 960KHz and length 139  2. 960KHz SCS for UL data and control channels and reference signal transmission in FR2-2  ~~[~~3. Multi-PUSCH scheduling by single DCI for the operation with 960 kHz SCS~~]~~ | 24-1a, 24-5 | Yes | N/A | 960KHz SCS support for UL is not supported | Per band | N/A | N/A | N/A |  | Optional with capability signalling |

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| 24. NR\_ext\_to\_71GHz | 24-6 | ~~Support [~~Type 1~~]~~ channel access procedure in uplink for FR2-2 ~~unlicensed operation~~ with shared spectrum channel access | 1. Support ~~[~~Type 1~~]~~ channel access procedure  [2. Support LBT performed per carrier/BWP bandwidth] | 24-1a | Yes | N/A | Type 1 channel access procedure in uplink for FR2-2 with shared spectrum channel access is not supported | per band | N/A | N/A | N/A |  | Optional with capability signalling  ~~[~~A UE that supports FR2-2 must indicate this FG is supported when required by regulation~~]~~ |

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| 24. NR\_ext\_to\_71GHz | 24-7 | ~~Support [~~Type 2~~]~~ channel access procedure in uplink for FR2-2 ~~unlicensed operation~~ with shared spectrum channel access | 1. Support ~~[~~Type 2~~]~~ channel access procedure  [2. Support LBT performed per carrier/BWP bandwidth] | 24-1a, 24-6 | Yes | N/A | Type 2 channel access procedure in uplink for FR2-2 with shared spectrum channel access is not supported | per band | N/A | N/A | N/A |  | Optional with capability signalling  ~~[~~A UE that supports FR2-2 must indicate this FG is supported when required by regulation~~]~~ |

[R1-2200050](../../Docs/R1-2200050.zip) Rel-17 UE features for extension to 71 GHz Huawei, HiSilicon

[R1-2200099](../../Docs/R1-2200099.zip) Discussions on UE features for NR operation from 52.6GHz to 71GHz vivo

[R1-2200217](../../Docs/R1-2200217.zip) UE features for supporting NR from 52.6 GHz to 71 GHz Samsung

[R1-2200247](../../Docs/R1-2200247.zip) Views on Rel-17 UE features for supporting NR in FR2-2 NTT DOCOMO, INC.

[R1-2200266](../../Docs/R1-2200266.zip) Discussion on UE features for 52.6 to 71GHz ZTE, Sanechips

R1-2200312 UE features for NR from 52.6 Ghz to 71 Ghz Qualcomm Incorporated

Late submission

[R1-2200330](../../Docs/R1-2200330.zip) Discussion on UE feature for FR2-2 OPPO

[R1-2200390](../../Docs/R1-2200390.zip) Discussion on UE capability for extending NR up to 71 GHz Intel Corporation

[R1-2200408](../../Docs/R1-2200408.zip) UE features for extending current NR operation to 71 GHz Ericsson

[R1-2200431](../../Docs/R1-2200431.zip) Views on Rel-17 Beyond 52.6 GHz UE features Apple

[R1-2200543](../../Docs/R1-2200543.zip) Views on UE features for supporting NR from 52.6 GHz to 71 GHz MediaTek Inc.

[R1-2200582](../../Docs/R1-2200582.zip) Discussion on UE features for NR above 52.6 GHz LG Electronics

[R1-2200623](../../Docs/R1-2200623.zip) On UE features for supporting NR from 52.6 GHz to 71 GHz Nokia, Nokia Shanghai Bell