**3GPP TSG RAN WG1 #104-e R1-20xxxxx**

**e-Meeting, January 25th – February 5th, 2021**

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

**Title: Session Notes of AI 7.2.11**

**Agenda Item:** **7.2.11**

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

1.

### NR Rel-16 UE Features (9)

R1-2101588 Summary on UE features for two-step RACH Moderator (NTT DOCOMO, INC.)

R1-2101589 Summary on UE features for NR-U Moderator (NTT DOCOMO, INC.)

R1-2101590 Summary on UE features for URLLC/IIoT Moderator (NTT DOCOMO, INC.)

R1-2101591 Summary on UE features for NR positioning Moderator (NTT DOCOMO, INC.)

R1-2101592 Summary on UE features for MR-DC/CA Moderator (NTT DOCOMO, INC.)

R1-2101593 Summary on UE features for CLI/RIM Moderator (NTT DOCOMO, INC.)

R1-2101594 Summary on UE features for TEIs Moderator (NTT DOCOMO, INC.)

R1-2101595 Summary on NR UE features for others Moderator (NTT DOCOMO, INC.)

[104-e-NR-UEFeatures-LS] Email approval of updated Rel-16 NR UE features by 2/4 – Hiroki (DCM)

Notes:

* There will not be any dedicated email discussions/approvals for 5G V2X Rel. 16 NR UE features during RAN1 #104-e. Editorial changes such as corrections of typos can be handled in email discussion/approval [104-e-NR-UEFeatures-LS]

**Mobility Enhancements:**

[104-e-NR-UEFeatures-MobEnh-01] Email discussion/approval of whether to change the prerequisites of FGs 21-2, 21-2a, 21-2b to include FG 21-1b and update the description with “for inter-frequency DAPS HO” , till 1/29 (Ralf, AT&T)

* Any necessary alignments between RAN1 and RAN2 (e.g., changing the type of FG 21-1a to “Per Band/per BC”) can be handled in email discussion/approval [104-e-NR-UEFeatures-LS]

**eMIMO:**

[104-e-NR-UEFeatures-eMIMO-01] Email discussion/approval of whether/how to address that UEs that support multi-DCI multi-TRP are not mandated to support PDSCH retransmission scheduled by different TRP, till 1/29 (Ralf, AT&T)

[104-e-NR-UEFeatures-eMIMO-02] Email discussion/approval of whether/how to capture that the maximum number of configured PUCCH spatial relations and candidate beams in BFR can be up to 64, till 1/29 (Ralf, AT&T)

[104-e-NR-UEFeatures-eMIMO-03] Email discussion/approval of how to interpret FG 16-2c “Simultaneous reception with different Type-D” and whether changes are needed, till 1/29 (Ralf, AT&T)

[104-e-NR-UEFeatures-eMIMO-04] Email discussion/approval of whether/how Section 5.2.1.6 in 38.214 applies to FGs 16-1a-1 and 16-1g, till 1/29 (Ralf, AT&T)

**Proposal:**

* If one resource is used for one or multiple of BFD/RLM, it is counted as one (basic usage1)
* If one resource is used for one or multiple of NBI/PL-RS/RSRP, add 1 (basic usage 2)
* If one resource is used for L1-SINR in addition to basic usage 1 & 2, add N if referred N times by one or more CSI Reporting Settings

**Proposal:**

Update both FG 16-1g and FG 16-1g-1 with the following note:

* Note: regarding the "configured to measure” RS counting
	+ If one resource is used for one or multiple of BFD/RLM, it is counted as one (basic usage1)
	+ If one resource is used for one or multiple of NBI (New Beam Identification)/PL-RS/L1-RSRP, add 1 (basic usage 2)
		- L1-RSRP measurement includes P3 procedure, i.e., NZP-CSI-RS-ResourceSet with “repetition” set to “on”.
	+ If one resource is used for L1-SINR in addition to basic usage 1 & 2, add N if referred N times by one or more CSI Reporting Settings
	+ This counting rule also applies to FG2-24 for L1-RSRP measurement and FG16-1a-1 for L1-SINR measurement

**Agreement:** The following changes highlighted in red are adopted

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 16-1a-1 | SSB/CSI-RS for L1-SINR measurement | Per slot limitations:1. The max number of SSB/CSI-RS (1Tx) for CMR
2. The max number of CSI-IM/NZP-IMR resources
3. The max number of CSI-RS (2Tx) resources for CMR

Memory limitations:1. The max number of SSB/CSI-RS resources as CMR
2. The max number of CSI-IM/NZP IMR resources

Other limitations:1. Supported density of CSI-RS (CMR)
2. The max number of aperiodic CSI-RS resources across all CCs configured to measure L1-SINR (including CMR and IMR) shall not exceed MD\_1
3. Supported SINR measurements
 | 2-21, 2-22 or 2-23, 2-23a | Yes  | N/A |  | Per band | No | No |  | Component 1: Candidate values {8, 16, 32, 64}Component 2: Candidate values {8, 16, 32, 64}Component 3: Candidate values {0, 4, 8, 16, 32, 64}Component 4: Candidate values {8, 16, 32, 64 , 128}Component 5: Candidate values {8, 16, 32, 64 , 128}Component 6: Candidate values {‘1 only’, ‘3 only’, ‘1 and 3’}Component 7: Candidate values {2, 4, 8, 16, 32, 64}Component 8: Candidate values: bitmap with entries {SSB as CMR with dedicated CSI-IM, SSB as CMR with dedicated NZP IMR, CSI-RS as CMR with dedicated NZP IMR configured, CSI-RS as CMR without dedicated IMR configured} If a UE supports FG 16-1a-1 it must support CMR(CSI-RS) + dedicated CSI-IM Note1: The reference slot duration is the shortest slot duration defined for the FR where the reported band belongsNote2: For component 4 and 5 the configured CSI-RS resources for both active and inactive BWPs are countedNote3: For components 1, 2 and 3, CSI-RS resources configured as CMR without dedicated IMR are counted both as CMR and IMRNote4: For components 1, 2, 3, 7, a SSB/CSI-RS resource is counted within the duration of a reference slot in which the corresponding reference signals are transmitted | Optional with capability signaling |

**Agreement:** The following changes highlighted in red are adopted

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| 16-1g | Resources for beam management, pathloss measurement, BFD, RLM and new beam identification  | 1. The maximum total number of SSB/CSI-RS/CSI-IM resources configured to measure within a slot across all CCs in one frequency range for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification
2. The maximum total number of SSB/CSI-RS/CSI-IM resources configured across all CCs in one frequency range for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification
 | 2-24, 2-31 | Yes | N/A |  | Per UE | No | Yes |  | Component-1: candidate value set is {2, 4, 8, 12, 16, 32, 64, 128}Component-2: candidate value set is {2, 4, 8, 12, 16, 32, 40, 48, 64, 72, 80, 96, 128, 256}Note: For RS configured for new beam identification, they are always counted regardless of beam failure eventNote: The “configure to measure” RS (component1) only counts those in active BWP but the configured RS (component2) counts all configured including both active and inactive BWPNote: the reference  slot duration is the shortest slot duration defined for the reported FR supported by the UENote: The “configured to measure” RS is counted within the duration of a reference slot in which the corresponding reference signals are transmitted | Optional with capability signaling |

**Agreement:** The following changes highlighted in red are adopted

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 16-1g-1 | Resources for beam management, pathloss measurement, BFD, RLM and new beam identification across frequency ranges | 1. The maximum total number of SSB/CSI-RS/CSI-IM resources configured to measure within a slot across all CCs for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification
2. The maximum total number of SSB/CSI-RS/CSI-IM resources configured across all CCs for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification
 | 2-24, 2-31, 16-1g | Yes  | N/A |   | Per UE | No | No |   | Component-1: candidate value set is {2, 4, 8, 12, 16, 32, 64, 128}Component-2: candidate value set is {2, 4, 8, 12, 16, 32, 40, 48, 64, 72, 80, 96, 128, 256}Note: This FG indicates the maximum number of resources across all FR(s) that are supported by the UENote: The signalled values apply to the shortest slot duration defined in any FR(s) that are supported by the UE Note: The “configured to measure” RS is counted within the duration of a reference slot in which the corresponding reference signals are transmitted | Optional with capability signaling |

**NR-U**

[104-e-NR-UEFeature-NRU-01] Email discussion/approval on UE features for NR-U (25th Jan – 29th Jan) – Hiroki (DCM)

* Whether or not to ask RAN2 to update the optionality of FG10-2f
* Whether or not to clarify that a UE indicating no support of FG 10-26a, also indicates that none of Rel-15 FG 1-5/1-5a/1-6/1-7/1-8/1-9 are supported by the UE in unlicensed bands
* Whether or not to clarify that Rel-15 FGs 1-4 applies to licensed band operation only
* How to reply to RAN4 on RAN1’s understanding on RB set of NR-U

**URLLC/IIoT**

[104-e-NR-UEFeature-URLLCIIoT-01] Email discussion/approval on UE features for NR URLLC and IIoT (25th Jan – 29th Jan) – Hiroki (DCM)

* Whether or not to confirm working assumption to add the replicated FGs of 11-2a/c with restriction for non-aligned span case
* Whether or not to add the replicated FGs of 11-2d/e with restriction for non-aligned span case
* Whether/how to clarify the interpretation of FG11-7b/9/9a and FG12-2/2a in case of cross-carrier operation (interpretation 1 or 3)
* Whether/how to clarify the relationship between FG11-4/4a and FG12-1

**Others**

[104-e-NR-UEFeature-Others-01] Email discussion/approval on NR UE features for others (25th Jan – 29th Jan) – Hiroki (DCM)

* Regarding FG22-6/6a/7
	+ Whether or not to add replicated FGs 6-[8/]9/9a to be reported with FG22-7
	+ Whether or not to update how to handle SDL/SUL
	+ Whether or not to confirm the working assumption on how to count SUL
	+ Whether/how to cover the case where the NUL and the SUL are in different FRs or in different licensed/unlicensed types
* Whether/how to update the prerequisite of FG22-8a/b/c/d
* Regarding licensed/unlicensed differentiation for Rel-15 FGs
	+ Confirm the FG descriptions of new FGs to indicate the support of following FG in unlicensed band (as agreed in RAN1#103-e)
		- FG 1-2 (SS block based SINR measurement (SS-SINR))
		- FG 2-32a/2-32b (Semi-persistent CSI report on PUCCH/PUSCH)
		- FG 3-6 (Dynamic SFI monitoring)
		- FG 4-19a/4-19b/4-19c/4-28 (HARQ-ACK multiplexing)
		- FG 4-23 (Repetitions for PUCCH format 1, 3, and 4 over multiple slots with K = 2, 4, 8)
		- FG 5-14/5-16/5-17/5-17a (PDSCH and PUSCH repetitions)
	+ Whether or not to add new FG(s) to indicate the support of following FG in unlicensed band
		- [FG 4-19]
		- [FG 5-18/5-19/5-20/5-21 (SPS and configured grant)]
	+ Whether each of Rel-16 versions of 4-19/4-23/4-28/5-17 is part of basic operation for corresponding scenarios of NR-U
	+ Whether/how to clarify the interpretation of support of FG in case of cross-carrier operation between licensed and unlicensed carriers

**LSs:**

[104-e-NR-UEFeature-LS-01] Email discussion/approval of the reply LS to R1-2100003, to be handled under 7.2.11 (name TBD, CMCC)

[104-e-NR-UEFeature-LS-02] Email discussion regarding LS in R1-2100019, including a possible reply LS if necessary, to be handled under 7.2.11 (name TBD, Qualcomm)

[R1-2100094](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2100094.zip) Discussion on NR Rel-16 UE Features ZTE

[R1-2100140](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2100140.zip) Correction for V2X UE feature list OPPO

[R1-2100522](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2100522.zip) Remaining details of Rel-16 NR UE features Ericsson

[R1-2100554](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2100554.zip) Discussion on NR Rel-16 UE features LG Electronics

[R1-2100635](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2100635.zip) Remaining issue on UE features Intel Corporation

[R1-2101184](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101184.zip) On NR Rel.16 UE features Samsung

[R1-2101249](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101249.zip) Updates on NR UE Features Nokia, Nokia Shanghai Bell

[R1-2101273](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101273.zip) Remaining details of Rel-16 NR UE features Huawei, HiSilicon

[R1-2101342](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101342.zip) Discussions on NR Rel-16 UE features Apple

R1-2101343 Discussion on Rel-16 UE features for mobility enhancement Apple

Withdrawn

[R1-2101444](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101444.zip) Discussion on NR Rel-16 UE features Qualcomm Incorporated

[R1-2101517](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101517.zip) Correction on half-DuplexTDD-CA-SameSCS-r16 CATT

[R1-2101587](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101587.zip) Remaining issues on Rel-16 NR UE features NTT DOCOMO, INC.

[R1-2101685](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2101685.zip) Remaining issues on Rel-16 eMIMO UE features vivo