**3GPP TSG RAN Meeting #98-e RP-22xxxx**

**Electronic Meeting, December 12-16, 2022**

## Status Report to TSG

**Agenda item:** **9.3.1.3**

|  |  |
| --- | --- |
| **WI / SI Name** | Further NR coverage enhancements |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:No |
| **Acronym** | NR\_cov\_enh2 |
| **Unique ID** | 940095 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-221858 |
| **Target Completion Date****(indicate if changed)** | Study Item: NA | Core part: 12/2023 | Performance part: 06/2024 | Testing part: NA |
| **Overall Completion level** | Study Item: NA | Core part: 15% | Performance Part: 0% | Testing part: NA |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN WG1 |
| **Rapporteur** | **Name** | Nanxi LI |
| **Company** | China Telecom |
| **Email** | linanxi@chinatelecom.cn |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

The TU allocation is updated based on RP-213697(Overview of time unit allocation for all RAN REL-18 projects from) approved in RAN#94e.

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

## 2.1 RAN1

#### 2.1.1 Agreements

RAN1 #110b-e

**PRACH enhancements:**

Agreement

For multiple PRACH transmissions with same beam, at least support to use same PRACH preamble during the multiple PRACH transmissions in one RACH attempt.

* FFS: whether different preambles can be utilized in different PRACH transmissions during the multiple PRACH transmissions in one RACH attempt.

Agreement

For multiple PRACH transmissions with same beam, at least ROs located at different time instances can be utilized for the transmissions.

* FFS: whether/how the starting RB of ROs can be different at different time instances for multiple PRACH transmissions.
* FFS: whether/how multiple PRACH transmissions located in the same time instance, e.g., for UEs with multiple Tx chains.

Agreement

For multiple PRACH transmissions with same beam, for RAR monitoring, consider the following options.

* Option 1: One RAR window per each PRACH transmission, the RAR window follows the legacy design.
	+ FFS: RA-RNTI.
* Option 2: Only one RAR window for all of the multiple PRACH transmissions.
	+ FFS: the start position of the RAR window.
	+ FFS: RA-RNTI.

**Power domain enhancements:**

Agreement

The following work split principles will be adopted in RAN1 for power domain enhancement throughout Rel-18 from RAN1 perspective and send LS to RAN4 in this meeting:

* RAN1 performs link level simulations of candidate solutions for power domain enhancements to study at least the SNR variation, PAPR/CM, and EVM, brought by each solution.
	+ Transparent MPR/PAR reduction solutions can be considered as a benchmark for studying the performance of non-transparent solutions.
* RAN1 is not expected to perform RF simulations of candidate solutions for power domain enhancements
	+ Results of RF simulations can be included in RAN1 contributions
* RAN1 will assess RAN1 specification impact of candidate MPR/PAR reduction solutions
	+ A list of candidate solutions, including necessary parameters, from RAN1 perspective should be ready before the end of RAN1 #111, and should be included in an LS to RAN4.
* RAN1 understands that RAN4 is responsible for selecting the Rel-18 MPR/PAR reduction solution, if any.

Conclusion

Sub-PRB transmission is de-prioritized for the study of MPR/PAR reduction solutions in Rel-18.

Agreement

The following spectrum extension options for frequency domain spectrum shaping with spectrum extension (FDSS-SE), are considered for studying MPR/PAR reduction enhancements in Rel-18:

* Option 1: Symmetric extension
* Option 2: Cyclic extension
* Option 3: Cyclic shift plus symmetric extension.

Agreement

The following design aspects of tone reservation (TR), are considered for studying MPR/PAR reduction enhancements in Rel-18:

* Sideband tone reservation size is expressed in integer units of RBs.
* FFS:
	+ Sideband tone reservation size
	+ Sideband tone reservation size determination
	+ Whether PRTs are added only to data or also DMRS symbols

Agreement

For enhancements to realize increasing UE power high limit for CA and DC, RAN1 can study based on RAN4’s input

* Whether RAN1 enhancements to information exchange between UE and gNB are needed to improve scheduling and network performance when using higher power CA/DC.
	+ FFS how to realize such information exchange, e.g., signalling enhancement, and what is the spec impact.

Agreement

DFT-s-OFDM is the target waveform for the study and, if applicable, the design of MPR/PAR reduction solutions in Rel-18.

Note: No doubt from RAN1 about the offline consensus “Results concerning the application of solutions for DFT-s-OFDM to CP-OFDM can be presented by companies in their contributions”.

Agreement

For power-domain enhancements targeting MPR/PAR reduction, study the following configurations for DFT-S-OFDM:

* At least pi/2-BPSK and QPSK modulation are considered
	+ FFS: other modulations, e.g., 16-QAM
* Any number of RB can be considered
* The starting RB of the allocation can be any RB in the BWP
	+ FFS:
		- Whether restrictions on the number of allocated RB or on the starting RB of the allocation are considered.

Agreement

At least the following candidate solutions for MPR/PAR reduction will be studied in RAN1.

* Frequency domain spectrum shaping w/ spectrum extension
* Frequency domain spectrum shaping w/o spectrum extension
* Tone reservation (which can only be w/ spectrum extension)

Agreement

The following design aspects of frequency domain spectrum shaping with spectrum extension (FDSS-SE), are considered for studying MPR/PAR reduction enhancements in Rel-18:

* Spectrum extension size is expressed in integer units of RBs.
* Both DMRS and data symbols undergo spectrum shaping
* FFS:
	+ Which extensions factor(s) to consider, where extension factor (α) is given by spectrum extension size / Total allocation size.
	+ Impact of shaping filter on FDSS-SE performance
	+ How to extend DMRS sequence to spectrum extensions, based on either the existing ZC-sequence DMRS or low-PAPR DMRS for PUSCH (FG 16-6c)
	+ How extension size is determined

Agreement

For link-level performance evaluation:

* R17 PUSCH DFT-s-OFDM waveform is the baseline for performance comparison
* Transparent schemes (to be reported by companies) can be used as benchmark for the performance assessment

All considered solutions should be configured to operate with same amount of time-frequency resource and a same spectral efficiency, that is:

* Same number of DFT-s-OFDM symbols
* Same TBS
* Same RB allocation

Note: it is understood that minor TBS variations across different waveform configurations can occur and are acceptable.

Agreement

For link-level performance evaluation, the performance of the considered MPR/PAR reduction solutions is studied using at least the metrics included in the work split principles for power domain enhancement agreed by RAN1 for Rel-18, for instance, but no limited to, , defined as the SNR variation w.r.t. baseline under the requirement BLER=10-1.

* FFS whether further definition or refinement of the metrics is needed

Note: metrics other than the ones included in the work split principles for power domain enhancement agreed by RAN1 for Rel-18 can be reported by companies.

Agreement

For link-level performance evaluation, companies are encouraged to report configuration details of the following aspects, when applicable:

* Shaping filter used for evaluating frequency domain spectrum shaping w/ and w/o spectrum extension (both the filter used at the transmitter and at the receiver should be reported, if the two filters are assumed to be mismatched).
* PRT generation algorithm used for evaluation tone reservation w/ spectrum extension.
* Design details and configuration of any transparent scheme used as benchmark

Agreement

For link-level performance evaluation of MPR/PAR reduction solutions involving the use of Tx filter, companies are encouraged to assume a Tx filter which fulfils a set of spectrum flatness requirements, e.g., existing RAN4 spectrum flatness requirements

* FFS whether the set of spectrum flatness requirements shall be the same set of constraints as in the current RAN4 spec or not.

For link-level performance evaluation of MPR/PAR reduction solutions involving the use of spectrum extensions or sideband, companies are encouraged to report whether/how the extended portion of the spectrum is handled by the receiver in the simulations.

**Dynamic switching between DFT-S-OFDM and CP-OFDM:**

Agreement

Dynamic waveform switching enhancement in R18 is only applicable to PUSCH channel.

Working Assumption

Support at least one of the following options for the dynamic waveform indication in R18:

* Alt 1: Indication from an UL scheduling DCI
	+ Alt 1-A: New field in scheduling DCI
	+ Alt 1-B: Reuse existing field in scheduling DCI
		- Alt 1-B-1: Explicit indication by repurposing field, e.g.
			* Add one column to TDRA table
			* Add one column to MCS table(s)
			* Other solutions not precluded
		- Alt 1-B-2: Implicit determination from condition(s) on scheduling information, e.g.
			* RA type, MSB of RA
			* Number of RBs (below threshold or multiple of 2,3,5)
			* Location of RB allocation within carrier and the associated MPR
			* MCS below threshold
			* Number of PUSCH repetitions (or whether PUSCH repetition is used) and/or TBoMS
			* Number of DMRS CDM group(s) without data
			* Precoding information and number of layers
			* SRI
			* Condition over multiple types of scheduling information
			* Other types of scheduling information not precluded
	+ Indicated waveform applies at least to the scheduled PUSCH transmission
		- FFS: Whether it also applies to subsequent transmissions, and of which type
	+ FFS: DCI formats can contain the indication
	+ FFS: Indication applies only if condition(s) are satisfied (e.g. PDCCH occasion, /RNTI, /Search space of the scheduling DCI, latest PHR reported by the UE, etc.)
* Alt 2: Indication from a non-UL scheduling DCI
	+ FFS: DCI formats that can provide the indication (e.g. Downlink DCI, UE-group common DCI)
	+ FFS: Types of subsequent transmissions to which indication is applicable

Agreement

To study and if necessary, specify, enhancements to assist the scheduler in determining waveform switching, such as:

* Reporting power headroom related information
* Other solutions are not precluded

Agreement

Dynamic waveform switching enhancement in R18 is applicable to PUSCH scheduled by DCI format 0\_1 or 0\_2 in PDCCH with CRC scrambled with C-RNTI, MCS-C-RNTI, or CS-RNTI with NDI=1.

* Note: The above does not imply that dynamic switching enhancement in R18 is applicable or not applicable to other cases of PUSCH (e.g. PUSCH transmission with a Type 1 or Type 2 configured grant, PUSCH scheduled by DCI format 0\_0).

RAN1 #111

**PRACH enhancements:**

Agreement

For multiple PRACH transmissions with same Tx beam, support to differentiate at least between multiple PRACH transmissions and single PRACH transmissions.

Agreement

For multiple PRACH transmissions with same Tx beam, to differentiate the multiple PRACH transmissions with single PRACH transmission, consider one or multiple of the following options.

* Option 1**: Multiple PRACH are transmitted with separate preamble on shared ROs.**
* Option 2**: Multiple PRACH are transmitted on separate ROs.**
* Option 3: **Partial of multiple PRACHs are transmitted with separate preamble on shared ROs, while the other multiple PRACHs are transmitted on separate ROs.**
* **Other options are not precluded.**
* Note: Shared or separate RO/preamble means that the RO/preamble is shared or separated with single PRACH transmission.

Agreement

* **Study at least the following case for multiple PRACH transmissions with different Tx beams.**
	+ UE uses different TX beams to transmit the multiple PRACH over ROs associated with the same SSB/CSI-RS
	+ FFS: UE uses different TX beams to transmit the multiple PRACH over ROs associated with different SSBs /CSI-RSs, where the different SSBs/CSI-RSs are not associated with the same RO.
	+ Note: not related to decision on CFRA

Note: UE uses different TX beams to transmit the multiple PRACH over ROs associated with different SSBs/CSI-RSs, where the different SSBs/CSI-RSs are associated with the same RO is not considered.

**Working Assumption**

**Simulation results for multiple PRACH transmissions with different beam(s) and same beam(s) (baseline) to be discussed in the next meeting.**

* Simulation assumptions in TR 38.830 are used as the starting point for the simulation.
	+ - Focus on FR2.
			* UE antenna configuration 2-2-2(baseline), 1-4-1(optional)
		- Performance metric: 0.1% false alarm, 1% miss-detection
		- Companies report the number of beams, the beam widths, beam correspondence assumption, and the boresights.
	+ Channel model for link-level simulation: CDL-A defined in table 7.7.1-1 in TR 38.901.
	+ Both that UE fulfills *beamCorrespondence requirements Without UL-BeamSweeping* and UE fulfils *beamCorrespondence requirements* *With UL-BeamSweeping* can be considered in the simulation are used as starting point for simulation.

Agreement

**For multiple PRACH transmissions with same Tx beam, down-select one option from the following options.**

* **Option 1**: gNB can only configure one value for the number of multiple PRACH transmissions.
* **Option 2**: gNB can configure one or multiple values for the number of multiple PRACH transmissions.
	+ FFS: details

Agreement

* **For multiple PRACH transmissions with same Tx beam, at least SSB-RSRP threshold(s) are used to determinethe number of PRACH transmissions at least for the first RACH attempt.**
	+ Note: whether to support multiple numbers of PRACH transmissions is separately discussed.

**Power domain enhancements:**

Agreement

* At least the following enhancements to information exchange between UE and gNB to facilitate higher power transmissions in CA and DC can be considered for study. Enhanced signaling, if necessary and subject to RAN4’s input, to allow:
* Determination at gNB of power class change at the UE
* Increased awareness at gNB of energy/power availability at the UE, e.g., a budget.
	+ More informative PHR to be sent from UE to gNB, which may include, e.g., P-MPR related information, power headroom for carrier configured for DL but not UL, power class change indication.
* More effective scheduling decisions in the context of UL CA, e.g., best band combination, preferred carrier for servicing uplink, adaptive load sharing across sharing,
* Other options are not precluded.

**Agreement**

For RAN1 link-level performance evaluation of MPR/PAR reduction solutions involving the use of ~~Tx~~ spectrum shaping filter, companies are encouraged to use at least the following spectrum shaping filter configuration for calibration purpose:

* 2-tap, e.g., (1 0.28), 3-tap, e.g., (0.335 1 0.335), ~~and~~ (0.28 1 0.28)
* Truncated RRC (0.5, 0.1667)

There is no restriction to use other spectrum shaping filter coefficients in simulations~~, e.g., [1 0.28]~~.

Note: the above does not have spec impact.

**Agreement**

The following non-transparent solutions for MPR/PAR reduction are currently under discussion in RAN1.

* Frequency domain spectrum shaping w/ spectrum extension
* Tone reservation w/ spectrum extension

In addition, transparent schemes, for instance but not limited to frequency domain spectrum shaping w/o spectrum extension or schemes based on clipping and filtering, are also being evaluated to serve as a benchmark to assess the benefits of non-transparent solutions. Companies are allowed to use any transparent transmission scheme of their choice.

Agreement

At least the symmetric spectrum extension option for frequency domain spectrum shaping with spectrum extension (FDSS-SE), are considered for studying MPR/PAR reduction enhancements in Rel-18.

**Conclusion**

It is RAN1 understanding that:

* Performance comparison based on net gain results combining transmitter and receiver performance is performed by RAN4.
* No final decision would be taken by RAN1 on which MPR/PAR reduction solution, will be specified in Rel-18, if any, since this is RAN4’s responsibility.
	+ - It does not preclude RAN1 specification impact

**Agreement**

For the study of the PAPR/CM of DMRS when considering tone reservation as candidate enhancement for MPR/PAR reduction in Rel-18, RAN1 to consider at least the case that PRTs are added to the DMRS symbols (in the sideband). The case of PRTs not added to DMRS symbols can be used as a benchmark.

**Agreement**

The LS out RAN1 aims at drafting before the end of RAN1 #111 should include at least the following three parts:

1. List of candidate non-transparent and an initial list of transparent (if any) schemes considered for study by RAN1
2. Schemes-specific parameterization used by RAN1 for evaluation, e.g., spectrum extension factor and cyclic shift (if applicable), sideband size, filter assumptions (if any), channel model and so on.
3. Further parameterizations ~~for~~ used in RAN1 evaluations, e.g., carrier frequency, channel model and so on.

Agreement

The following baseline parameterization is used for link-level performance evaluation of MPR-PAR reduction solutions in RAN1 for Rel-18.

|  |  |
| --- | --- |
| Channel  | PUSCH, 14 symbols  |
| Carrier frequency and scenario | 4GHz (Urban), 28GHz (Urban)700MHz (Rural), |
| Channel BW | 100MHz for Urban20MHz for Rural, |
| SCS | 30 kHz (4GHz), 120 kHz (28GHz)15 kHz (700 MHz),  |
| Channel model | TDL-C 300ns for FR1 Urban (4GHz), TDL-A 30ns for FR2 Urban (28GHz), TDL-D 30ns for Rural |
| UE speed | 3km/h |
| Waveform | According to agreements |
| Modulation | According to agreements |
| Number of Tx antennas | 1, Optional: 2  |
| Number of Rx antennas | 4 for FR1 Urban, 2 for FR2,2 or 4 for FR1 Rural,  |
| Number of DMRS symbols | 2 |
| Number of PUSCH data symbols | 12 |
| HARQ configuration | No retransmissions |
| Frequency hopping | Disabled |
| Number of PRBs | Reported by companies |
| MCS | Chosen as a function of the number of PRBs to guarantee same spectral efficiency between MPR/PAR reduction solutions and baseline/benchmarks as per agreements |
| Extension factor [FDSS-SE] / sideband size [TR] (α) | [1/8, 1/4, 3/8] is encouraged.  |
| BLER | 10% |

For any parameter that is not listed in the table, companies are encouraged to consider corresponding value from TR 38.830 (or TR 38.868, if the parameter is absent in TR 38.830) and report the parameter with the results.

Notes:

* Other configurations and scenarios can be studied, and corresponding results can be reported.
* RAN1 to inform RAN4 about the content of the table.
* This table can be updated in future meetings, especially if alignment with assumptions and parameterization in RAN4 is needed

**Agreement**

Study the PAPR/CM[/OBO] of DMRS with FDSS-SE, e.g., the following solutions:

* + Option 1 - Based on low PAPR Type 1 DMRS sequence:
		- 1-a: A DMRS sequence is generated considering the number of PRBs in the inband + extension. The sequence length depends on the number of PRBs in the inband + extension.
		- 1-b A DMRS sequence is generated considering the number of PRBs in the inband (no extension). The sequence length depends on the number of PRBs in the inband. The sequence is then cyclically extended to span the PRBs in the extension.
		- 1-c A DMRS sequence is generated considering the number of PRBs in the inband (no extension). The sequence length depends on the number of PRBs in the inband. DMRS extension is applied similar to data to span the PRBs in the extension.
* Option 2 - Based on low PAPR type 2 DMRS sequence
	+ - Variances like those of Option 1 can be referred
	+ Option 3 – For in-band DMRS lengths 6/12/18/24 symbols, DMRS sequence is obtained by DFT transformation of low PAPR sequence type 1. Then the sequence is extended to span the PRBs in the extension in the same way as data extension.

Note: Other solutions can be studied. Comparison with the three solutions above is encouraged. Sequence with different density between in-band and extension can be studied

**Working Assumption**

* **The following set of configurations is for companies’ consideration for the calibration of the link performance of MPR/PAR reduction techniques.**

|  |  |  |
| --- | --- | --- |
|   | No spectrum extension | With spectrum extension |
| TBS value | Tput estimation for DDDSU @4GHz | #PRBs | MCS | #PRBs before extension | #PRBs after extension | MCS | Spectrum extension factor |
| 2408 | 963.2 kbps | 16 | 7 | 14 | 16 | 8 | 1/8  |
| 5376 | ~2.15 Mbps | 32 | 8 | 28 | 32 | 9 | 1/8  |
| 272 | 108.8 kbps | 8 | 0 | 6 | 8 | 1 | ¼ |
| 1032 | 412.8 kbps | 8 | 6 | 6 | 8 | 8 | ¼ |
| 2152 | ~0.9 Mbps | 40 | 2 | 30 | 40 | 3 | ¼ |
| 4992 | ~2.0 Mbps | 40 | 6 | 30 | 40 | 8 | ¼ |
| 552 | 220.8 kbps | 16 | 0 | 10 | 16 | 2 | 3/8 |
| 1736 | 694.6 kbps | 32 | 2 | 20 | 32 | 4 | 3/8 |
| [432 | 172.8 kbps | 8 | 2 | 6 | 8 | 3 | ¼] |
| [808 | 323.2 kbps | 24 | 0 | 18 | 24 | 1 | ¼] |

* **The values above serve as a common basis, but any other configuration and result reported by companies will be considered for any input related to LLS that RAN1 may provide to RAN4.**
* **Results of the simulations of MPR/PAR reduction solutions which companies may report in contributions to RAN1 #112 should be reported using the template in R1-2212918.**
* **Note: At least 10% BLER SNR is reported**

Agreement

Draft LS R1-2212916 is endorsed in principle.

Agreement

Final LS R1-2212917 is endorsed.

**Dynamic switching between DFT-S-OFDM and CP-OFDM:**

**Agreement**

**For DCI based solution,**

* For supported dynamically scheduled PUSCH, support dynamic waveform switching indication from UL scheduling DCI

Note: “Supported dynamically scheduled PUSCH” is to be confirmed in further discussion

Note: It does not imply that the waveform switching indication applies to other transmission or not

* Indication from non-UL scheduling DCI is not supported.

Note: the working assumption made in RAN1#110b-e for “Support at least one of the following options for the dynamic waveform indication in R18” does not need to be confirmed

Working Assumption

Support new 1-bit field for dynamic waveform indication from UL scheduling DCI

* Note: no change of the current size alignment procedure between UL DCI and DL DCI

Agreement

Study the necessity of the following potential enhancements to assist the scheduler in determining waveform switching:

* Reporting power headroom related information based on PCMAX,f,c applicable to a target waveform
	+ Target waveform can be same or different from waveform of an actual PUSCH transmission
	+ FFS target RB allocation and/or target modulation order can be same or different from respective properties of an actual PUSCH transmission
	+ FFS determination of target waveform, target RB allocation, target modulation order
	+ FFS details, e.g. report PCMAX,f,c or Type 1 power headroom for a waveform, or difference thereof between waveforms
* PHR triggering enhancements, e.g.
	+ Network-triggered PHR
	+ PH becomes lower (higher) than a threshold
	+ PHR triggered by waveform switching
* Reporting of recommended waveform or request to switch waveform
* Other solutions not precluded

#### 2.1.2 Remaining Open issues

* PRACH coverage enhancements
	+ Detailed mechanism(s) to support multiple PRACH transmissions with same beams for 4-step RACH procedure.
	+ Study, and if justified, specify PRACH transmissions with different beams for 4-step RACH procedure.
* Power domain enhancements
	+ Study and if necessary specify enhancements to realize increasing UE power high limit for CA and DC based on Rel-17 RAN4 work on “Increasing UE power high limit for CA and DC”, in compliance with relevant regulations.
	+ Study and if necessary specify enhancements to reduce MPR/PAR, including frequency domain spectrum shaping with and without spectrum extension for DFT-S-OFDM and tone reservation.
* Detailed mechanism(s) to support dynamic switching between DFT-S-OFDM and CP-OFDM.

## 2.2 RAN2

#### 2.2.1 Agreements

#### 2.2.2 Remaining Open issues

* Specify following PRACH coverage enhancements (RAN1, RAN2)
	+ Multiple PRACH transmissions with same beams for 4-step RACH procedure
	+ Study, and if justified, specify PRACH transmissions with different beams for 4-step RACH procedure
	+ Note 1: The enhancements of PRACH are targeting for FR2, and can also apply to FR1 when applicable.
	+ Note 2: The enhancements of PRACH are targeting short PRACH formats, and can also apply to other formats when applicable.

## 2.3 RAN3

#### 2.3.1 Agreements

#### 2.3.2 Remaining Open issues

## 2.4 RAN4

#### 2.4.1 Agreements

RAN4 #104b-e

The progress in RAN4 #104b-e meeting is summarized below:

* The Email discussion summary for [104-bis-e][141] NR\_cov\_enh2\_part1 was provided in R4-2217793.
* The Email discussion summary for [104-bis-e][142] NR\_cov\_enh2\_part2 was provided in R4-2217794.
* The Way forward on enhancements of increasing UE power high limit was approved in R4-2217744.
* The Way forward on Enhancements to reduce MPR/PAR was approved in R4-2217745.

RAN4 #105

The progress in RAN4 #105 meeting is summarized below:

* The topic summary for [105][140] NR\_cov\_enh2\_part1 was provided in R4-2220120.
* The topic summary for [105][141] NR\_cov\_enh2\_part2 was provided in R4-2220121.
* The LS on RF simulation parameters to be used in RAN4 for power domain enhancements was approved in R4-2220842.
* The Way forward on higher power limit increasing for Rel-18 was approved in R4-2220550.
* The Way forward on the MPR reduction for coverage enhancement was approved in R4-2220841.

#### 2.4.2 Remaining Open issues

* Study and if necessary specify enhancements to realize increasing UE power high limit for CA and DC based on Rel-17 RAN4 work on “Increasing UE power high limit for CA and DC”, in compliance with relevant regulations
* Study and if necessary specify enhancements to reduce MPR/PAR, including frequency domain spectrum shaping with and without spectrum extension for DFT-S-OFDM and tone reservation.

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

RAN1 #110b-e:

1. R1-2208411 Discussion on PRACH coverage enhancements Huawei, HiSilicon
2. R1-2208412 Discussion on coverage enhancement in power domain Huawei, HiSilicon
3. R1-2208413 Discussion on dynamic waveform switching for coverage enhancement Huawei, HiSilicon
4. R1-2208488 Discussion on PRACH coverage enhancements ZTE
5. R1-2208489 Discussion on power domain enhancements ZTE
6. R1-2208490 Discussion on dynamic waveform switching ZTE
7. R1-2208575 Discussion on PRACH coverage enhancements Spreadtrum Communications
8. R1-2208576 Discussion on power domain enhancements Spreadtrum Communications
9. R1-2208577 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM Spreadtrum Communications
10. R1-2208671 Discussions on PRACH coverage enhancements vivo
11. R1-2208672 Discussions on power domain enhancements vivo
12. R1-2208673 Discussions on dynamic switching between DFT-S-OFDM and CP-OFDM vivo
13. R1-2208783 Work plan for Rel-18 WI on Further NR coverage enhancements China Telecom
14. R1-2208784 Discussion on PRACH coverage enhancement China Telecom
15. R1-2208785 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM China Telecom
16. R1-2208846 PRACH coverage enhancements OPPO
17. R1-2208847 The study of power domain enhancements OPPO
18. R1-2208848 Supporting of dynamic switching between DFT-S-OFDM and CP-OFDM OPPO
19. R1-2208963 PRACH coverage enhancements CATT
20. R1-2208964 Discussion on power domain enhancements CATT
21. R1-2208965 Dynamic switching between DFT-S-OFDM and CP-OFDM CATT
22. R1-2209001 PRACH coverage enhancements TCL Communication Ltd.
23. R1-2209025 Discussion on PRACH Coverage Enhancement Fujitsu
24. R1-2209026 Discussion on power domain enhancements for CA/DC Fujitsu
25. R1-2209078 Discussions on PRACH coverage enhancement Intel Corporation
26. R1-2209079 Discussions on power domain enhancement Intel Corporation
27. R1-2209080 Dynamic switching between DFT-S-OFDM and CP-OFDM waveform Intel Corporation
28. R1-2209116 PRACH Coverage Enhancement using Multi PRACH Transmissions Sony
29. R1-2209117 Considerations on dynamic waveform switching for NR UL Sony
30. R1-2209130 Discussion on PRACH coverage enhancements Panasonic
31. R1-2209159 Discussion on PRACH coverage enhancement NEC
32. R1-2209160 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM NEC
33. R1-2209162 Discussion on dynamic waveform switching Panasonic
34. R1-2209205 Dynamic switching between DFT-S-OFDM and CP-OFDM InterDigital, Inc.
35. R1-2209223 PRACH coverage enhancements Lenovo
36. R1-2209224 Power domain enhancements Lenovo
37. R1-2209225 Discussion on dynamic switching between DFT-s-OFDM and CP-OFDM Lenovo
38. R1-2209248 Discussion on solutions for NR dynamic switching between DFT-S-OFDM and CP-OFDM Mavenir
39. R1-2209249 Discussion on solutions for NR PRACH coverage enhancement Mavenir
40. R1-2209272 Discussion on PRACH coverage enhancements xiaomi
41. R1-2209273 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM xiaomi
42. R1-2209363 Discussion on PRACH coverage enhancements CMCC
43. R1-2209364 Discussion on power domain enhancements CMCC
44. R1-2209365 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM CMCC
45. R1-2209412 PRACH coverage enhancements ETRI
46. R1-2209413 Dynamic switching between DFT-S-OFDM and CP-OFDM ETRI
47. R1-2209415 Discussion on triggering multiple PRACH transmissions FGI
48. R1-2209433 Discussion on Dynamic switching between DFT-s-OFDM and CP-OFDM Fujitsu Limited
49. R1-2209521 Enhancements for PRACH coverage MediaTek Inc.
50. R1-2209522 Discussion on power-domain enhancements MediaTek Inc.
51. R1-2209523 Discussion on dynamic switching between waveforms MediaTek Inc.
52. R1-2209608 Discussion on PRACH coverage enhancement Apple
53. R1-2209609 Discussion on power domain coverage enhancement Apple
54. R1-2209610 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM Apple
55. R1-2209661 Discussion on PRACH repetition InterDigital, Inc.
56. R1-2209662 Uplink power enhancements InterDigital, Inc.
57. R1-2209672 Discussion on PRACH coverage enhancement Ericsson
58. R1-2209673 Power Domain Enhancement Evaluation Methodology and Schemes Ericsson
59. R1-2209674 Discussion on Dynamic UL Waveform Switching Ericsson
60. R1-2209759 PRACH coverage enhancements Samsung
61. R1-2209760 Power domain enhancements Samsung
62. R1-2209761 Dynamic switching between DFT-S-OFDM and CP-OFDM Samsung
63. R1-2209788 Views on multiple PRACH transmission for coverage enhancement Sharp
64. R1-2209789 Power domain enhancements for Rel-18 CovEnh Sharp
65. R1-2209790 Dynamic switching between DFT-S-OFDM and CP-OFDM for Rel-18 CovEnh Sharp
66. R1-2209803 Discussion on PRACH repeated transmission for NR coverage enhancement LG Electronics
67. R1-2209804 Discussion on dynamic waveform switching for NR coverage enhancement LG Electronics
68. R1-2209925 Discussion on PRACH coverage enhancements NTT DOCOMO, INC.
69. R1-2209926 Discussion on power domain enhancements NTT DOCOMO, INC.
70. R1-2209927 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM NTT DOCOMO, INC.
71. R1-2210013 PRACH Coverage Enhancements Qualcomm Incorporated
72. R1-2210014 Power-domain enhancements Qualcomm Incorporated
73. R1-2210015 Dynamic switching between DFT-S-OFDM and CP-OFDM Qualcomm Incorporated
74. R1-2210115 Discussion on Dynamic switching between DFT-S-OFDM and CP-OFDM CEWiT
75. R1-2210165 PRACH coverage enhancements Nokia, Nokia Shanghai Bell
76. R1-2210166 RAN1 impacts for power domain enhancements Nokia, Nokia Shanghai Bell
77. R1-2210167 Dynamic switching between DFT-s-OFDM and CP-OFDM Nokia, Nokia Shanghai Bell
78. R1-2210318 FL Summary#1 of PRACH coverage enhancements Moderator (China Telecom)
79. R1-2210322 FL summary of power domain enhancements (AI 9.14.2) Moderator (Nokia/Nokia Shanghai Bell)
80. R1-2210323 FL summary #2 of power domain enhancements (AI 9.14.2) Moderator (Nokia/Nokia Shanghai Bell)
81. R1-2210324 FL summary #3 of power domain enhancements (AI 9.14.2) Moderator (Nokia/Nokia Shanghai Bell)
82. R1-2210325 FL summary #4 of power domain enhancements (AI 9.14.2) Moderator (Nokia/Nokia Shanghai Bell)
83. R1-2210326 Final FL summary of power domain enhancements (AI 9.14.2) Moderator (Nokia/Nokia Shanghai Bell)
84. R1-2210431 Summary #1 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
85. R1-2210432 Summary #2 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
86. R1-2210433 Summary #3 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
87. R1-2210547 Work plan for Rel-18 WI on Further NR coverage enhancements China Telecom
88. R1-2210553 FL Summary#2 of PRACH coverage enhancements Moderator (China Telecom)
89. R1-2210554 FL Summary#3 of PRACH coverage enhancements Moderator (China Telecom)
90. R1-2210563 [Draft] LS on work split principles adopted in RAN1 for power domain enhancements Moderator (Nokia)
91. R1-2210660 FL Summary#4 of PRACH coverage enhancements Moderator (China Telecom)
92. R1-2210673 [Draft] LS on enhancements to realize increasing UE power high limit for CA and DC Moderator (Nokia)
93. R1-2210674 LS on work split principles adopted in RAN1 for power domain enhancements RAN1, Nokia
94. R1-2210696 Session notes for 9.14 (Further NR coverage enhancements) Ad-Hoc Chair (CMCC)
95. R1-2210739 LS on enhancements to realize increasing UE power high limit for CA and DC RAN1, Nokia
96. R1-2210749 Summary #4 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
97. R1-2210782 Session notes for 9.14 (Further NR coverage enhancements) Ad-Hoc Chair (CMCC)

RAN4 #104b-e:

1. R4-2215514 Scope of the work for MPR/PAR -objective Nokia, Nokia Shanghai Bell
2. R4-2215515 Enhancements to reduce MPR/PAR Nokia, Nokia Shanghai Bell
3. R4-2215793 Power high limit and intra band UL CA Nokia, Nokia Shanghai Bell
4. R4-2215891 Discussion on power domain enhancements to reduce MPR/PAR ZTE Corporation
5. R4-2215892 Discussion on enhancement of increasing UE power high limit for CA and DC ZTE Corporation
6. R4-2215955 The high-power limit and power-class fallback Ericsson
7. R4-2216120 Discussion on enhancement of increasing UE power high limit for CA and DC vivo
8. R4-2216121 Discussion on power domain enhancements to reduce MPR vivo
9. R4-2216149 initial discussion on enhancement of increasing UE maximum power high limit Xiaomi
10. R4-2216441 R18 Discussion on power domain enhancement OPPO
11. R4-2216588 On further enhancement for NR UL coverage Huawei, HiSilicon
12. R4-2216639 MPR reduction scope discussion in Rel-18 NR Cov-Enh Ericsson
13. R4-2216788 On UE RF coverage enhancements for Rel-18 Qualcomm Incorporated
14. R4-2216977 Email discussion summary for [104-bis-e][141] NR\_cov\_enh2\_part1 Moderator (Huawei)
15. R4-2216978 Email discussion summary for [104-bis-e][142] NR\_cov\_enh2\_part2 Moderator (Nokia)
16. R4-2217020 Email discussion summary for [104-bis-e][141] NR\_cov\_enh2\_part1 Moderator (Huawei)
17. R4-2217021 Email discussion summary for [104-bis-e][142] NR\_cov\_enh2\_part2 Moderator (Nokia)
18. R4-2217744 WF on enhancements of increasing UE power high limit Huawei, HiSilicon
19. R4-2217745 WF on Enhancements to reduce MPR/PAR Nokia, Nokia Shanghai Bell
20. R4-2217746 LS on RF evaluation parameters Nokia, Nokia Shanghai Bell
21. R4-2217793 Email discussion summary for [104-bis-e][141] NR\_cov\_enh2\_part1 Moderator (Huawei)
22. R4-2217794 Email discussion summary for [104-bis-e][142] NR\_cov\_enh2\_part2 Moderator (Nokia)

RAN1 #111:

1. R1-2210879 Discussion on PRACH coverage enhancements Huawei, HiSilicon
2. R1-2210880 Discussion on coverage enhancement in power domain Huawei, HiSilicon
3. R1-2210881 Discussion on dynamic waveform switching for coverage enhancement Huawei, HiSilicon
4. R1-2211033 Discussions on issues of PRACH coverage enhancements vivo
5. R1-2211034 Discussions on issues of power domain enhancements vivo
6. R1-2211035 Discussions on issues of dynamic waveform switching vivo
7. R1-2211047 Discussion on PRACH coverage enhancements ZTE
8. R1-2211048 Discussion on power domain enhancements ZTE
9. R1-2211049 Discussion on dynamic waveform switching ZTE
10. R1-2211087 Discussion on PRACH coverage enhancements Fujitsu
11. R1-2211088 Discussion on Power domain enhancements for CA/DC Fujitsu
12. R1-2211089 Discussion on Dynamic switching between DFT-s-OFDM and CP-OFDM Fujitsu
13. R1-2211134 Discussion on dynamic waveform switching Panasonic
14. R1-2211185 PRACH coverage enhancements CATT
15. R1-2211186 Discussion on enhancements to reduce MPR/PAR CATT
16. R1-2211187 Dynamic switching between DFT-S-OFDM and CP-OFDM CATT
17. R1-2211254 Discussion on PRACH coverage enhancements Spreadtrum Communications
18. R1-2211255 Discussion on power domain enhancements Spreadtrum Communications
19. R1-2211256 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM Spreadtrum Communications
20. R1-2211324 Dynamic switching between DFT-S-OFDM and CP-OFDM InterDigital, Inc.
21. R1-2211350 Discussion on PRACH coverage enhancements xiaomi
22. R1-2211351 Discussion on power domain enhancements xiaomi
23. R1-2211352 Discussion on dynamic switching between DFT-s-OFDM and CP-OFDM xiaomi
24. R1-2211390 Dynamic switching between DFT-S-OFDM and CP-OFDM waveform Intel Corporation
25. R1-2211423 Discussions on PRACH coverage enhancement Intel Corporation
26. R1-2211424 Discussions on power domain enhancement Intel Corporation
27. R1-2211474 PRACH coverage enhancements OPPO
28. R1-2211475 The study of power domain enhancements OPPO
29. R1-2211476 Considerations on dynamic switching between DFT-S-OFDM and CP-OFDM OPPO
30. R1-2211537 Discussion on PRACH coverage enhancement China Telecom
31. R1-2211538 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM China Telecom
32. R1-2211541 PRACH coverage enhancements TCL Communication Ltd.
33. R1-2211568 PRACH coverage enhancements ETRI
34. R1-2211569 Dynamic switching between DFT-S-OFDM and CP-OFDM ETRI
35. R1-2211573 PRACH coverage enhancements Lenovo
36. R1-2211574 Power domain enhancements Lenovo
37. R1-2211575 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM Lenovo
38. R1-2211592 Discussion on PRACH coverage enhancements Panasonic
39. R1-2211593 Discussion on power domain enhancements Panasonic
40. R1-2211595 PRACH coverage enhancements Nokia, Nokia Shanghai Bell
41. R1-2211596 RAN1 impacts for power domain enhancements Nokia, Nokia Shanghai Bell
42. R1-2211597 Dynamic switching between DFT-s-OFDM and CP-OFDM Nokia, Nokia Shanghai Bell
43. R1-2211630 PRACH Coverage Enhancement using Multi PRACH Transmissions Sony
44. R1-2211631 Further considerations on dynamic waveform switching for NR UL Sony
45. R1-2211705 Discussion on PRACH coverage enhancements CMCC
46. R1-2211706 Discussion on power domain enhancements CMCC
47. R1-2211707 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM CMCC
48. R1-2211711 Discussion on PRACH coverage enhancements InterDigital, Inc.
49. R1-2211712 Discussion on power domain enhancements InterDigital, Inc.
50. R1-2211837 Discussion on PRACH coverage enhancement Apple
51. R1-2211838 Discussion on power domain coverage enhancement Apple
52. R1-2211839 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM Apple
53. R1-2211879 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM FGI
54. R1-2211881 Discussion on PRACH Resource for multiple PRACH transmissions FGI
55. R1-2211895 Discussion on PRACH coverage enhancement Ericsson
56. R1-2211896 Power Domain Enhancement Evaluation Methodology and Schemes Ericsson
57. R1-2211897 Discussion on Dynamic UL Waveform Switching Ericsson
58. R1-2211931 Discussion on PRACH repeated transmission for NR coverage enhancement LG Electronics
59. R1-2211932 Discussion on dynamic waveform switching for NR coverage enhancement LG Electronics
60. R1-2212009 Discussion on PRACH coverage enhancements NTT DOCOMO, INC.
61. R1-2212010 Discussion on power domain enhancements NTT DOCOMO, INC.
62. R1-2212011 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM NTT DOCOMO, INC.
63. R1-2212073 PRACH coverage enhancements Samsung
64. R1-2212074 Power domain enhancements Samsung
65. R1-2212075 Dynamic switching between DFT-S-OFDM and CP-OFDM Samsung
66. R1-2212145 PRACH Coverage Enhancements Qualcomm Incorporated
67. R1-2212146 Power-domain enhancements Qualcomm Incorporated
68. R1-2212147 Dynamic switching between DFT-S-OFDM and CP-OFDM Qualcomm Incorporated
69. R1-2212181 Views on multiple PRACH transmission for coverage enhancement Sharp
70. R1-2212182 Power domain enhancements for Rel-18 CovEnh Sharp
71. R1-2212183 Dynamic switching between DFT-S-OFDM and CP-OFDM for Rel-18 CovEnh Sharp
72. R1-2212255 Discussion on PRACH coverage enhancements MediaTek Inc.
73. R1-2212256 Discussion on power domain enhancements MediaTek Inc.
74. R1-2212257 Dynamic switching between waveforms MediaTek Inc.
75. R1-2212272 Discussion on Dynamic switching mechanism of CP-OFDM and DFT-S-OFDM Mavenir
76. R1-2212273 Discussion on issues of PRACH coverage enhancement Mavenir
77. R1-2212282 DMRS design for power domain enhancements Indian Institute of Tech (H)
78. R1-2212360 Discussion on PRACH coverage enhancement NEC
79. R1-2212361 Discussion on dynamic switching between DFT-S-OFDM and CP-OFDM NEC
80. R1-2212431 Discussion on Dynamic switching between DFT-S-OFDM and CP-OFDM CEWiT
81. R1-2212445 Summary #1 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
82. R1-2212446 Summary #2 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)
83. R1-2212562 Discussion on PRACH coverage enhancement Ericsson
84. R1-2212566 FL Summary#1 on PRACH coverage enhancements Moderator (China Telecom)
85. R1-2212567 FL Summary#2 on PRACH coverage enhancements Moderator (China Telecom)
86. R1-2212568 FL Summary#3 on PRACH coverage enhancements Moderator (China Telecom)
87. R1-2212573 FL summary of power domain enhancements (AI 9.14.2) Moderator (Nokia)
88. R1-2212574 FL summary #2 of power domain enhancements (AI 9.14.2) Moderator (Nokia)
89. R1-2212575 FL summary #3 of power domain enhancements (AI 9.14.2) Moderator (Nokia)
90. R1-2212576 FL summary #4 of power domain enhancements (AI 9.14.2) Moderator (Nokia)
91. R1-2212577 Final FL summary of power domain enhancements (AI 9.14.2) Moderator (Nokia)
92. R1-2212851 Session notes for 9.14 (Further NR coverage enhancements) Ad-Hoc Chair (CMCC)
93. R1-2212916 [Draft] LS to RAN4 for further information on RAN1 assumptions for LLS performance evaluation of MPR/PAR reduction solutions Moderator (Nokia)
94. R1-2212917 LS to RAN4 for further information on RAN1 assumptions for LLS performance evaluation of MPR/PAR reduction solutions RAN1, Nokia
95. R1-2212918 Template for reporting results of LLS performance evaluations of MPR/PAR reduction solutions Moderator (Nokia)
96. R1-2212983 Summary #3 on dynamic switching between DFT-S-OFDM and CP-OFDM Moderator (InterDigital, Inc.)

RAN4 #105:

1. R4-2218044 Spec. impact of UL power enhancement from transparent techniques Qualcomm Incorporated
2. R4-2218216 Discussion on enhancement of increasing UE power high limit for CA and DC Fujitsu Limited
3. R4-2218217 DRAFT Reply LS on enhancements to realize increasing UE power high limit for CA and DC Fujitsu Limited
4. R4-2218237 RF simulation parameters for MPR/PAR evaluations Nokia, Nokia Shanghai Bell
5. R4-2218238 Scope of the work for MPR/PAR -objective Nokia, Nokia Shanghai Bell
6. R4-2218239 RF simulation results for non-transparent schemes Nokia, Nokia Shanghai Bell
7. R4-2218240 RF simulation results for transparent schemes Nokia, Nokia Shanghai Bell
8. R4-2218248 RF specification impacts Nokia, Nokia Shanghai Bell
9. R4-2218372 Coverage enhancements using idled MIMO resources Qualcomm Incorporated
10. R4-2218373 Discussion on some transparent techniques for UL power enhancement Qualcomm Incorporated
11. R4-2218415 Scope of increasing UE power high limit for CA and DC Nokia, Nokia Shanghai Bell
12. R4-2218828 Power-class fallback reporting in the PHR for improved scheduling and enhanced network performance with SAR constraints Ericsson
13. R4-2218856 Discussion on enhancement of increasing UE power high limit for CA and DC vivo
14. R4-2218857 RF specification impact for enhancement to reduce MPR vivo
15. R4-2218877 Discussion on RF simulation parameters for enhancement to reduce MPR vivo
16. R4-2218878 RF simulation results for transparent schemes for enhancement to reduce MPR vivo
17. R4-2218879 RF simulation results for non-transparent schemes for enhancement to reduce MPR vivo
18. R4-2219042 Discussion on enhancement of increasing UE maximum power high limit Xiaomi
19. R4-2219208 Discussion on enhancement of increasing UE power high limit for CA and DC ZTE Corporation
20. R4-2219498 On enhancements of increasing UE power high limit for CA and DC Huawei, HiSilicon
21. R4-2219499 On further enhancements to reduce MPR/PAR Huawei, HiSilicon
22. R4-2219595 R18 Clarification on inter-band 3Tx requirements OPPO
23. R4-2219795 Initial simulation results for the transparent scheme Ericsson
24. R4-2219796 Initial simulation results for non-transparent scheme Ericsson
25. R4-2219797 simualtion parameter discussion Ericsson
26. R4-2220019 View for LS on Enhancement of increasing UE power high limit for CA and DC NTT DOCOMO INC.
27. R4-2220120 Topic summary for [105][140] NR\_cov\_enh2\_part1 Moderator (Huawei)
28. R4-2220121 Topic summary for [105][141] NR\_cov\_enh2\_part2 Moderator (Nokia)
29. R4-2220550 WF on higher power limit increasing for Rel-18 Huawei
30. R4-2220551 WF on the MPR reduction for coverage enhancement Nokia
31. R4-2220552 LS on RF simulation parameters to be used in RAN4 for power domain enhancements Nokia
32. R4-2220841 WF on the MPR reduction for coverage enhancement Nokia
33. R4-2220842 LS on RF simulation parameters to be used in RAN4 for power domain enhancements Nokia