**3GPP T****SG-RAN WG4 Meeting#102-e R4-210**

**E-meeting, 21 Feb – 3 Mar, 2022**

**Title: GTW session material for [102-e][125] NR\_RF\_FR2\_enh2\_Part\_1 on 23 of Feb.**

**Source: Nokia**

**Agenda item: 10.4.1, 10.4.2**

**Document for:** **Discussion**

# 1 Introduction

### Sub-topic 2-1: REFSENS

Issue 2-1-1: EIS spherical coverage

* Proposals *(Can support more than one)*
  + Option 1: REFSENS requirements is specified based on normalized equal PSD. The requirements on each CC do not have to be met simultaneously at single direction. R4-2204361, R4-2204575
  + Option 2: It is proposed to differentiate PSD based on different UE architectures, i.e. 6dB PSD difference for UE implemented with single RF chain, and requirements including PSD difference similar to IBM for inter-band CA with CBM for different frequency group.
  + Option 3: specify sensitivity verification rule for inter-band CA supporting ‘both’ beam management capability as following:
  + Peak EIS should be verified with both IBM and CBM
  + if the measured EIS spherical coverage of CBM has already satisfied the requirements of IBM, then the IBM EIS spherical coverage verification is not necessary
* Recommended WF
  + Option 1 to be discussed and agreed in GTW.

Issue 2-1-3: peak EIS

* Proposals
  + Option 1: Use simultaneous sensitivity with different beam direction of each band approach to define the peak EIS requirements for inter-band DL CA CBM. R4-2204927
  + Option 2: It is proposed to differentiate PSD based on different UE architectures, i.e. 6dB PSD difference for UE implemented with single RF chain, and requirements including PSD difference similar to IBM for inter-band CA with CBM for different frequency group.
  + Option 3: REFSENS requirements is specified based on normalized equal PSD. The requirements on each CC do not have to be met simultaneously at single direction. R4-2204361, R4-2204575
* Recommended WF
  + Option 1 to be discussed and agreed in GTW.

### Sub-topic 2-2: Fs\_inter

Issue 2-2-1: Fs\_inter

* Proposals *(Can support more than one)*
  + Option 1: Define the minimum requirement based on the largest frequency separation between two CCs. R4-2204035
  + Option 2: For REFSENS requirements for CA within same frequency group, Fs\_Inter capability is introduced for performance functional separation. R4-2204361, No additional EIS relaxation specific for frequency separation factor is acceptable R4-2204229, R4-2204940 .
  + Option 3: Fs\_inter capability is optionally reported by UE, and should be considered by NW, but to keep both NW scheduling and UE implementation flexibility, it is proposed to agree that once configured CCs exceed this capability then UE behavior is considered to be undefined.
  + Option 4: If Fs\_inter is to be introduced, it is proposed to refine previous agreement of Max input level, ACS and IBB verification rules as following:
    - if the measured Max input level, ACS and IBB has already satisfied the requirements with IBM, then the verification with CBM is not necessary
* Recommended WF
  + None as compromise CR seems not acceptable

### Sub-topic 2-3: BMRS configuration

Issue 2-3-1:

* Proposals *(Can support more than one)*
  + Option 1: Use SSB+CSI RS as the BMRS and use DMRS at the other band as the QCL-D target reference signal.
  + Option 2: The REFSENSE and spherical coverage will only be tested with worst case of BMRS side condition, i.e., the BMRS is only located in the untested band, to reduce the test complexity.
  + Option 3: If no consensus reached for the BMRS conditions, leave it to RAN5 as a measurement issue.
  + Option 4: For CBM, all the reference signals in Band\_without\_BMRS shall traces its QCL type-D dependence to SSB and/or CSI-RS in Band\_with\_BMRS by certain manner and For CBM. Be more specific, DMRS in Band\_without\_BMRS traces TRS of Band\_without\_BMRS, and then traces its QCL type-D dependence to SSB and/or CSI-RS in Band\_with\_BMRS, R4-2204230.
* Recommended WF
  + None

### Sub-topic 2-4: Band combination

Issue 2-4-1:

* Proposals
  + Option 1: Wait for the operator demands before defining requirements for specific band combinations within same frequency group. R4-2205122
  + Option 2: If an example band combination, i.e., CA\_n258-n261, is required strongly, the requirements for both CBM and IBM should be introduced. R4-2205122
  + Option 3: it is preferred not to explicitly introduce band combination, e.g. n258+n261into core specification without operator request, but to define CBM requirements in such manner that both same frequency group and different frequency group are applicable. R4-2204575
  + Option 4: Proposal 3: Introduce requirement of n258-n261 as an example band combination in TR and with note as follows: Note: the ΔRIB,S,n and ΔRIB,P,n can be revised with sufficient technical justification when the band combination is request by operator. R4-2204940
* Recommended WF
  + Go with CA\_n258-n261 for band combination within same f-group pointed out by ZTE, and requested by USC in WID R4-2118205 .

### Sub-topic 2-5: in-gap exemption for ACS and IBB

Issue 2-5-1:

* Proposals
  + Option 1: for adjacent or overlapped band combinations, in-gap exemption for ACS and IBB apply for FR2 inter-band CA no matter IBM or CBM. R4-2204575
  + Option 2: Other
* Recommended WF
  + None

### Sub-topic 3-1: Requirement setting for CBM between frequency groups

**Issue 3-1-1: Requirement setting for CBM between frequency groups**

* Proposals
  + Option 1: For CBM between different band groups is not feasible with single-chain architecture. The requirement definition for inter-band DL CA between different band groups should only be based on multi-chain architecture, R4-2203699 and R4-2204941 partly. And Sensitivity requirements for CBM UEs in an H+L combination shall be based on a multi-chain architecture. R4-2206056
  + Option 2: For UEs indicating IBM and ‘both’ capability for a BC across different frequency groups, then unequal PSD is used, while for UEs indicating CBM-only the input levels resembling an equal PSD are used, R4-2204036.
  + Option 3: CBM requirement shall NOT imply additional request on beam peak direction of each band compared to IBM; and CBM requirement shall NOT imply additional request on untested band EIS at specific AoA of tested band. R4-2204230
  + Option 4: Sensitivity requirements for CBM UEs in an H+L combination shall be based on a multi-chain architecture. R4-2206056
* Recommended WF
* Option 1 and 4 to be discussed and agreed in GTW.

### Sub-topic 4-1: Rx beam switch value

**Issue 4-1-1:**

* Proposals
  + Option 1: 60 ns
  + Option 2: 200n s
  + Option 3: Other
* Recommended WF
  + Yes

UL CA:

**Issue 5-1: Band combo**

* Proposals
  + Option 1: UL CA\_n260-n261 is included in this WI in addition to CA\_n257-n259.
  + Option 2: Specify only CA\_n257-n259.
* Recommended WF
  + Option 1

**Issue 5-2: power class**

* Proposals
  + Option 1: PC3 is specified
  + Option 2: PC5 is specified.
  + Option 3: Both PC3 and PC5 are specified.
* Recommended WF
  + As there are concerns about total power for PC3, Moderator propose to exclude PC3 and focus on non-handheld device types such as PC1/PC2/PC4/PC5 and a possible new power class similar to PC3 but for non-handheld form factor like for laptops. The possible new power class is less affected by thermal/power/MPE issues and thus could maintain the PC3 EIRP/EIS requirement (without power concept but with CA relaxations).
  + Is it acceptable to specify PC1, PC2, PC4, PC5 and the new power class?

**Issue 5-3: total power concept for PC3**

* Proposals
  + Option 1: not needed
  + Option 2: 1 dB
  + Option 3: 2 dB
  + Option 3: 3 dB or more
  + Option 4: TRP power for inter-band UL CA should not exceed the level for single band
  + Option 5: Others (please specify)
* Recommended WF
  + Moderator suggests focussing on non-hand-held power classes. Is it acceptable to skip PC3 issues 5-3, 5-5, 5-6, and 5-7?

**Issue 5-4: total power concept for other than handheld device types (i.e., such as PC1/2/4/5 and a new PC)**

* Proposals
  + Option 1: not needed
  + Option 2: still needed
  + Option 3: Others (please specify)
* Recommended WF
  + Moderator suggests Option 1

**Issue 5-11: Power Control**

* Proposals
  + Option 1: **for UL inter-band CA power control in FR2, the existing behavior in 38.213 is assumed: the UE configures a PCMAX in an implementation-specific manner like for the intra-band case and relative power limits are used for controlling the power on the serving cells. PCMAX ≥ PCMAX,f,c for each configured serving cell *c* with PCMAX,f,c as specified in clause 6.2.4 with parameters MPR and A-MPR as specified per serving cell or modified as needed for the band combination (CA MPR). (Ericsson)**
  + Option 2: ***Before conclusion of SCell dropping solution for intra-band CA, no need to have further discussion on power control for FR2 UL inter-band CA case. (Huawei)***
  + Option 3: **For FR2+FR2 inter-band ULCA, the configured power requirement shall be independent and per-FR2 band. (Qualcomm)**
  + Option 4: Others (Please specify)
* Recommended WF
  + TBD