**3GPP T****SG-RAN WG4 Meeting#100e R4-210**

**E-meeting, 16th – 27th Aug, 2021**

**Title: GTW session [100-e][129] NR\_RF\_FR2\_req\_enh2\_Part\_1**

**Source: Nokia, Nokia Shanghai Bell**

**Agenda item: 9.4.1, 9.4.2, 9.4.4, 9.4.5**

**Document for:** **Approval**

# 1 Introduction

This contribution relates

# 2 Discussion

# Topic #2: CA within same frequency group based on CBM AI

#### Issue 2-1-1: UE capability supporting both IBM and CBM

* Proposals
	+ Option 1: Add new enumerated value to beam management type in Rel-17 so that a UE can support both IBM and CBM, i.e., ENUMERATED {ibm, cbm, both}.
	+ Option 2: Add new enumerated value to beam management type in Rel-17 so that a UE can support both IBM and CBM but it Applies to only inter-band CA within same frequency group if defined (R4-2112335)
	+ Option 3: Is not introduced
	+ Option 4: Other
* WF
	+ TBA

**Moderator comment: Majority support or can accept option 1 (OPPO, vivo, Sony, LG, Xiaomi, Ericsson, Samsung, ZTE, Nokia). One company (HW) proposed that if UE supports CBM it automatically supports CBM. In GTW we could check if option 1 is acceptable.**

#### Issue 2-1-2: UE capability MultiChainCBM.

The capability to indicate that whether the UE support CBM under multi-chain architecture (R4-2113002)

* Proposals
	+ Option 1: Is introduced
	+ Option 2: Is not introduced
* WF
	+ TBA

**Moderator comment: Majority supports option 2 (OPPO,HW, QC, Sony, LG, Xiaomi, Ericsson, Samsung, ZTE, Nokia) and Option 1 (vivo, MTK). In GTW we could check if option 2 is acceptable.**

#### Issue 2-1-3: UE capability Fs\_inter\_CBM

* Proposals
	+ Option 1: Is introduced for inter-band DL CA with CBM within same frequency group.
	+ Option 2: Is introduced and is applicable to all CA configurations i.e. also between the frequency groups.
	+ Option 3: Is not introduced but acknowledged and is included in general aspects of defining FR2 CA requirements.
* WF
	+ TBA

**Moderator comment: Majority (OPPO, HW, vivo, MTK, LG, Docomo, Apple?) supports option 1 or both 1 and 2. Three (QC, ZTE, Nokia) companies supported option 3. (This is quite controversial topic hence we should not spend rest of the GTW time for this one)**

#### Issue 2-2-1: Core requirements applicability in relation to BMRS location

* Proposals
	+ Option 1: CBM inter-band CA requirements apply per-band with the BMRS configured in any one of the participating bands.
	+ Option 2: For inter-band DL CA BM RS configuration, leave it to RAN5
	+ Option 3: other
* WF

**Moderator comment: Vast majority supports option 1 (OPPO, vivo, QC, Sony, MTK, Xiaomi, Ericsson, Nokia) but there were also Clarification questions from Apple and Samsung and option 2 was supported by HW. In GTW we could check if option 1 is acceptable.**

* Samsung would like to confirm if it is practical scenario for real network to configure BMRS in SCC than PCC
* Apple: Does this option propose that the CBM inter-band CA requirements shall be defined considering both; the case where the band has been configured with the BMRS and the case where the band has not been configured with the BMRS?

#### Issue 2-3-3: Spherical coverage

* Proposals
	+ Option 1: Do not define EIS spherical coverage
	+ Option 2: Reuse the requirement framework of inter-band DL CA with IBM to define relaxation values for EIS spherical coverage.
	+ Option 3: Based on IBM inter-band CA with min. PSD difference (R4-2111903)
* WF

**Moderator comment: Apart from one company others think that Spherical coverage is needed (HW, vivo, Sony, Xiaomi, Samsung, Apple, Nokia) and one company (MTK) wants to postpone the decision and LG couples it to introduction of ‘Fs\_inter\_CBM’. In GTW we could check if option 3 is acceptable.**

#### Issue 2-3-4: REFSENS testing scheme

* Proposals
	+ Option 1: Reuse the requirement framework of inter-band DL CA with IBM to define relaxation values of REFSENS (R4-2113096)
	+ Option 2: Testing CBM UE with intra-band non-contiguous approach with either define larger relaxation or REFSENS are not required to be met at the same direction. (R4-2113901)
	+ Option 3: Based on IBM inter-band CA, min. PSD difference (R4-2111903)
	+ Option 4: Define PSD difference between 2 Bands as 6dB for UEs manufactured with only one RF chain for one frequency group; and Define PSD difference between 2 Bands as IBM type for UEs manufactured with 2 or more RF chains for one frequency group.
* WF

**Moderator comment: Majority either prefer or can accept option 3 (OPPO, vivo, QC, Sony, Xiaomi, Ericsson, Samsung, Nokia) Option 4 (HW) and postponing the decision is proposed by MTK. In GTW we could check if option 3 is acceptable.**

# Topic #3: UL CA

#### Issue 3-3-1: Applicability of total power concept

* Proposals
	+ Option 1: Yes it is and is defined as the sum of EIRP in peak direction of two band shall not exceed the 43 dBm
	+ Option 2: Applied to TRP
	+ Option 3: Applied to minimum peak EIRP
	+ Option 4: Applied to EIRP spherical coverage
	+ Option 5: Not needed, cannot be used for MPE and power consumption and thermal issues; can be handled with P-MPR
* Recommended WF

**Moderator comment: No consensus on the matter Option 1( vivo, Xiaomi), option 2 (Xiaomi, Ericsson, Sony), option 3 (MTK), option 5(QC, Sony, Docomo, Ericsson, Nokia). But it would be important to progress this issue in this meeting hence at least down selection would be good in GTW.**

#### Issue 3-1-1: How to incorporate PA-PA interaction

* Proposals
	+ Option 1: Included in CA MPR
	+ Option 2: Included in relaxations X and Y
	+ Option 3: No need to include.
* WF

**Moderator comment: Majority supports option 1 (Verizon, vivo, QC, Xiaomi, Docomo, Ericsson, ZTE, Nokia) and option 2 ( OPPO, HW, LG) Sony do not want option 2 and Samsung questions if PA-PA is included in MPR, when UE is in MOP status, it will fail the emission requirements? In GTW we could check if option 1 is acceptable.**

#### Issue 3-1-2: PA-PA interaction aspect

* Proposals
	+ Option 1: Only inter panel interaction is considered
	+ Option 2: Depends on activation status
	+ Option 3: Others (both or none, etc)
* WF

**Moderator comment: No consensus on the matter option 1(VzW), option 3 (vivo) and option 2 (QC, Xiaomi, Nokia) .**

# Topic #4: Feasibility study for DL CA

#### Issue 4-1: Feasibility of CBM between different frequency groups

* Proposals
	+ Option 1: CBM between different frequency groups is feasible and study phase can be completed
	+ Option 2: CBM between different frequency groups is not feasible
	+ Option 3: Keep study phase open.
* WF
* **Moderator comment: Majority (12 companies) prefer option 1, option 2 and 3 both is supported by one company. In GTW we could check if option 1 is acceptable.**

#### Issue 4-2: Reference architecture

* Proposals
	+ Option 1: Both single chain and multi chain is assumed as reference architecture for CBM between frequency groups
	+ Option 2: Only multi chain is assumed as reference architecture for CBM between frequency groups
* WF

**Moderator comment: No consensus on the matter. Option 1 ( OPPO, QC, Sony, LG, Xiaomi, Ericsson, Nokia) Option 2 (HW, vivo, MTK, Docomo, Samsung)**

# Topic #5: DC-location

#### Issue 5-1: Signalling framework

* Proposals
	+ Option 1: Offset from the default DC location is signalled compared to the declared default
	+ Option 2: Combined signalling framework (static reporting for typical scenario + dynamic reporting for corner case)
	+ Option 3: Any other alternatives
* WF

**Moderator comment: No consensus but online time in GTW may help to get better understanding on others proposals as some think that option 1 and 2 are same in the end. It would be important to agree the framework in this meeting.**

#### Issue 5-2: Default DC location

* Proposals
* Note: Please share views including pros and con between single and multiple DC default(s).
	+ Option 1: Single default DC location, i.e., The default UL DC location is a center of a lower edge of the lowest active bandwidth part (BWP) and a higher edge of the highest active BWP among all active component carriers (CC).
		- Note that the proponent’s intention(R4-2111772) was common default location across frequency range so that “For FR1” is removed from their original proposal.
	+ Option 2: Multiple default DC locations: DC is in the middle of outermost configured, activated CC or activated BWP bandwidth and depends on UL or DL bandwidth for each case.
	+ Option 3: Any other alternatives
* WF

**Moderator comment: Small majority (OPPO, vivo, Apple) prefer option 2, HW do not support option 2, QC indicated option 2? and Nokia supported option 1. No consensus but online time in GTW may help to get better understanding on others proposals.**