**3GPP TSG-RAN2 #124 R2-23xxxxx**

**Chicago, USA, 13~17 November 2024**

**Agenda item:** **7.25.1.6** (NR\_ATG-Core)

**Source:** LG Electronics Inc.

**Title:** Introduction of ATG to 38.304\_discussion

**Document for:** Discussion and Decision

# 1. Introduction

 This is to progress the following post email discussion:

* [POST124][030][ATG] 38.304 CR (LG)

 Intended outcome: Agree to 38.304

 Deadline: 2 weeks

# 2. Discussion

## **Issue1**: Codepoint of *cellBarredATG in 5.3.1*

**RAN2#124 Agreements:**

Similar to NTN, a 1 bit barring mechanism is introduced for ATG UEs. Non-ATG UEs are barred with legacy barring bit in MIB.

RAN2 needs to introduce *cellBarredATG* as similar to NTN. Note that for NTN, *cellBarredNTN* has two codepoints {*barred*, *notBarred*}, and if *cellBarredNTN* is absent, UE considers the cell as barred for NTN access.

Even if *cellBarredNTN* has two codepoints, the necessity of “*barred*” codepoint for *cellBarredATG* is unclear (actually neither for *cellBarredNTN* as well), because absence of *cellBarredATG* already means that the cell is barred for ATG access. In other words, if a cell (ATG cell or even normal cell) wants to bar ATG access, it can choose not broadcasting *cellBarredATG*, rather than broadcasting *cellBarredATG* set to “*barred*”.

*So, we have to options to implement the 1 bit barring field specific to ATG UEs:*

* *Alt1: cellBarredATG has a two codepoints {barred, notBarred}*
* *Alt2: cellBarredATG has a single codepoint {notBarred}*

**Question1**: Which option do think is more reasonable?

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| Company | Alt1/Alt2 | Comment |
| Apple | Alt1 | It should follow the legacy ASN.1 style of the cell barred parameters, e.g.*cellBarred ENUMERATED {barred, notBarred},**cellBarredNTN-r17 ENUMERATED {barred, notBarred}*For the TP, it should be clarified that This field is only applicable to ATG UEs |
| ZTE | Alt1 | For NTN, there are two codepoints {barred, notBarred}Although both the absence of cellBarredNTN and the codepoint ‘barred’ indicate that this cell is barred for NTN access, they have difference. According to TS 38.300 clause 16.14.3.1:*The UE can determine the network type (Terrestrial or non-terrestrial) implicitly by the existence of cellBarredNTN in SIB1.*If the cell broadcasts *cellBarredNTN*, this cell is considered as NTN cell, otherwise it is considered as normal Cell.For ATG, whether the UE can detect the signals from normal Cell is unclear. But considering the potential enhancement in the future and limited signaling overhead (only 1 bit), we prefer Alt1. |
| Samsung | Alt1 | Agree with ZTE. We believe that cellBarredATG should function in the same way as NTN, thus alternative 1 should be pursued.  |
| Huawei | Alt1 | We can follow the principles from NTN. Also agree with Apple that it should be clarified that “This field is only applicable to ATG UEs”. |
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The draft CR to 38.304 uploaded to the same folder is currently written with the Alt1 as below. But, if majority companies prefer alt2, the draft CR will be modified accordingly.

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| 5.3.1 Cell status and cell reservationsCell status and cell reservations are indicated in the *MIB or SIB1* message as specified in TS 38.331 [3] by means of following fields:- *cellBarred* (IE type: "barred" or "not barred") Indicated in *MIB* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs. This field is ignored by UEs supporting NTN while *cellBarredNTN* is included in SIB1. This field is ignored by UEs supporting ATG while *cellBarredATG* is included in SIB1.- *cellBarredNTN* (IE type: "barred" or "not barred")Indicated in SIB1 message. In case of multiple PLMNs indicated in *SIB1*, this field is common for all PLMNs. This field is ignored if the UE does not support NTN connectivity.- *cellBaredATG* (IE type: "barred" or "not barred")Indicated in SIB1 message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs. *cellBarredRedCap1Rx* (IE type: "barred" or "not barred")Indicated in *SIB1* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs. This field is only applicable to RedCap UEs.- *cellBarredRedCap2Rx* (IE type: "barred" or "not barred")Indicated in *SIB1* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs. This field is only applicable to RedCap UEs.- *cellReservedForOperatorUse* (IE type: "reserved" or "not reserved") Indicated in *SIB1* message*.* In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is specified per PLMN or per SNPN.- *cellReservedForOtherUse* (IE type: "true") Indicated in *SIB1* message. In case of multiple PLMNs indicated in *SIB1*, this field is common for all PLMNs.*- cellReservedForFutureUse* (IE type: "true") Indicated in *SIB1* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs.NOTE 0: IAB-MT ignores the *cellBarred*, *cellReservedForOperatorUse, cellReservedForFutureUse,* and *intraFreqReselection* (i.e. treats *intraFreqReselection* as if it was set to *allowed*) as defined in TS 38.331 [3]. IAB-MT also ignores *cellReservedForOtherUse* for cell barring determination (i.e. NPN capable IAB-MT considers *cellReservedForOtherUse* for determination of an NPN-only cell) as defined in TS 38.331 [3].- *halfDuplexRedCapAllowed* (IE type: "true")Indicated in *SIB1* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is common for all PLMNs and NPNs. This field is only applicable to RedCap UEs.- *iab-Support* (IE type: "true")Indicated in *SIB1* message. In case of multiple PLMNs or NPNs indicated in *SIB1*, this field is specified per PLMN or per SNPN.When cell status is indicated as "not barred" and "not reserved" for operator use and not "true" for other use and not "true" for future use,- UEs shall treat this cell as candidate during the cell selection and cell reselection procedures.When cell broadcasts any CAG-IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and not "true" for future use:- All NPN-capable UEs shall treat this cell as candidate during the cell selection and cell reselection procedures, other UEs shall treat this cell as if cell status is "barred".When cell status is indicated as "true" for other use, and either cell does not broadcast any CAG-IDs or NIDs or does not broadcast any CAG-IDs and the UE is not operating in SNPN Access Mode,- The UE shall treat this cell as if cell status is "barred".When cell status is indicated as "true" for future use,- The UE shall treat this cell as if cell status is "barred".When *cellBarredNTN* is not broadcast in this cell,- For NTN access, the UE shall treat this cell as if cell status is "barred".When *halfDuplexRedCapAllowed* is not broadcast in this cell,- The RedCap UE only capable of operating in half-duplex for FDD shall treat this cell as if cell status is "barred".When *cellBarredATG* is not broadcast in this cell,- For ATG access, the UE shall treat this cell as if cell status is "barred". |

## Issue2: PPowerClass expression in 5.2.3.2

**RAN2#124 Agreements:**

3 Introduce maxOutputPower-ATG-r18 with 5 bit INTEGER to indicate UE’s rate maximum output power. For ATG capable UE, it is mandatory with per band UE capability signaling.

4 With UE’s rate maximum output power, clarify the existing power class UE capabilities signaling (e.g., ue-PowerClass) does not apply to ATG. Clarify in stage 2 that CA/DC is not supported for ATG in this release

In clause 5.2.3.2 of 38.304, Srxlev derivation refers toPPowerClass. For maximum output power derivation, ATG UE does not apply *ue*-*PowerClass* capability bit but apply the new capability bit *maxOutputPower-ATG-r18* field. According to ATG 38.331 UE capability CR, maximum output power value in dBm is calculated as maxOutputPower-ATG+22, given that the maxOutputPower-ATG value range of {1...18 } corresponds to {23… 40}dBm with 1dB granularity. Whether we need clarification on PPowerClass , we have two options:

* Alt1: Add clarification in 5.2.3.2 of 38.304 on PPowerClass such that for ATG UE, max RF output power. is derived based on *maxOutputPower-ATG, not power class.*
* Alt2: Do not add clarification in 5.2.3.2 of 38.304 on PPowerClass., but just rely on existing reference to TS 38.101-1[15].

 **Question2**: Which option do think is more reasonable?

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| Company | Alt1/Alt2 | Comment |
| Apple | Alt1 | For the TP, it should be define in TS 38.101-1 not in TS38.331.  |
| ZTE | Alt2 | In the RAN4 TS 38.101-1 agreed CR R4-2321919, it has clarified that maximum RF output power of the ATG UE is determined based on UE capability maxOutputPower-ATG, as follows:Thus, we see no need to further clarify it here. |
| Samsung | Alt2 | Agree with ZTE.  |
| Huawei | Alt2 | Not needed as it is already defined in other specs (as explained above). |
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The draft CR to 38.304 uploaded to the same folder is currently written with the Alt1 as below. But, if majority companies prefer Alt2, the draft CR will be modified accordingly.

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| PPowerClass | Maximum RF output power of the UE (dBm) according to the UE power class as defined in TS 38.101-1 [15]. For ATG UE, maximum RF output power of the UE is determined based on *maxOutputPower-ATG* as defined in TS 38.331 [3]. |

## Issue3: P-Max for ATG UE

**RAN2#124 Agreements:**

5 As per RAN4 LS, add clarification in the description of field P-Max that in ATG cell, actual value of P-Max = 9 + field value [dBm].

For maximum TX power level in a cell, 38.304 already refers to *p-Max* and *NR-NS-PmaxList,* and it is expected that the extra 9dB to derive P-Max value for ATG UE will be specified in 38.331. Then, there is no strong need to clarify it for Pcompensation or PEMAX1, PEMAX2 in 5.2.3.2.

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| Pcompensation  | For FR1, if the UE supports the *additionalPmax* in the *NR-NS-PmaxList*, if present, in *SIB1, SIB2* and *SIB4:**max(PEMAX1 –PPowerClass, 0) – (min(PEMAX2, PPowerClass) – min(PEMAX1, PPowerClass)) (dB);**else:**max(PEMAX1 –PPowerClass, 0) (dB)*For FR2, Pcompensation is set to 0.For IAB-MT, Pcompensation is set to 0. |
| PEMAX1, PEMAX2 | Maximum TX power level of a UE may use when transmitting on the uplink in the cell (dBm) defined as PEMAX in TS 38.101 [15]. If UE supports SUL frequency for this cell, PEMAX1 and PEMAX2 are obtained from the *p-Max* for SUL in *SIB1* and *NR-NS-PmaxList* for SUL respectively in *SIB1, SIB2* and *SIB4* as specified in TS 38.331 [3], else PEMAX1 and PEMAX2 are obtained from the *p-Max* and *NR-NS-PmaxList* respectively in *SIB1*, *SIB2* and *SIB4* for normal UL as specified in TS 38.331 [3].  |

* Alt1: No clarification in 5.2.3.2 is needed for P-Max for ATG UE
* Alt2: Clarify in description of PEMAX1, PEMAX2 in 5.2.3.2 that P-Max for ATG UE is calculated by adding 9 dB to the p-max field.

**Question3**: Which option do think is more reasonable?

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| Company | Alt1/Alt2 | Comment |
| Apple | Alt 1 | According to agreement, the actual value of P-Max calculation will be captured in the field description in RRC spec. Then, we donot need to further clarify it in 38.304.  |
| ZTE | Alt1 |  |
| Samsung | Alt1 |  |
| Huawei | Alt1 | It will be captured in RRC. |
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The draft CR to 38.304 uploaded to the same folder is currently written with the Alt1. But, if majority companies prefer Alt2, the draft CR will be modified accordingly.

## Issue4: Other necessary changes?

**Question4:** Companies are kindly requested to propose other changes to 38.304 not addressed above but necessary for ATG.

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| Company | Propose changes |
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# 3. Conclusion