**3GPP TSG RAN #103 RP-240718**

**Maastricht, Netherlands, March 18-21, 2024**

**Agenda item: 9.1.4.6**

**Source: Apple (Moderator)**

**Title: Moderator's summary for discussion on ATG**

**Document for: Discussion**

# Introduction

In RP-240019 (Proposed Summary for RAN Rel-19 Package: RAN4 Part) prepared by RAN Chair and RAN4 Chair, the following proposed scope is endorsed as a starting point for discussion in RAN#103.



This document summarizes the relevant contributions on this topic and provides moderator recommendations for further discussions with an aim to reach an agreement on R19 WI scope.

# List of relevant contributions and their views

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| --- | --- | --- | --- |
| RP-240434 | Views on other RAN4-led topics for Rel-19 | Huawei, HiSilicon | The following objectives could be considered for Rel-19 ATG enhancement:* Specify the intra-band and inter-band CA band combination and configurations for ATG
	+ Decide the example band combinations
* Specify the necessary UE RF requirements for ATG intra-band and inter-band CA (example band combinations)
	+ Tx requirements including maximum output power, configured Tx power, output power dynamics, Tx signal quality, SEM, ACLR
	+ Rx requirements including REFSENS, maximum input level, ACS, blocking and etc
* Specify the necessary BS RF requirements for ATG including
	+ TAE requirements for intra-band and inter-band CA for ATG
* Specify the necessary RRM core/performance requirements for intra-band and inter-band CA for ATG including
	+ SCell activation/de-activation delay requirements and interruption requirements
	+ RRM measurement requirements
* Specify the necessary demodulation performance requirements for intra-band and inter-band CA for ATG
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| RP-240547 | Views on Rel-19 RAN4 cross-area and other topics | Intel | Core part: 1. Evaluate and specify the necessary RF and RRM requirements for intra-band and inter-band CA for ATG.

Performance part: 1. Specify the necessary RRM performance requirements and test cases for intra-band and inter-bandCAforATG.
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| RP-240154 | Views on Rel-19 ATG enhancement | CMCC, China Unicom | * **CA to enhance capacity**
	+ Define ATG BS and ATG UE requirements
	+ Define RRM Core requirements:
	+ Define Performance requirements
	+ Including
		- FR1 intra-band CA, e.g. n79C, n41C, n78C
		- FR1+FR1 inter-band CA, e.g. n3+n39, n34+n39, n1+n78
* **R18 leftover issues**
	+ **FR1 MIMO:** In R18, two kinds of ATG UE types have been defined, one with omni-directional antenna and the other with antenna array. For the UE with antenna array, if dual-polarization antenna is used, UL MIMO can be supported. However, corresponding requirements are not specified in Rel-18.
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| RP‑240397  | Views on R19 topics impacting both RF and RRM | CATT | Objectives •Core •Specify ATG BS and ATG UE RF requirements for intra-band and inter-band FR1 CA. •Specify ATG UE RRM core requirements for intra-band and inter-band FR1 CA. •Performance •Specify ATG BS RF conformance test for intra-band and inter-band FR1 CA. •Specify ATG UE RRM performance requirements for intra-band and inter-band FR1 CA. •Specify ATG BS and UE demodulation requirements for intra-band and inter-band FR1 CA.  |

# Moderator recommendations for further discussions

## Intra-band and [inter-band] CA

It is agreeable to consider the following WI scope in the WID:

* Specify the RF requirements for intra-band and [inter-band] CA
	+ FR1 intra-band CA, e.g. n79C, n41C, n78C
	+ [FR1+FR1 inter-band CA, e.g. n3+n39, n34+n39, n1+n78]
* Specify corresponding RRM core requirements
* Specify corresponding RRM performance and demodulation requirements

## R18 leftover issues: support of MIMO

It is recommended to assess the amount of work required for support of UL MIMO for UE with antenna array where dual-polarization antenna is used and then decide whether it can be included in the WID:

* Specify the RF/RRM/Demod requirements for support of UL MIMO for UE with antenna array where dual-polarization antenna is used.

# Offline discussions and conclusions

## Discussions

CMCC: to have enough ATG capacity, inter-band CA is needed. Also prefer to have MIMO with 2TX.

LGE: support inter-band CA. regarding example bands, can consider one in this WI and leave the others to basket WIs.

Apple: support inter-band CA. is it for co-located scenarios?

CMCC: we consider only co-located scenarios.

ZTE: it is fine to include UL-MIMO.

Apple: UL-MIMO for single CC only or CA?

CMCC: UL-MIMO is for single CC and CA is for DL only.

Ericsson: need to be cautious about ruling out non-co-located scenario.

Apple: will there be RRM impact for support of UL-MIMO?

Intel: need to be careful about the inclusion of UL-MIMO. What is the workload? Can we consider doing it as part of maintenance?

CMCC: no need to specify RRM for UL-MIMO. Prefer to keep UL-MIMO as part of R19, as the workload is manageable.

Intel: we agree the workload of supporting UL-MIMO is small.

Huawei: we prefer to include this work after Dec. 2024.

Moderator: there seems to be consensus that the workload associated with support of UL-MIMO is small.

## Conclusions

**4.2.1 Intra-band and [inter-band] CA**

The WI scope was revised as follows with change marks:

* Specify the RF requirements for intra-band co-located and inter-band co-located DL CA
	+ FR1 intra-band contiguous CA, e.g. n79C, n41C, n78C
	+ FR1+FR1 inter-band CA, e.g. n3+n39, n34+n39, n1+n78
* Specify corresponding RRM core requirements
* Specify corresponding RRM performance and demodulation requirements

**4.2.2 3.2 R18 leftover issues: support of MIMO**

As the workload seems manageable, it may be acceptable to include the support of UL-MIMO in the scope. The WI scope was revised as follows with change marks:

* Specify the RF/Demod requirements for support of UL MIMO with 2TX for single CC for UE with dual-polarization antenna.
	+ UE RF requirement
	+ BS demod requirement