**3GPP TSG-RAN Meeting #103 RP-240710**

**Maastricht, Netherlands, March 18th – 22nd, 2024**

**Title: Moderator's summary for discussion on BS RF requirement evolution**

**Agenda Item: 9.1.4.2**

**Source: RAN4 chair (Huawei)**

**Document for: Information**

# Introduction

This document provides the summary for potential RAN4 Rel-19 BS RF enhancement work item based on companies’ contributions and the summary provided by RAN Chair and RAN4 Chair.

This document is divided into two parts: EIRP mask for upper 6GHz plus OTA test enhancements and other proposals.

# EIRP mask for upper 6GHz and OTA test enhancement

The summaries in RP-240019 for BS RF enhancement are as follow:

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| **BS RF requirement evolution (2 topics)*** **Core requirements/conformance test for expected EIRP mask for upper 6GHz**
* **OTA test enhancement**
 | **WI** |

**BS RF requirement evolution: EIRP for U6GHz and OTA test enhancement**

* References: [RP](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_101/Docs/RP-231540.zip)[-](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_101/Docs/RP-232745.zip)[233918](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_102/Docs/RP-233918.zip)
* Potential objectives:
	+ Core requirements/conformance test for expected EIRP mask for upper 6GHz (~~depending~~ based on WRC-23 conclusions)
		- Target completion by Dec’2024
	+ OTA test enhancement
	+ ~~Network RF specification simplification~~ (Check in Dec’2024)

**Moderator’s observations:**

* Companies’ views are quite aligned based on the contributions. So to save some efforts, the moderator suggests to directly discuss the potential objectives.
* Regarding the network RF specification simplification, the moderator suggest to discuss it at December 2024 to save some effort in this meeting. Based on companies’ feedback, there seems consensus in the group to work on it. Just because of TU limit, we can postpone it.
* According to MCC feedback, it is expected to make clear whether the objective will be applied to NR or LTE, BS or UE, and which frequency range of FR1 and/or FR2 the objective will be applied. So the moderator adds some clarifications in the potential objectives.

**Moderator proposals:**

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| **Core part**The objectives of core part WI for BS expected EIRP mask for NR upper 6GHz are as follows:* Introduce the concept of “limits on expected EIRP for angles above horizon” into the RAN4 BS specifications and specify related BS requirement for 6425-7125 MHz based on the WRC-23 outcome.
	+ Note: target completion date of this objective is December 2024.

The objectives of core part WI for BS OTA test enhancement are as follows:* Investigate whether the BS/IAB OTA co-location reference antenna definition need be improved for FR1, and if feasible, update the definition.

**Perf. part** The objectives of performance part WI for Expected EIRP mask for upper 6GHz are as follows:* Specify manufacturer declarations, conformance test descriptions, test tolerances and test requirements.
	+ Note: target completion date of this objective is December 2024.

The objectives of performance part WI for BS OTA test enhancement are as follows:* Identify BS excessive OTA test scope cases and reduce it with the aim to shorten the test duration time for selected RF requirements, e.g., TX IM, RX out of band blocking for NR FR1
* Investigate whether the existing test approach can be improved, and if feasible, improve test methods for BS/IAB OTA co-location requirements and tests for AAS-based test specifications for FR1.
* Investigate and if possible, simplify BS TRP test methods for FR1 and FR2 by improving the applicability and not removing any the existing TRP test methods.

**Additional proposal:**In this WI, RAN4 will have the new external TR for BS expected EIRP mask for NR upper 6GHz, which is expected to be approved by RAN#106. |

# Other proposals

**Study on antenna models for 5G macro BS**

The following contribution is summarized in this section.

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| **Tdoc number** | **Title** | **Source companies** | **Agenda** |
| RP-240056 | Rel-19 New SID proposal: Antenna Models for 5G Macro BS | Spark NZ Ltd | 9.1.4 |

**Proposals:**

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| It is proposed to develop an internal Technical Report on AAS systems led by RAN4 under a new REL-19 study item "Study on Antenna Models for 5G macro BS".The proposed Technical Report (TR) <37.8xx/37.9xx> aims to address the following key aspects:* An antenna array antenna model, including the sub-array extension (including polarised arrays) , down tilts, [8] using array factor algorithms that are standardised in 3GPP whilst also aligned with fundamental principles [10].AAS at the UE end may also be considered.
* Techniques for side lobe suppression, including an investigation into their feasibility and undesirable side effects [6,7].
* Techniques for MU MIMO beamforming. [4].
* Definition of Antenna element patterns that are more realistic than specified in [5,9] and are aligned with commercial practices.
* Analysing the performance of arrays with frequency separation from the center frequency, in particular how far in frequency separation does one needs to go before the array performance degrades to that of a single element.
* Performance of antennas on a chip, mutual coupling, slant polarised antennas etc.
* Emerging architectures including D-MIMO, cell free MIMO etc.

By addressing above key aspects, the proposed technical report will facilitate a deeper understanding of adaptive antennas, support performance and coverage improvements and capacity studies, and contribute to the international regulatory studies.The above work /study may be undertaken as an important topic by 3GPP RAN WG4 with the target completion date Sep.2025. |

# Conclusions

The objectives of this WI are summarized below.

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