**3GPP TSG-RAN WG4 Meeting #116bis R4-251xxxx**

**Prague, Czech Republic, 13th – 17th October, 2025**

**Agenda item:** 8.1

**Source:** Feature lead (Qualcomm)

**Title:** WF for [116bis][102] 6G general RF and UE RF

**Document for:** Approval

# Recommendations from feature lead

Encourage all companies to apply this guidance in future contributions

* **Apply the same order of topics as topic summary in R4-2514509**

1. **General aspects**
2. **Single carrier output power**
3. **CA output power**
4. **Tx requirements**
5. **Rx requirements**
6. **Frequency range between FR1 and FR2-1**
7. **Spectrum aggregation**
8. **Joint UE and BS RF**
9. **Testing and verification**
10. **Others**

* **Avoid proposals written as: “adopt alternative 1”, where definition of alternative 1 is nowhere near your proposal in the Tdoc:** your proposal is at higher risk of being misrepresented in the summary if it is not clear and self-contained.
* **Aim towards actionable proposals: “**Discuss topic X” is an understandable proposal in the first meeting of the study but more clarity is always appreciated: what it is related to topic X you want to discuss? Could it be “discuss if requirement Y is needed for topic X” or “discuss if approach A is better suited than approach B for topic X”.
* **Aim to spell out abbreviations at least once:** we are working on new technology, and some abbreviations/acronyms may not be familiar to all 3GPP participants.

# Topic #1: High level principles for 6G UE RF study

* Agreements
  + High level principles during 6G UE RF study
    - Strive towards minimum performance requirements applicable for all regions to allow global circulation of terminals, accommodate local regulatory requirements as necessary
    - Strive towards only one set of requirements for each feature and avoid multiple sets of requirements from multiple implementation assumptions whenever possible, considering e.g. different form factors and target use cases
    - Strive towards requirement framework where dependencies between features are minimized and understood. Strive to identify dependencies as early as possible.
    - Strive towards requirements which are testable and meaningful
    - Final requirements are to be defined in the work item.
    - For all topics in the way forward it is possible to contribute new aspects to consider and study in future meeting(s).

NOTE: No further discussion is expected on this topic in next meeting.

# Topic #2: UE reference architecture

* Agreements in online session
  + Strive to agree UE reference architecture on case-by-case manner for features being studied. Discuss reference architecture together with the feature itself as necessary.(first 6G agreement in RAN4)
    - Base evaluations on agreed reference architecture, while resulting requirements should apply for any feasible implementation architecture as much as possible
  + If no reference architecture is agreed, recommend companies to mention assumed architecture together with evaluation results for easier comparisons between inputs

NOTE: No further discussion is expected on this topic in next meeting.

# Topic #3: Single carrier output power requirements

* Agreements
  + Study a new framework for 6G power class definition to enable more flexibility to different UE implementations to reflect the PA capability for single band
    - Encourage inputs on how to allow UE to deliver more output power and how power class framework includes e.g. Tx diversity and UL-MIMO
  + Study improvements on configured maximum output power requirements and associated parameters
  + Strive to improve clarity on UE power ability under different UE condition (e.g. configured, activated, scheduled) in all output power requirements
  + Study the default power class for FDD and TDD bands for 6G
  + Study applicable SAR solution for 6GR

# Topic #4: Power class framework for CA

* Agreements
  + Prioritize discussion for single carrier in RAN4#117 and RAN4#118

# Topic #5: Tx requirements

* Agreements
  + PA modelling is discussed in system parameter thread
  + In initial 6GR evaluations, use 5G NR unwanted emission requirements as starting point until requirement framework for 6GR is clear
  + Spurious emissions requirements, SEM and ACLR will be defined for 6GR
    - FFS for
      * OOB boundary
      * potential accommodations for different frequency sub-ranges
      * potential accommodations for first 1 MHz of SEM
  + Encourage inputs on regulatory survey being conducted in spectrum agenda
  + Study efficiency improvements in defining MPR/A-MPR requirements. Consider that MPR results are needed earlier than A-MPR and better efficiency should not result in reduced UE output power.
  + Study the UE Tx impairment requirements (e.g. carrier leakage, image rejection, CIM3 and CIM5)
  + In RAN4#117, prioritize discussion for UE Tx impairments and unwanted emission framework

# Topic #6: Rx requirements

* Agreements
  + Study if the RX requirements used in 5G are still relevant for respective 6G bands up to 100MHz CBW and how to define relevant RX requirements for >100MHz CBW’s
  + Study concept for RX requirements for new frequencies, especially those above 7.125GHz
  + Study how to specify 6G REFSENS in a scalable way considering that 6G will support devices with different implementations/capabilities (e.g. different number of Rx chains) potentially addressing different use cases
  + Study single carrier REFSENS requirements considering technology advancement as well as implementation constraints
    - Study the 6G REFSENS level and respective UL RB allocations for FDD bands as well as other RX requirements using respective 5G requirements as reference
  + Study improvements to MSD framework for 6GR in parallel to progressing single carrier requirements
    - Study simplification of the framework, MSD reporting concepts and technology improvements both on UE and gNB
  + Study multi-carrier requirements (e.g. ACS, blocking) once single carrier work is more stable

# Topic #7: Frequency range between FR1 and FR2-1

* Agreements
  + Study UE RF front end characteristics considering potential differences between e.g. frequencies around 7 GHz and around 15 GHz.

# Topic #8: Spectrum aggregation

* Agreements
  + Prioritize spectrum aggregation topics with low dependency on RAN1/2. Further check study scope in RAN4#118
    - Until and including RAN4#118 study e.g.
      * RF switch-time performance
      * Need for intra-band support of multiple RATs as well as non-contiguous UL CA and RB allocations
      * Study benefits-drawbacks of using CA vs. using wider single carrier BW
      * Study how to account for simultaneous TX/RX between the bands properly from the beginning
  + Discuss band combination simplification in spectrum agenda

# Topic #9: Joint UE and BS RF

* Agreements
  + Encourage companies to contribute whether there are concrete study points for low power receiver. Coexistence study including need for coex study will be discussed in agenda for BS RF and co-existence.
  + Prioritize work for the baseline single carrier output power requirement framework before detailed studies on ACLR and SEM relaxation.
  + Discuss PAPR reduction topics in system parameter agenda
  + For Tx EVM relaxation
    - Discuss PA modelling in system parameter agenda. Once work in system parameters is finished, UE RF will check if the output can be used for this work. Strive to study also TX non-linearity sources other than PA in this thread.
    - Discuss non-AI related UL demod in UE RF thread
    - Do not discuss AI in UE RF thread
    - In RAN4#117, prioritize discussion on study scope including
      * Which aspects need to be considered to conclude on feasibility
      * Need for network control