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

**Prague, Czech Republic, Oct 13th ‒ 17th, 2025**

**Agenda item:** 8.1

**Source:** Moderator (CATT)

**Title:** Offline discussion for [116bis][111] 6G operation efficiency

**Document for:** Information

# Introduction

This offline session aims to initiate discussions on several high-level issues which are not treated online, and to share views, identify key directions and categorize potential discussion points for consideration at the next meeting.

Suggested issues to be discussed in the offline discussion:

* Modernization and new tools
  + Issue 2-2-2
  + Issue 3-1-2
* Drafting rules
  + Issue 2-2-5
* General principles
  + Issue 2-2-1

# Topic #2: General aspects on RAN4 6G standardization

Modernization and new tools

**Issue 2-2-2: Modernization and new tools**

* Proposals
  + Proposal 1: Follow conclusions in 6GSM SID (SP-250802).
    - Modernization of drafting tool: markdown, version control (TR 21.802).
    - Study RAN4 impacts on new formats such as Markdown or LaTeX.
    - RAN4 needs to keep an eye on the progress of alternative tools to replace current Word-based specification, and prepare for the potential impacts.
  + Proposal 2: The general specification modernization works (6GSM SID) can be discussed and decided in RANP to identify the needs and feasibility first, before starting any trial/study in RAN WGs level.
  + Proposal 3: Adopt equivalent multi-formatted specifications with each format tailored to a specific purpose, e.g., facilitating script-based tools for CR drafting and consolidation: one format as the root specification under version control, and other formats can automatically be generated from the root format for different purposes.
  + Proposal 4: New tools to avoid cover sheet issues.
  + Proposal 5: For band combos, continue to use JSON schema with CA config tables as first priority. 🡪 move to Issue 3-1-2
* Recommended WF
  + To be further discussed

**Discussion points:**

**Discussion point #1: On the conclusions of 6GSM SID**

* Proposal 1: follow the conclusions
* Proposal 2: discussed and decided in RANP once feasibility/needs identified, and start study and trial in RAN4

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| Discussions: |

**Discussion point #2: multi-formatted specs**

* Proposal 3: multi-formatted specs introduced, with each format tailored to a specific purpose
  + “root format”: convenient for version control
  + E.g., “format 1”: convenient for script-based tools for CR drafting and consolidation
  + E.g., “format 2”: e.g., PDF, easy to open
  + “Non-root format” can be automatically generated via some tool from “root format”

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| Discussions: |

**Discussion point #3: other general auxiliary tools**

* Proposal 4: new tools to avoid cover sheet issues
* Any other (beyond inputs to this meeting)

Note: new tools related to band combinations are discussed under Issue 3-1-2.

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| Discussions: |

**Issue 3-1-2: Band-Combination Handling and Tool Support**

* Proposals
  + Proposal 1:
    - Proposal 1a: Utilize the band-combination database from the beginning of 6GR.
    - Proposal 1b: Band combos stored in database instead of in specs.
    - Proposal 1c: Exploit the rules and principles made on the band/band combinations in 5G-NR via data-based approach and spec. modernization as much as possible.
    - Proposal 1d: RAN4 to make some trial of using this band-combination database and study how to incorporate this database into RAN4 specification and meeting handling like CR process, etc.
    - Proposal 1e: Consider the CA MSD requirements or relevant notation notes in the CA database.
  + Proposal 2: Automated tools for generating supported band combinations and their related specific requirements, e.g. delta values and MSD in 6GR.
  + Proposal 3: Develop an automatic checking tool for fallback band combinations in RAN4.
  + Proposal 4: With the introduction of assistant new tools for band/band combinations, RAN4 6G specifications should still remain tangible, self-contained and not dependent on any new tool.
  + Proposal 5: Consider the progress in band-combo simplification.
  + Proposal 6: Simplify band and band-combination requirements (Emissions, REFSENS, MSD, blocking) with a default set of requirements per band groups and band group combinations (See also in Issue 3-1-3).
  + Proposal 5 (from Issue 2-2-2): For band combos, continue to use JSON schema with CA config tables as first priority.

**Discussion points:**

**Discussion point #1: Relationship between band combination database and RAN4 Specifications (In- or Out-of-Spec Consideration)**

* Option 1: band combination database is part of specs
  + Proposal 1b: band combos stored in database instead of in specs
  + Proposal 5 (from Issue 2-2-2): For band combos, continue to use JSON schema with CA config tables as first priority
* Option 2: band combination database itself is NOT part of specs, but an assistant tool since specs should be self-contained.
  + Proposal 4: With the introduction of assistant new tools for band/band combinations, RAN4 6G specifications should still remain tangible, self-contained and not dependent on any new tool.
  + Proposal 5: Consider the progress in band-combo simplification.

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| Discussions: |

**Discussion point #2: utilization of band combo database**

* Proposal 1a: Utilize the band-combination database from the beginning of 6GR.
* Proposal 1d: RAN4 to make some trial of using this band-combination database and study how to incorporate this database into RAN4 specification and meeting handling like CR process, etc.
* Proposal 1e: Consider the CA MSD requirements or relevant notation notes in the CA database
* Proposal 1c: Exploit the rules and principles made on the band/band combinations in 5G-NR via data-based approach and spec. modernization as much as possible.
* Proposal 6: Simplify band and band-combination requirements (Emissions, REFSENS, MSD, blocking) with a default set of requirements per band groups and band group combinations (See also in Issue 3-1-3).

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| Discussions: |

**Discussion point #3: automation tools related to band combination database**

* Proposal 2: Automated tools for generating supported band combinations and their related specific requirements, e.g. delta values and MSD in 6GR.
* Proposal 3: Develop an automatic checking tool for fallback band combinations in RAN4.

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| Discussions: |

Drafting rules

**Issue 2-2-5: Drafting rules and principles for specification quality assurance**

* Proposals
  + Proposal 1: Study the root causes of specification quality challenges in RAN4.
  + Proposal 2: Uniform drafting guidance/rules for requirements definition when introduction of a new feature in the specification.
  + Proposal 3: For 6G, the specification needs to be explicitly stated so that it is always clear which requirements apply to a given BS.
  + Proposal 4: Consistency and editorial improvements:
    - To ensure consistency in terminology and structure within the same topic, a partial initial draft template can be provided before the overall drafting.
    - Consistent and identical terminologies shall be used.
    - Avoid the following issues:
      * Terminology/style inconsistency, incorrect notation/symbols/abbreviation, undefined abbreviations, redundant information/notes.
      * “TBD”, “FFS”, empty test cases.
  + Proposal 5: Reduce redundancy
    - Proposal 5a: Add paragraph numbering to some paragraphs, and using these numbers to refer to identical paragraphs without any text changes.
    - Proposal 5b: Block-based method, i.e., capture similar requirements just in one place and refer this part if needed.
    - Proposal 5c: Introduce an applicability description in relevant sections and define different parameter values for each relevant parameter for the different scenarios, use cases etc.
  + Proposal 6: Reduce the usage of RAN2 language in RAN4 specification as much as possible.

**Discussion points:**

**Discussion point #1: Consistency and editorial improvements**

* Proposal 4:
  + - To ensure consistency in terminology and structure within the same topic, a partial initial draft template can be provided before the overall drafting.
    - Consistent and identical terminologies shall be used.
    - Avoid the following issues:
      * Terminology/style inconsistency, incorrect notation/symbols/abbreviation, undefined abbreviations, redundant information/notes.
      * “TBD”, “FFS”, empty test cases.

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| Discussions: |

**Discussion point #2: Reduce redundancy**

* Proposal 5:
  + Proposal 5a: Add paragraph numbering to some paragraphs, and using these numbers to refer to identical paragraphs without any text changes.
  + Proposal 5b: Block-based method, i.e., capture similar requirements just in one place and refer this part if needed.
  + Proposal 5c: Introduce an applicability description in relevant sections and define different parameter values for each relevant parameter for the different scenarios, use cases etc.

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| Discussions: |

**Discussion point #3: General drafting rules**

* Proposal 1: Study the root causes of specification quality challenges in RAN4.
* Proposal 2: Uniform drafting guidance/rules for requirements definition when introduction of a new feature in the specification.
* Proposal 3: For 6G, the specification needs to be explicitly stated so that it is always clear which requirements apply to a given BS.
* Proposal 6: Reduce the usage of RAN2 language in RAN4 specification as much as possible.

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| Discussions: |

General principles

**Issue 2-2-1: General principles for RAN4 6GR specifications**

* Proposals
  + Proposal 1: Adapt an overall principle for 3GPP RAN4 specifications – creating lean and streamlined standards for 6G, e.g., by dimensioning an appropriate set of functionalities, minimizing the adoption of multiple options for the same functionality, avoiding excessive configurations, etc. Any exception to the above shall be well justified.
  + Proposal 2: Scalable specs consideration
    - Proposal 2a: Study how to manage growing number of CBWs, e.g., requirements scalable to CBW, etc.
    - Proposal 2b: Study in Rel-20 on how to define a more scalable and maintainable structure for 6G RRM specifications before formalization in Release 21.
  + Proposal 3: Specs restructuring
    - Proposal 3a: Revisit the orchestrations of RAN4 specifications for 6G, with the goal of reducing redundancy, improving clarity and easing long-term maintenance
    - Proposal 3b: For AI/ML-enabled features, how to capture the standardized AI/ML model and dataset in the 3GPP specification, considering AI/ML model and dataset naming rules, and unified AI/ML model and dataset format for sharing.
    - Proposal 3c: Consider common coexisting framework for all features.
    - Proposal 3d: Use RAN2 release independent from Rel-N with early implementation concept for “release independent” feature instead of the 3x.307.
    - Proposal 3e: Remove release-independent spec and capture all of the information in a separate file in the latest-release core spec package.

**Discussion point #1: overall principle**

* Proposal 1: Adapt an overall principle for 3GPP RAN4 specifications – creating lean and streamlined standards for 6G, e.g., by dimensioning an appropriate set of functionalities, minimizing the adoption of multiple options for the same functionality, avoiding excessive configurations, etc. Any exception to the above shall be well justified.

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| Discussions: |

**Discussion point #2: Scalable considerations**

* Proposal 2: Scalable specs consideration
  + Proposal 2a: Study how to manage growing number of CBWs, e.g., requirements scalable to CBW, etc.
  + Proposal 2b: Study in Rel-20 on how to define a more scalable and maintainable structure for 6G RRM specifications before formalization in Release 21.

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| Discussions: |

**Discussion point #3: restructuring**

* Proposal 3: Specs restructuring
  + Proposal 3a: Revisit the orchestrations of RAN4 specifications for 6G, with the goal of reducing redundancy, improving clarity and easing long-term maintenance
  + Proposal 3b: For AI/ML-enabled features, how to capture the standardized AI/ML model and dataset in the 3GPP specification, considering AI/ML model and dataset naming rules, and unified AI/ML model and dataset format for sharing.
  + Proposal 3c: Consider common coexisting framework for all features.
  + Proposal 3d: Use RAN2 release independent from Rel-N with early implementation concept for “release independent” feature instead of the 3x.307.
  + Proposal 3e: Remove release-independent spec and capture all of the information in a separate file in the latest-release core spec package.

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| Discussions: |