[95e-11-RAN4-R18-BSRF] - Version 0.0.4
RAN

3GPP TSG RAN Meeting #95-e RP-220871

Electronic Meeting, March 17-23, 2022

Agenda item: 9.1.4

Source: Huawei

Title: Moderator's summary for discussion [95e-11-RAN4-R18-BSRF]

Document for: Discussion

1 Background

According to the RP-220024 [1], the moderator's summary for discussion [RAN95-e-RAN4-R18Prep-06] on Other RAN4 Enhancements has identified BS RF requirement evolution as one of the areas for RAN4 Rel-18 scoping, including objective for Home base station (HBS) and for mmWave multi-band BS.

The following objectives were identified for Home base station (HBS) [1]:

Table 1: Initial objectives identified for Home base station (HBS)

- Example band is n41
- Phase I: Study phase
  - Study if NR local area BS requirements can be applied to HBS or LTE home eNB requirement could be used as baseline to define the requirement for HBS.
- Phase II: Normative work, which starts only if the study concludes that the new requirements are necessary
  - Specify RF requirements for BS
  - Specify conformance testing requirements.
  - No new demodulation performance requirement is needed

The following objectives were identified for mmWave multi-band BS [1]:

Table 2: Initial objectives identified for mmWave multi-band BS

- Example bands: 26+28GHz, 28+39GHz, 26+40GHz, 28+40GHz
    - Target at studying and defining the generic requirements
- Phase I: Study phase
    - Investigate the feasibility and performance of wideband RF and antenna architectures covering multiple FR2 bands
    - Investigate if FR1 multi-band methods are re-usable for FR2, and (if so) agree on the appropriate inter-RF BW gaps
    - Investigate if FR1 exceptions are acceptable for FR2
    - Investigate whether a generic solution for all combinations within FR2-1 is possible and/or a solution for all or a part of the 24-29GHz frequency range in which n257/n258/n261 overlap should be targeted
    - Study the definition of FR2 multi-band BS
- Phase II: normative work depending on the conclusion of phase I
    - Core part:
        - Specify the definition of multi-band for FR2, if needed
        - Specify RF core requirements for FR2 multi-band BS, if deemed feasible
            - Define RF core requirements to include FR2 multi-band BS
                - Dependent on the study phase outcome, this may be all or part of FR2 bands
            - Define EMC requirements
    - Perf part:
        - Specify the BS conformance test requirements, if needed

NOTE 1: The requirements for mmWave multi-band BS are to be defined for the synchronized operating bands.
NOTE 2: No change is needed for 37 series specification since FR2 is not included in MSR AAS BS specifications.

Based on the above proposed objectives for HBS and for mmWave multi-band BS, RAN4 Chair has provided a draft WI on NR BS RF requirement evolution for NR (NR_BSRF_evo) in RP-220060 [2].

Furthermore, RAN Chair together with the RAN4 Chair have further provided a Summary for RAN Rel-18

Package in RP-220068 [3], where the following guidance was captured for the BS RF requirements evolution in RAN4:

RAN4-led Package 2/3

Item	SI or WI
BS RF requirement evolution (**1 topic**) • mmWave multi-band BS (12-month SI)	SI

Figure 1: RAN Chair and RAN4 Chair guidance on the BS RF requirements evolution in RAN4

According to [3], the above was proposed by RAN Chair and RAN4 Chair to be Endorsed as the baseline for further discussion during RAN#95-e for final RAN4 Rel-18 SID/WID approvals.

2 Introduction

The following contributions submitted to agenda 9.1.4 on the BS RF requirements evolution were identified:

Table 3: List of contribution for [95e-11-RAN4-R18-BSRF]

tdoc	Title	Source
RP-220645	Discussion on Home Base Station for NR	CMCC
RP-220657	Further discussion on BS RF enhancement in Rel-18	ZTE, Sanechips
RP-220726	Consideration and motivation for Rel-18 new SI on mmWave multi-band BS	Huawei, HiSilicon
RP-220727	New SI: Study on mmWave MB-BS	Huawei, HiSilicon

3 Initial round

Please provide your Initial round input by the deadline of Friday, 18th March 11:00 UTC.

3.1 Topic#1: SI vs. WI

The initial proposal has included both study and normative work. According to RP-220068 [3], RAN Chair and RAN4 Chair proposal is to consider this topic as baseline for SI proposal. Moderator have identified the following options for this discussion:

- **Option 1:** SI: Stick to the RAN Chair and RAN4 Chair proposal in RP-220068 and define a SI for BS RF requirements evolution,
- **Option 2:** WI: Consider both study phase, and normative phase in WI (RP-220657),

Moderator's proposal: Option 1: follow RAN Chair and RAN4 Chair proposal.

Companies are welcome to provide their views on the options above.

Feedback Form 1: Topic#1: SI vs. WI

1 – Nokia Germany We are fine with option 1
2 – Ericsson France S.A.S Option 1 also fine for us
3 – Huawei Technologies France We are fine with option 1
4 – Intel Corporation (UK) Ltd We are fine with Option 1 based on endorsed proposals in RP-220068
5 – Huawei Technologies Sweden AB Based on the content endorsed in RP-220068, option 1 is preferred.

3.2 Topic#2: Consideration of HBS objectives

The initial proposal has included both HBS and mmWave multi-band BS objectives. According to RP-220068 [3], RAN Chair and RAN4 Chair proposal is to consider mmWave multi-band BS objectives only. Moderator have identified the following options for this discussion:

- **Option 1**: Stick to the RAN Chair and RAN4 Chair proposal in RP-220068 and capture mmWave multi-band BS objectives only,
- **Option 2:** include both mmWave multi-band BS as well as HBS objectives (RP-220645, RP-220657)

Moderator proposal: Option 1: follow RAN Chair and RAN4 Chair proposal.

Companies are welcome to provide their views on the options above.

Feedback Form 2: Topic#2: Consideration of HBS objective

1 – Nokia Germany We agree with Option 1, taking into account high RAN4 workload as well as it was discussed already Local Area BS requirements can be used for HBS
2 – Ericsson France S.A.S We propose to follow option 1. We can clarify if needed that a quick discussion on whether any requirements differ for LA and a CR including a clarification of LA description can be done within TEI.
3 – ZTE Corporation Both option 1 and option 2 are fine for us. If option 1 is finally approved, as mentioned by Ericsson, one quick discussion on the applicability of LA requirement into HBS is necessary, maybe TEI approach is one approach to handle that.
4 – Huawei Technologies France We agree with moderator's proposal. As discussed in GTW session, with the SI approved in Mar RAN meeting, it doesn't mean that HBS cannot not be considered later, it can be further checked depending on the SI progress.
5 – China Mobile Group Device Co. We also agree with moderator's proposal and respect the online decision in Thursday's GTW. HBS could be discussed in the TEI.
6 – Intel Corporation (UK) Ltd We are fine with Option 1 based on endorsed RAN4 SI/WI package

3.3 Topic #3: HBS objectives adjustments

This topic is dependent on the conclusions of section 3.2. Still, to progress as much as possible, it is suggested to be discussed already in the Initial round. The following HBS objective adjustments were proposed:

Table 4: HBS objectives adjustments proposals

tdoc	HBS objectives adjustments

RP-220645	HBS objectives adjustments as proposed in RP-220645: – Removal of example band n41, – Introduction of FR1 as the applicable frequency range, – Study phase: Removal of LTE eNB requirements reference, – Normative work: addition of the conformance testing requirements.
RP-220657	Add "*Specify the conformance testing for home gNB*" to the list of HBS objectives Moderator: Please note that proposal from RP-220657 in embedded in RP-220645.

Companies are asked to provide their views on the HBS objectives modifications from RP-220645.

Feedback Form 3: Topic #3: HBS objectives adjustments

1 – Huawei Technologies Sweden AB Based on the content endorsed in RP-220068, we suggest to close this discusssion. As commented by other companies and RAN Chair, in case of interest the HBS may be handelded in RAN4 under TEI.

3.4 Topic#4: mmWave multi-band BS objectives adjustments

The following mmWave multi-band BS objective adjustments were proposed:

NOTE: Please note that the same band combinations were considered in all related contributions.

Table 5: mmWave multi-band BS objectives adjustments

Tdoc	**mmWave multi-band BS objectives adjustments**

RP-220657	Band combinations clarification (delta ***bolded***): Example bands: 26+28GHz, 28+39GHz, 26+40GHz, 28+40GHz - Target at studying and defining the generic requirements - ***Other band combination is not considered in Rel-18*** - Investigate whether a generic solution for all combinations within FR2-1 is possible and/ora solution for all or a part of the 24-29GHz frequency range in which n257/n258/n261, overlap should be targeted ***or a part of the 37-43GHz frequency range in which n260/n259/n262 overlap should be targeted or both***.
RP-220726/27	Study the following aspects for FR2 multi-band BS with example bands of 26+28GHz, 28+39GHz, 26+40GHz, 28+40GHz: – Investigate the feasibility and performance of wideband RF and antenna architectures covering multiple FR2 bands – Investigate if FR1 multi-band methods are reusable for FR2, and (if so) agree on the appropriate inter-RF BW gaps – Investigate if FR1 exceptions are acceptable for FR2 – Investigate whether a generic solution for all combinations within FR2-1 is possible and/ora solution for all or a part of the 24-29GHz frequency range in which n257/n258/n261 overlap should be targeted – Study the definition of FR2 multi-band BS

Moderator have identified the following options for this discussion:

- **Option 1**: incorporate band combination clarifications into the list of objectives (RP-220657),
- **Option 2:** other (please provide concrete proposal, also considering possible modifications of Option 1)

Companies are asked to provide their views on the options above.

Feedback Form 4: Topic#4: mmWave multi-band BS objectives adjustmen

1 – Nokia Germany

With the following text proposed we suggest to clearly define which FR2 bands would be considered (instead of frequency range): ”***Other band combination is not considered in Rel-18***”. This comment applies also to the following text: ”26+28GHz, 28+39GHz, 26+40GHz, 28+40GHz”.

”Investigate whether a generic solution for all combinations within FR2-1 is possible and/ora solution for all or a part of the 24-29GHz frequency range in which n257/n258/n261, overlap should be targeted ***or a part of the 37-43GHz frequency range in which n260/n259/n262 overlap should be targeted or both***.” Proposed sentence is too long and needs to be further clarified, what does ”or both” mean?

2 – Ericsson France S.A.S

The sentence about considering overlap of n260/n259/n262 does not fit together with the list of band combinations (no n260/n259 type combination listed). Also there is no overlap for n262.

3 – QUALCOMM JAPAN LLC.

We believe it would be useful to have a clear list of target bands

4 – ZTE Corporation

Clear list of target bands are more preferred from my perspective.

For the long sentence mentioned by Nokia, it’s proposed to be rephrased following way:

Investigate whether a generic solution for all combinations within FR2-1 is possible and/ora solution for all

If the above generic solution is not possible, then whether multi-band operation within the same frequency group should be targeted

- a part of the 24-29GHz frequency range in which n257/n258/n261;
- a part of the 37-43GHz frequency range in which n260/n259/n262;

5 – Huawei Technologies France

Based on above comments and the discussion paper in RP-220657, we propose the following revisions:

• mmWave multi-band BS

Study the following aspects for FR2 multi-band BS ~~with example bands of 26+28GHz, 28+39GHz, 26+40GHz, 28+40GHz~~:

- Example bands:

- 26+28GHz: n258+n261
- 28+39GHz: n257/n261+n260
- 26+40GHz: n258+n259/n262
- 28+40GHz: n257/n261+n259/n262
- Other band combinations are not considered in Rel-18

- Investigate the feasibility and performance of wideband RF and antenna architectures covering multiple FR2 bands

- Investigate if FR1 multi-band methods are re-usable for FR2, and (if so) agree on the appropriate inter-RF BW gaps

- Investigate if FR1 exceptions are acceptable for FR2

- Investigate whether a generic solution for all combinations within FR2-1 is possible and/or a solution for all or a part of the ~~24-29GHz~~ frequency range ~~in which n257/n258/n261 overlap~~ should be targeted

  - Frequency range 24-29GHz which includes n257/n258/n261
  - Frequency range 37-48GHz which includes n260/n259/n262

- Study the definition of FR2 multi-band BS

6 – Intel Corporation (UK) Ltd

We are ok to include the list of specific bands. However, we prefer not to limit the SI and further discuss in the SI stage if conclusions can be extended to other FR2 bands.

3.5 Topic#5: WID text for BS RF requirements evolution

This is a placeholder for any other comments to the final version of the WID, including both Justification part, list of impacted, co-sourcing companies, etc.

It is proposed to take RP-220727 as the baseline for final WID, subject to the comments received. Companies are welcome to provide their views on top of RP-220727, if any.

Feedback Form 5: Topic#5: WID text for BS RF requirements evolution

3.6 Summary of initial round

Based on the initial round discussion, the following conclusions are proposed for topics #1 - 5:

Table 6: Proposed conclusions of the initial round

Topic	**Summary of comments**	**Proposed conclusion**
Topic #1: SI vs. WI	All companies agreed to proceed with Option 1.	Proceed with **Option 1:** SI: Stick to the RAN Chair and RAN4 Chair proposal in RP-220068 and define a SI for BS RF requirements evolution. Topic #1 to be closed.
Topic #2: Consideration of HBS objectives	All companies agreed to proceed with Option 1. One company was ok with both options.	Proceed with **Option 1:** Stick to the RAN Chair and RAN4 Chair proposal in RP-220068 and capture mmWave multi-band BS objectives only. Topic #2 to be closed. It is a common understanding that HBS requirements consideration in Rel-18 can be handeled in RAN4 under TEI.
Topic #3: HBS objectives adjustments		Moderator suggestion is to follow topic#2 conclusion, meaning that no further discussion on HBS objectives is necessary during this meeting. Topic #3 to be closed.
Topic #4: mmWave multi-band BS objectives adjustments	Multiple comments were shared on the considered bands combinations.	In order to address all the comments, it is proposed to work on the SI Objectives text directly under topic #5. Topic #4 to be closed.
Topic #5: WID text for BS RF requirements evolution		Continue the discussion during the Intermediate round.

4 Intermediate round

4.1 Topic#5: WID text for BS RF requirements evolution

The aim of the intermediate round is to reach stable version of the SI text. Companies are welcome to provide their proposed updates to the following SID revision, where all comments from the Initial round were addressed - companies are welcome to double-check and provide futher updates, if necessary:

https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/%5B95e-11-RAN4-R18-BSRF%5D/revision_RP-220727_v1.doc

For the latest version of the SI revision, please check the following folder:

https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/%5B95e-11-RAN4-R18-BSRF%5D

When updating the SI revision, please increase version number of the file.

Feedback Form 6: Topic#5: WID text for BS RF requirements evolution (intermediate round)

1 – Huawei Technologies Sweden AB For the final version of the SI it is suggested to resolve square brackets in the following statement: ”[Other band combinations are not considered in Rel-18]”. We would propose to remove that sentence as the band combinations to study are already explicitly listed.
2 – QUALCOMM JAPAN LLC. This part from the motivation should be removed, in our view: ”This study item will study the feasibility and specification needs for multiband and if feasible a follow-up WI is to be established to specify the modifications need to the BS RF core and performance specification to specify an FR2 multi-band BS.” This has nothing to do with the motivation and it is premature to mention anything about any WI. Also, please add Qualcomm to the list of supporting companies.
3 – ZTE Corporation The current version is fine for us and please add ZTE to the list of the supporting companies.
4 – CATT The current version is fine for us and please add CATT to the list of the supporting companies.
5 – Ericsson France S.A.S We are OK to remove the sentence in square brackets as proposed by Huawei; the term ”band combinations” is not generally used in BS specs anyhow and sounds rather UE centric.

6 – Huawei Technologies Sweden AB For the ”WI” wording in the Justicifation part: we do not see problem with that sentence being captured in the SI (as any follow-up WI requires RAN decision anyway), but it is ok to remove the whole sentence if other companies prefer so. The sentence on band combinations limitation was removed. Based on the feedback received, an updated version v3 of the SI was uploaded: https://www.3gpp.org/ftp/tsg*ran/TSG*RAN/TSGR*95e/Inbox/Drafts/%5B95e-11-RAN4-R18-BSRF%5D/revision*RP-220727_v3.doc
7 – Nokia UK The SI content looks good.

4.2 Summary of intermediate round

Based on the initial round discussion, the following conclusion is proposed for topics #5:

Table 7: Proposed conclusions of the intermediate round

Topic	Summary of comments	Proposed conclusion
Topic #5: WID text for BS RF requirements evolution	Multiple adjustments were implemented into the SI based on the comments received.	SI content stable and agreeable. Topic #5 to be closed.

5 Final round

6 Conclusions

Based on the comments received on Topic#5 (WID text for BS RF requirements evolution), related SI text revisions were implemented in the following version:

https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/%5B95e-11-RAN4-R18-BSRF%5D/revision_RP-220727_v3.doc

With this, the SI content is proposed to be declared stable and agreeable.

Proposed final tdoc status is as follows:

Table 8: tdoc status

tdoc	Title	Status
RP-220060	New WI: NR BS RF requirement evolution	Noted
RP-220645	Discussion on Home Base Station for NR	Noted
RP-220657	Further discussion on BS RF enhancement in Rel-18	Noted
RP-220726	Consideration and motivation for Rel-18 new SI on mmWave multi-band BS	Noted
RP-220946	New SI: Study on mmWave MB-BS	Approved

7 References

[1] RP-220024 Moderator's summary for discussion [RAN95e-RAN4-R18Prep-06] Other RAN4 Enhancements RAN4 chair (Huawei)

[2] RP-220060 New WI: NR BS RF requirement evolution RAN4 chair (Huawei)

[3] RP-220068 Summary for RAN Rel-18 Package: RAN4 Part RAN chair (Qualcomm), RAN4 chair (Huawei)

[4] RP-220645 Disucssion on Home Base Station for NR CMCC

[5] RP-220657 Further discussion on BS RF enhancement in Rel-18 ZTE, Sanechips

[6] RP-220726 Consideration and motivation for Rel-18 new SI on mmWave multi-band BS Huawei, HiSilicon

[7] RP-220727 New SI: Study on mmWave MB-BS Huawei, HiSilicon