[95e-10-RAN4-R18-700800900] - Version 0.0.5
RAN

3GPP TSG RAN#95e RP-22xxxx

Electronic Meeting, March 17 - 23, 2022

Agenda Item: 9.1.4.6

Source: Moderator (CATT)

Title: Moderator's summary for [95e-10-RAN4-R18- 700800900]

Document for: Discussion & Decision

1 Background

The aim of this NWM thread is to coverage to an agreeable SID on Enhancement for 700/800/900MHz band combinations.

During the pre-RAN#95 RAN4 Rel-18 E-mail discussion, the moderator summary for [RAN95-e-RAN4-R18Prep-06] other RAN4 Enhancements was provided in [1]. And the corresponding SID on enhancement for 700/800/900MHz band combinations was also provided in [2]. Base on the latest Chair guidance in [3], the following objectives seems stable with the contents in [] to be confirmed in this meeting.

- *Investigate the feasibility and solutions to enable simultaneous transmission on two UL bands and simultaneous reception on two or three bands for the band combination of 700, 800 and 900MHz spectrum for smart phone form factor*
    - *The following band combinations will be considered. And the technical discussion on three band combination will start after the completion of feasibility study of all the fallback band combinations.*
        - *CA_n8-n20-n28 with uplink configurations of CA_n8-n20, CA_n8-n28, CA_n20-n28, and the fallback modes*
        - *[CA_n5-n8-n28 with uplink configurations of CA_n5-n8, CA_n5-n28, CA_n8-n28, and the fall back modes]*
        - *[CA_n5-n8 with uplink configurations of CA_n5-n8, and the fallback modes]*
        - *CA_n20-n67 with uplink on band n20*
    - *The following aspects need be studied*
        - *UE architecture including n-plexing, PA*
        - *Study feasibility of low band wideband antenna*

- *Performance due to impacts including inter-modulation products*
- *Method to manage the inter-modulation product impacts*

- *Power class 3 (PC3) is considered in this study*

– *Identify necessary RAN4 requirements including Tx and Rx RF requirement.*

Further, it is proposed in [4] to remove the bracket on CA_n5-n8, and add a note saying "Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink" .

In summary, moderator suggests having discussion with the focus on the following Issues [3, 4],

Issue#1: Whether the [] on CA_n5-n8 can be removed or not by adding the note saying "*Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink"*

Issue#2: Whether the [] on CA_n5-n8-n28 can be removed or not

Issue#3: Duration of the SI and follow-up WI

Issue#4: Review justification and scope for the SID

2 Initial round

2.1 Collection of companies's views

2.1.1 CA_n5-n8

Do you agree to remove the [] for CA_n5-n8 or not by adding a note saying "*Note: Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink"*

Please provide your views/comments if any in the following.

Feedback Form 1:

1 – Skyworks Solutions Inc. This combination is only feasible with restricted spectrum in both n5 and n8 and without a clear frequency range it is difficult to engage on studying such BC as the spectrum restrictions may be different in different regions/countries. it also depends on the targeted channel BWs in both bands. In our view also, even with spectrum restriction, there should be an agreement whether it would still target using existing band 5 and band 8 (full band) filters and whether band 5 can be implemented with a band 26 filter. We understand this is difficult to decide on these technical details in RAN but at least those aspects should be clearly noted if the brackets are removed.
2 – TELECOM ITALIA S.p.A. if there is agreement to remove the [], we suggest to study n5-n8 and n5-n8-n28 with lower priority due to more complexity

3 – China Telecom Corporation Ltd.

We fully support to remove the []. CA n5+n8 is our interested BC in the SI, and we appreciate companies' consideration for this BC.

Response to Skyworks:

Thanks for sharing the detailed technical consideration. We agree that this is difficult to decide on these technical details in RAN, but sure, we need to discuss them in RAN4.

Regarding the exact frequency range/restriction, it seems the note "Note: Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink" could resolve the concern in general.

In addition, considering that the restrictions may be different in different regions/countries, we could propose to **add the supported operator(s) for the BC in the SID, which will help us to identify the frequency restriction in RAN4.**

4 – ZTE Corporation

we are fine to remove the [] for CA_n5-n8 and add one generic note saying "*Note: Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink" to resolve the concerns.*

5 – Guangdong OPPO Mobile Telecom.

It is not easy to handle n5+n8 due to overlapping UL/DL spectrum, some restrictions are needed to make this discussion in RAN4 will be easier. The suggestion from China Telecom could be considered as one approach, i.e. Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink. And it should also be recognized that with this restriction the outcome of RAN4 requirements only can be applied for the specific restricted spectrum cases rather than apply it to all other operator spectrum. Covering all operator cases would cause big burden in Rel-18. Suggest to clarify the targeted spectrum in the WID.

6 – Nokia Japan

We understand the intention of the proposed NOTE. However, we should make it clear that feasibility should be conducted with **existing analogue components(full band n5 and n8)** like duplexer and a kind of restriction in terms of spectrum. If we just considered "restriction of the spectrum" as the solution, it would be quite dangerous since it may just encourage to produce country specific designed devices and in the end, it just jeopardises ecosystem.

7 – CATT

Since there is strong interest from operator to conduct study for this combination, we are fine to remove the [] for this combinaiton with the proposed note added.

Whether it is generic solution or specific solution to the spectrum holder can be left for further study in SI phase.

8 – Beijing Xiaomi Mobile Software

With the clarification from China Telecom and proposed added note, removing the bracket is acceptable for us.

9 – Huawei Technologies France We are OK to remove the brackets. We are going to study new solutions and corresponding feasibility. Thus, there is no reason to restrict the solution by only using existing analogue components (full band n5 and n8). Any solutions which can solve this issue should be considered.

2.1.2 CA_n5-n8-n28

Do you agree to remove the [ ] for CA_n5-n8-n28?

Please provide your views/comments if any in the following.

Feedback Form 2:

1 – Skyworks Solutions Inc. If CA_n5-n8 is properly covered then we can further look into CA_n5-n8-n28 but it should be noted than there may be restriction on supported UL configurations.
2 – TELECOM ITALIA S.p.A. if there is agreement to remove the [], we suggest to study n5-n8 and n5-n8-n28 with lower priority due to more complexity
3 – Spark NZ Ltd Can we suggest if there is still difficulty in CA_n5-n8 (and consequently CAn5-n8-n28) due to the spectrum overlap in n5/n8 and no spectrum restrictions can be imposed, we consider looking at CA_n5-n28 and CA_n8-n28 as a higher priority. In many APT countries n5/n8/n28 are priority bands for coverage deployment and combinations of such are used. In addition even though Band5 is is predominantly a North American Band it is also used many APT countries alongside Band8 and Band28. Further it's worth noting in countries where Band5 and Band8 co-exist countries have accommodated co-existance via guard-bands etc.
4 – Guangdong OPPO Mobile Telecom. It can be further discussed after the CA_n5-n8 is completed, i.e. 2nd priority in the WID.
5 – China Mobile Com. Corporation Considering the workload, 2 bands should be discussed firstly, we support to remove n5-n8-n28.
6 – Nokia Japan OK, but since there is no urgency from the fact that the study of CA_n5-n8-n28 starts after the completion of feasibility study of CA_n5-n8, we don't have to spend time on this discussion now.

2.1.3 Duration of SI

Do you agree the following proposal on SI duration and potential follow-up WI?

Proposal: Nine-month duration for the SI with a potential follow-up WI to be discussed depending on the outcome of the SI

Please provide your views/comments if any in the following.

Feedback Form 3:

1 – ZTE Corporation we are fine with the proposal.
2 – Nokia Japan We don't have to discuss follow-up WI now and spend our time on this discussion. It's normal procedure. Regarding SI duration of 3Q is ok.
3 – Ericsson LM 3 Quarter duration is fine. Agree with Nokia that the need for WI depends on the outcome of the SI. So there is no need to make any agreement regarding follow up WI at this stage.
4 – Huawei Technologies France We are fine with the proposal.

2.1.4 Justification of the SID

Please provide comments for the justification of the SI

Sub-1GHz bands play the important role in wireless communication due to the outstanding coverage performance. However, sub-1GHz spectrum is rare and the spectrum allocation is fragmental. For the individual operator, only a small portion is allocated on 700/800/900MHz IMT bands, which is difficult to meet the NR wideband service requirements.

A straightforward but promising approach to promote those low bands is to combine them by using CA or DC to achieve the high data rate and the good coverage at the same time. Such approach would be a key enabler to bridge the digital divide in rural areas, as the operators commented. The operators showed the interests on this enhancement.

However, according to the existing RAN4 study of the band combination of 700+800+900MHz, only FWA can support it because the separate antennas are needed to achieve the good isolation. A number of challenges were identified for a device with a smart phone form factor to support the combinations of those low bands. Those challenges include the maximum sensitivity degradation (MSD) and poor low band antenna performance.

So a dedicated study item with a clear target date and objectives is proposed to identify the issues and investigate the solution to enable the support of band combinations made up of 700/800/900MHz for a smart phone, which would be critical to promote NR on those low bands.

Feedback Form 4:

1 – Qualcomm Korea We understand and agree with the motivation of the study to establish feasibility. However, we aren't sure if there is a common understanding of what is meant by "feasible". For example, RAN4 has defined specs where the degradation is 30 dB or larger. Would this be regarded as feasible? Operator input may be beneficial here.
2 – Spark NZ Ltd In response to Qualcomm's response : We feel determination of what is feasible is upto the SI as well to define. As an operator we are open to provide input and feedback during the course of the SI.
3 – CATT What Qualcomm proposed is a valid point for the study. The criteria should be an aspects to be discussed during the SI.
4 – TELECOM ITALIA S.p.A. As an European operator owning n8, n20 and n28, the combinations of these three bands are clearly our priority. To Qualcomm: let's see the results of the study (in line with Sparks). This activity is potentially very important to bridge the digital divide in rural areas.
5 – VODAFONE Group Plc Agree with Telecom Italia that combinations of n8, n20 and n28 are a clear priority for European operators, and the study should proceed to explore this further for smartphone form factors.
6 – Huawei Technologies France Feasible or not is based on study duing the SI. It's not clear what kind of criteria should be considered at this stage.

2.1.5 Scope of the SID

Please provide provide comments for scope of the SID.

Investigate the feasibility and solutions to enable simultaneous transmission on two UL bands and simultaneous reception on two or three bands for the band combination of 700, 800 and 900MHz spectrum for smart phone form factor

- *The following band combinations will be considered. And the technical discussion on three band combination will start after the completion of feasibility study of all the fallback band combinations.*
  - *CA_n8-n20-n28 with uplink configurations of CA_n8-n20, CA_n8-n28, CA_n20-n28, and the fallback modes*
  - *[CA_n5-n8-n28 with uplink configurations of CA_n5-n8, CA_n5-n28, CA_n8-n28, and the fall back modes]*

- *[CA_n5-n8 with uplink configurations of CA_n5-n8, and the fallback modes]*
- *CA_n20-n67 with uplink on band n20*

– *The following aspects need be studied*

- *UE architecture including n-plexing, PA*
- *Study feasibility of low band wideband antenna*
- *Performance due to impacts including inter-modulation products*
- *Method to manage the inter-modulation product impacts*

– *Power class 3 (PC3) is considered in this study*

Feedback Form 5:

1 – Skyworks Solutions Inc. CA_n5-n8 should be in the list before CA_n5-n8-n28 as it is a prerequisite to have the two band fallback work first.
2 – China Telecom Corporation Ltd. No other comment after the removal of [] on CA n5+n8.
3 – Qualcomm Korea Similar to the comment above, it may be helpful to define what is meant by feasible. The justification points to low bands with ”outstanding coverage performance”, so if this outstanding coverage is lost then one could argue that aggregation is not feasible. Perhaps using a metric like ”coverage better than mid bands” could be used as definition of feasible when discussing performance?
4 – Spark NZ Ltd In response to Skyworks : Like comment we made earlier we suggest if CA_n5-n8 is challenging we pay attention to other possible combinations such as CA_n5-n28 and CA_n8-n28. In response to Qualcomm : as per comment above in response to Qualcomm we feel SI should guide the feasibility conclusion (as an operator we are happy to guide).
5 – Guangdong OPPO Mobile Telecom. For clarification, what is intended to be studied for n20+n67 if there is only UL@n20?
6 – TELECOM ITALIA S.p.A. As an European operator owning n8, n20 and n28, the combinations of these three bands are clearly our priority. To Qualcomm: let’s see the results of the study (in line with Sparks). This activity is potentially very important to bridge the digital divide in rural areas.

7 – China Mobile Com. Corporation We support to focus on 1~2 band combiantion in the SID, and remove CA n5-n8-n28.
8 – Nokia Japan CA_n5-n8 bullet should be placed before CA_n5-n8-n28. Still not sure why CA_n20-n67 needs to be handled here. That can be handled in a normal CA basket WI.
9 – VODAFONE Group Plc Fine with the objectives. As above, agree with Telecom Italia. Combinations of n8, n20 and n28 are a clear priority for European operators, and the study should proceed to explore this further for smartphone form factors.
10 – Orange We are also fine with the objectives and have the same priorities as Telecom Italia and Vodafone since bands n8, n20, n28 have been widely allocated in Europe.
11 – Huawei Technologies France The UL coverage is bottleneck for IMT system and related to UE output power and path loss. And power class 3 is considered in this SI. We think the UL coverage is obvious and we don't think it is necessary to add the metric like "coverage better than mid bands" to increase additional working group workloads. The most important thing for this SI is to study the implementation and solutions to enable these band combinations for smart phone form factor.

2.1.6 Others

Do you indentify any other issue that is relevant for this SI, e.g. impacted TR or specifications...

Feedback Form 6:

1 – Huawei Technologies France OK to create a new internal TR for this SI.

2.2 Summary of 1st round

The following 4 issues were discussed during the first round. Summary is given under each issue.

Issue#1: Whether the [] on CA_n5-n8 can be removed or not by adding the note saying "*Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink*"

Majority of the companies are ok to remove the [] on CA_n5-n8 by adding the note saying "*Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink*".

Skyworks expressed concern on spectrum restriction details. China telecom (the proponent of this combination) responded that it's hard to discuss restriction details for now in RAN. While it can be done during the SI course.

There is also some discussion on whether the feasibility should be based on existing analogue components and whether it should be generic solution or conuntry specific solution. While it seems this is part of the study during the SI course.

One company prefer to have CA_n5+n8 combination as low priority due to the complexity. However it should be noted that RAN4 discussion is contribution driven anyway, which means giving priority between different combinations may be not necessary.

There is a request from China telecom to list the interested operators for each combination.

Recommendation for Issue#1:

Remove [] on CA_n5-n8 by adding the note saying *"Spectrum restrictions should be studied to solve overlap of band n5 downlink and band n8 uplink"*

Issue#2: Whether the [] on CA_n5-n8-n28 can be removed or not

From the feedbacks, the common understanding now is that the work on CA_n5-n8-n28 should not be discussed before the completion of CA_n5-n8-n28. Further there is also a request to include CA_n5-n28 and CA_n8-n28 instead.

Recommendation for Issue#2:

CA_n5-n8-n28 can only be considered after the completion of feasibility study for CA_n5-n8.

In the intermediate round, it is proposed to further discuss,

- Whether to delete CA_n5-n8-n28 from the scope or leave it with a note saying"CA_n5-n8-n28 can only be considered after the completion of feasibility study for CA_n5-n8"
- Whether to include CA_n5-n28 and CA_n8-n28 as requested by operator in the intermediate round.

Issue#3: Duration of the SI and follow-up WI

It is agreeable to have this SI as nine-month duration. The potential follow-up WI can be discussed after the completion of SI.

No further discussion on Issue#3 is needed in the intermediated round.

Issue#4: Review justification and scope for the SID

Qualcomm requests input from operators on how to judge the feasibility of a combination. Multiple operators' feedback prefer to leave this up to SI study.

Oppo and Nokia questioned why CA_n20-n67 needs to be handled in this SI and what to be studied for this combination.

Recommendation for Issue#4

Criteria on feasible is up to SI study.

Furhter clarify in the intermediate round whether CA_n20-n67 needs to be handled in this SI and what to be studied for this combination.

Others

Create a new RAN4 internal TR for this SI.

3 Intermediate round

3.1 colletion of company views

3.1.1 how to handle CA_n5-n8-n28

Please give your preference on how to handle CA_n5-n8-n28

Option 1: Delete CA_n5-n8-n28 from the scope

Option 2: leave it in the scope and adding a saying"CA_n5-n8-n28 can only be considered after the completion of feasibility study for CA_n5-n8"

Feedback Form 7:

1 – Qualcomm Korea

This comment is not related to CA_n5-n8-n28, but since there is no "other comment" category for the intermediate round, I leave my comment here. Sorry for being off topic. Since it was agreed that feasibility criteria would be left to the SI, I suggest adding a specific objective for the study

The following aspects need be studied

- ...
- Feasibility criteria shall be identified for 700-800-900 CA

2 – Spark NZ Ltd

we agree that that the SI should look at the feasibility criteria and seek guidance from operators but as discussed earlier if the overlap of spectrum 800/900 proves un feasible even after spectrum restrictions then two of the three bands should be considered - see below.

3 – Nokia Japan

At least we don't agree with Option 2.

Since there is a following text in the objective, addition a text proposed in Option 2 creates confusion.

- *And the technical discussion on three band combination will start after the completion of feasibility study of all the fallback band combinations.*

We don't see the necessity of spending time for this discussion. We just leave CA_n5-n8-n28 with square brackets if removing square brackets or deleting CA_n5-n8-n28 is not agreeable.

With respect to a suggestion from Qualcomm on adding "- Feasibility criteria shall be identified for 700-800-900 CA" to the objective, we are fine with it.

4 – CATT

With respect to the suggestion on adding "- Feasibility criteria shall be identified for 700-800-900 CA", we are fine with it.

No strong opinion on CA_n5-n8-n28, no strong opinion. since we cannot do the study before CA_n5-n8 completion. so either option 1 or option 2 is ok for us.

5 – TELECOM ITALIA S.p.A.

We have concerns with the proposal from Qualcomm

"Feasibility criteria shall be identified for 700-800-900 CA"

This may be ambiguous and cause a lot of discussion in RAN4. As already stated we should investigate and assess different solutions. Based on the results we can decide which technique to move to the normative phase (i.e., business as usual)

6 – Guangdong OPPO Mobile Telecom.

Ok with remove CA_n5-n8-n28 to save RAN4 efforts.

7 – China Mobile Com. Corporation

OK with option1. We share similar view with Nokia that option 2 is not preferred.

8 – Skyworks Solutions Inc.

This feedback is on CA_n5-n8, if we are OK to discuss spectrum restriction in the SI we need to add that we need to study applicability of current filter too.

9 – Skyworks Solutions Inc.

regarding CA_n5-n8-n28, this can only happen after the fallbacks but the key is the antenna/filter architecture that is feasible for 3xLB.

10 – CATT

@Skyworks,

Regarding CA_n5-n8, could you please propose a wording for checking?

11 – CATT

Moderator:

@Skyworks,

Regarding CA_n5-n8, could you please propose a wording for checking? e.g. how would you like to address your concern on the filter in the SID scope?

12 – VODAFONE Group Plc

We also share the concerns expressed by Telecom Italia on Qualcomm's comment. The objective "Feasibility criteria shall be identified for 700-800-900 CA" may be too ambiguous and cause open-ended discussion in RAN4.

13 – vivo Communication Technology

Ok with option 1.

14 – Huawei Technologies Sweden AB

The objective "Feasibility criteria shall be identified for 700-800-900 CA". proposed by Qualcomm is too ambiguous and will result open-ended discussion.

Current objectives clearly show to investigate the Feasibility in the first sentence, and the following specific aspects need be studied:

– UE architecture including n-plexing, PA

– Study feasibility of low band wideband antenna

– Performance due to impacts including inter-modulation products

– Method to manage the inter-modulation product impacts

Thus, we don't agree to add this new ambiguous objective to distract the group discussion from the main topic. It will cause open-ended discusison and too much uncertainty to close the item.

15 – ZTE Corporation

From our understanding, it might be difficult to discuss the Feasibility criteria at the end, it's better not to add it.

3.1.2 Whether to include CA_n5-n28 and CA_n8-n28

Please feedback whether you are ok to include these 2 fall-back mode in the scope.

Feedback Form 8:

1 – Spark NZ Ltd

as we pointed out in the initial round , the 700/800/900 bands are extensively used in the APT region. Majority of operators have band 28 but some also have band 5 or band 8 alongside band 28. Some have both bands 5 and 8 and band 28. So we strongly suggest the CA_*n5-n28 and* CA_n8-n28 be studied. The APT region is unique in that it has licenced bands 5 and 8.

2 – Nokia Japan

We need to understand the intention of the proponent of this request. Requirements for both CA_n5-n28 and CA_n8-n28 are already in 38.101-1. At least we don't see the necessity of adding CA_n8-n28 to the objective. This just creates confusion in terms of what needs to be further discussed.

Regarding CA_n5-n28and also CA_n5-n8-n28, we need more clarification in terms of frequency range. CA_n5-n28 has the following restriction. Hence, the SID shall clarify when RAN4 study CA_n5-n8-n28, the frequency range in band 28 is limited to 703-733 MHz for the UL and 758-788 MHz for the DL or not. If it's limited, we don't have to list CA_n5-n28 in the objective in the SID.

- NOTE 2: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL

3 – China Mobile Com. Corporation

We agree with Nokia that n8-28 is already supported, no need to study.

4 – Skyworks Solutions Inc.

In our view all the fallbacks are needed but some are already in the spec, still the key issue is CA_n5-n8 the others are business as usual. regarding n28 it may be useful to know if there is any regional spectrum restrictions when used with n5 and n8

3.1.3 CA_n20-n67

Please feedback whehter CA_n20-n67 should be included in the scope and what to be studied for this combination.

Feedback Form 9:

1 – Nokia Japan

Just for clarification. We don't object study of CA_n20-n67 itself in a suitable basket WI. But we just don't see the necessity to study this in this SI

2 – CATT

Moderator: Can th eproponent of CA_n20-n67 clarify what needs to be studied for this combination in this SI? Or can it be addressed by usual basket WI?

3 – Guangdong OPPO Mobile Telecom. Also would like to understand why this band combination is to be studied here.
4 – ZTE Corporation CA_n20-n67 was already included in the spec after RAN4 #102 meeting (The corresponding approved TP was **R4-2201565**). Therefore, we don't see there is need to include this combination again.
5 – ZTE Corporation Just a correction on our previous comments: CA_n20-n67 was already included in the **rapporteur big CR R4-2204770** after RAN4 #102 meeting.....
6 – Skyworks Solutions Inc. We do not see the need for 2xLB cases in the WI unless they are a "tricky" fallback of a 3xLB case like CA_n5-n8.

3.2 summary of intermediate round

Regarding CA_n5-n8-n28, almost all companies agree to remove it from the scope. CA_n5-n8-n28 will be removed from the SI.

Regarding CA_n5-n28 and CA_n8-n28, according to the feedbacks there is no need to study CA_n8-n28 in this SI. Nokia asked for clarification on the restriction of n28 frequency range if we are going to consdier CA_n5-n28. But no response received from the proponent.

Regarding CA_n20-n67, it is clarified that CR R4-2204770 in RAN4#102-e has already captured this combination. CA_n20-n67 will be removed from the SI scope.

Regarding the proposal on "Feasibility criteria shall be identified for 700-800-900 CA", 2 companies are fine with it but Telecom Italia/Vodafone/Huawei/ZTE have strong concern on adding this point. It is proposed to sutdy this aspect on contribution driven basis in RAN4 during the SI since the feasibility will be discussed after the evaluations for each combination anyway. (Note: the first objective is saying "Investigate the feasibility and solutions to enable....")

Regarding CA_n5-n8, Skyworks propose to add a clarification that the applicability of current filter need to be studied.

4 Final round

4.1 Review the SID

The aim of the final round is to reach stable version of the SI text. Companies are welcome to provide their proposed updates to the following SID revision, where we have tried to address all agreeable comments from the previous rounds. 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-10-RAN4-R18-

700800900%5D/RP-220xxx_draft%20SI%20on%20700800900_RD3.doc

Feedback Form 10:

1 – Qualcomm Korea

We continue to propose the addition of an objective ”Feasibility criteria shall be identified for 700-800-900 CA” to the SID. Companies who opposed adding this objective commented that it would be difficult to agree on any such criteria. However, if companies cannot agree to feasibility criteria, then how will the SI objective ”Investigate the feasibility” be achieved? Other companies commented that we should study the quantitative values first and then decide the criteria for feasibility based on that, but that seems to be an approach of writing specifications according to the capability rather than writing specifications according to the necessary system performance. Both are needed.

The statement ”*Note2: The applicability of current filter need to be studied”* is unclear. Is this note suggesting that the current filter needs to be redesigned to support CA? Does this note imply that a sub-band filter design is required? Some additional clarification would be helpful in the SID.

2 – Spark NZ Ltd

we would like to take the opportunity to comment on feasibility criteria as this could result in a long and protracted debate during the SI and could prejudice its completion.

Current objectives in this SI clearly show to investigate the feasibility at the outset, and the following specific aspects need be studied:

– UE architecture including n-plexing, PA

– Study feasibility of low band wideband antenna

– Performance due to impacts including inter-modulation products

– Method to manage the inter-modulation product impacts

with regard to bands n5-n28 and n8-n28. The n28 band range as pointed out by Nokia is limited but in APT countries all the band 703- 748 paired wth 758-803 is allocated and this complete range should be considered. in addition:

UL CA *n5A-n28A and CA*n8A-n28A into this work item.

3 – Nokia Japan

Spark NZ Ltd is right. UL configurations for CA_n5A-n28A and CA_n8A-n28A have not been specified. Regarding CA_n5A-n28A, if complete range of n28 is considered, the feasibility study is surely needed from DL configuration for CA_n5A-n28A.

What is not clear is a procedure. The SID says ”after the completion of feasibility study of all the fallback band combinations”, but this is a SI so that it does not have authority to specifying the requirements.

Wouldn’t it better to handle fallback configurations that are not likely to be controversial in a corresponding basket WI?

While band combinations like CA_n5-n8 and CA_n5-n28(with full range) should be studied in this SI.

4 – CATT

After a further check for 38.101-1, there is no uplink CA configuration specified for CAn5-n28 (with full range) and CA_n8-n28.

5 – China Mobile Com. Corporation

We are fine to consider uplink for CA_n8A-n28A in basket WI if companies believe no study is needed.

6 – CATT

Moderator

CA_n5-n28 (full range) is updated to the SID. please double check the following link.

https://www.3gpp.org/ftp/tsg*ran/TSG*RAN/TSGR*95e/Inbox/Drafts/%5B95e-10-RAN4-R18-700800900%5D/RP-220xxx*draft%20SI%20on%20700800900*RD3*v1.doc.

7 – vivo Communication Technology

Regarding Qualcomm's proposal to do a study of the feasibility criteria, maybe the following compromised wording can be considered:

"Identify feasibility criteria for 700-800-900 CA if necessary."

We can leave some room for further discussion in RAN4 and also do not mandate it.

8 – China Telecom Corporation Ltd.

Thanks moderator for the draft SID. We have uploaded an reversion in:

https://www.3gpp.org/ftp/tsg*ran/TSG*RAN/TSGR*95e/Inbox/Drafts/%5B95e-10-RAN4-R18-700800900%5D/RP-220xxx*draft%20SI%20on%20700800900*RD3*v2.doc

The changes include:

1) Put the "*Note2: The applicability of current filter need to be studied*" for n5+n8 in [] according to QC's comment. To our understanding, we already included one aspect on "UE architecture including n-plexing" in the SID, perhaps no need to add this Note 2 again.

2) Added the supported operators for the 3 BCs in the SID according to the discussion in this thread, which will be helpful for the discussion in RAN4. We requested to add this table in the initial round, and seems no objections so far. So we took the liberty and added the table. Hopefully, it could be be fine.

For the bullet on feasibility criteria, we share the majority view that it is not needed. There are study phase in the several other items, and we don't see similar criteria added explicitly.

9 – Huawei Technologies France

To Qualcomm's comments:

In our understanding, RAN4 seemed never set such precondition (Feasibility criteria) in other SIs and band combinations when investigating the feasibility. The technique content for feasibility study have already been included in the SID and whether it is feasible depending on companies' analysis and consensus among companies. We fail to understand why the explicit objective for feasibility criteria for sub1GHz combos is needed.

Such general feasibility criteria discuss is too subjective and the objective iteself is too ambiguous. What exactly is hiden behind such vague proposal. Besides, even if we discuss the feasiblity criteria in RAN plenary, we don't think companies can reach a consensus during a reasonable time. Can the proponent clarify what exact criteria in your mind and propose a specific feasibility criteria such that other companies can agree in this meeting?

Based on the concerns above, if the proponent insisted on discussing the general "feasibility criteria", it should be decoupled with this SI. We think it is some kind of general discussion and RAN should establish a new SI to discuss what the general feasibility criteria is and after reaching agreement such criteria should apply to all the feasibility study.

10 – MediaTek Inc.

We have the following comments:

- Unclear what is the **technical** discussion here.... "And the technical discussion on three band combination will start after the completion of feasibility study of all the fallback band combinations." We are not specifying requirements in this SI. The technical discussion is the feasibility study.
- The following bullet shall be removed "Identify necessary RAN4 requirements including Tx and Rx RF requirements". In a study item we do agree on performance requirements. We can identify if there are any new types of requirements needed, but we do not agree what the values shall be.
- We would propose to add as a sub-bullet under aspects to be studied "Envisaged performance gains of 2 ULs in low bands with a PC3 UE".
- Justification: The underlined text below should be removed. How can it be assumed to be critical if we don't even know the performance trade-offs? "...to enable the support of band combinations made up of 700/800/900MHz for a smart phone, which would be critical to promote NR on those low bands."

11 – TELECOM ITALIA S.p.A.

We are generally fine with the proposal. We also share the concern raised by Huawei on the Qualcomm's proposal to add a feasibility criteria. This is a study and on the basis of performance (i.e., gain or loss in performance) we will decide to move to a normative phase. I would say business as usual.

We also support to move directly to the basket Work Item the non controversial combinations.

Please add Telecom Italia as a supporting company.

12 – Orange

We also share the same concern as Huawei and Telecom Italia on the need for a feasibility criteria.

This topic is of interest for Orange. Please add Orange as a co-signing company.

13 – China Telecom Corporation Ltd.

We'd like to share our understanding to MediaTek's comments:

1) We agree the technical discussion is the feasibility study, since it is a SI.

2) "Identify necessary RAN4 requirements including Tx and Rx RF requirements" would be helpful for us to draft the follow-up WID, and we agree that the values for the requirements can be decided in WI phase.

3) For ”Envisaged performance gains of 2 ULs in low bands with a PC3 UE”, does this mean the UL throughput gain based on system level simulation? If so, it seems difficult to finish it in a 9-month SI.

4) Although not preferred, it is acceptable to us to remove which would be critical to promote NR on those low bands in the justification.

14 – Skyworks Solutions Inc.

If other 2DL/2UL fallbacks than CA*n5-n8 are needed they can be covered within the ”not for block approval” AI and are anyhow needed for the 3 band configuration. regarding the filter applicability this is not related to N-plexing which is how the signals are combined at the antenna. what we are looking for here is whether the filters need to be taillored to the restricted n5 and n8 spectrum or not. We prefer NOTE 2 to cleary stae this as this is specific to CA*n5-n8 and not related to the genric architecture issue of n-plexing 3 low bands

15 – Skyworks Solutions Inc.

for the CA_n5-n8, there is no need to add ”and the fallback modes” since this is only a 2 band case.

16 – VODAFONE Group Plc

Same views as Telecom Italia and Orange. Please add Vodafone as a supporting company.

17 – China Telecom Corporation Ltd.

@ Skyworks, for CA_n5-n8, the fallback modes indicate the 2DL/1UL case, so it is still needed.

18 – Huawei Technologies France

To MTK’s comments.

1) For the technical discussion, we share the same view with China Telecom. Technical discussion is the feasibility study.

2) We have to highlight “Identify”. We can discuss and identify the necessary RAN4 requirements including Tx and Rx RF requirements. The values can be specified in the follow-up WI phase.

3) For ”Envisaged performance gains of 2 ULs in low bands with a PC3 UE”, does that mean we need to compare the UL throughput gain between two UL CA bands and one UL band? We think the performance gain is related to general UL CA feature instead of these specific band combinations.

4) To make progress, we can compromise to remove the last sentence in Justification section.

19 – MediaTek Inc.

Re Huawei/CT comments to my comments:

1) Maybe change technical discussion to ”feasibility study” then?

2) Fine to say ”identify potential impact to relevant RAN4 requirements”

3) Yes like where will I actually be able to use UL CA to provide a meaningful benefit in these rural scenarios mentioned, and whether there would be any negative impact on single carrier operation to support that.

4) I think removing that sentence would be best.

20 – CATT

Regarding Note 2, we fine to list it in [], Sorry for missing Gene's last Round comment to this point. With the added part by skyworks "*whether the filters need to be taillored to the restricted n5 and n8 spectrum or not", the note 2 becomes to "The applicability of current filter need to be studied e.g.* whether the filters need to be tailored to the restricted n5 and n8 spectrum or not" companies please check this one.

Regarding MediaTek's comments,

We share the same view as China Telecom that the bullet "Identify necessary RAN4 requirements including Tx and Rx RF requirements" is useful. RAN4 needs to conduct feasibility study and identify (not specify) the impacted requirements. Specification of this requirements is up to follow-up WI.

The sentence "which would be critical to promote NR on those low bands." can be removed from the justification part.

Regarding the 2nd proposal from MediaTek, more discussion may be needed in the GTW.

The feasibility criteria needs more clarification in the GTW.

21 – MediaTek Inc.

@CATT so my latest text proposal "identify potential impact to relevant RAN4 requirements" should be fine for you?

22 – CATT

@ MediaTek, it's fine for me. if there is no objection from other companies, I will update the SID.

there is a typo in my previous comments□#20□. I meant proposal 3 may need more discussion. Let's also see feedbacks from other companies.

4.2 other aspects

If any.

Feedback Form 11:

4.3 summary of Final round,

An updated SID version is uploaded to the following link.
https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/%5B95e-10-RAN4-R18-700800900%5D/RP-220xxx_draft%20SI%20on%20700800900_RD3_v3.doc.

Open issue to be further discussed in GTW:

a. Feasibility criteria for the concerning band combination.

b. Confirm "*Note 2 The applicability of current filter need to be studied e.g. whether the filters need to be tailored to the restricted n5 and n8 spectrum or not*"

c. New study point came from the last minute, "Envisaged performance gains of 2 ULs in low bands with a PC3 UE

Thanks to all for the good discussion!

5 Reference

[1] RP-220024, Moderator's summary for discussion [RAN95-e-RAN4-R18Prep-06] Other RAN4 Enhancements, RAN4 Chair (Huawei)

[2] RP-220059, Nsew SI: Study on enhancement for 700/800/900MHz band combinations, RAN4 Chair (Huawei)

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

[4] RP-2200583, Views on Rel-18 study for 800+900MHz CA, China Telecom