**3GPP TSG-RAN WG4 Meeting #96-e R4-2011758**

**Electronic Meeting, August 17th – 28th 2020**

**Agenda item:** 7.1.4 (Rel-16 NR-U BS RF requirements

**Source:** Moderator (Nokia)

**Title:** Post-meeting email discussion summary for [96e][305] NR\_unlic\_RF\_BS

**Document for:** Information

# Introduction

Email discussion of NR-U BS RF requirements is summarized in [1] for RAN4 #96-e. At the conclusion of the RAN4 #96-e meeting, a set of CRs with NR-U introduction to BS RF specifications was presented in response to comments received during the meeting.

The RAN4 Chairman has allotted a one-way email approval process for the CR to be concluded by 5pm UTC September 4. This document summarizes comments received during the post-meeting email discussion.

# Email discussion

There is strong desire and passion to complete the NR-U work. Therefore, the following NR-U BS RF tdocs are for email approval by 5pm UTC Sept. 4:

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| --- | --- | --- |
| R4-2012608 | CR to TS 38.104: Introduction of NR-U into BS core specification | Nokia, Nokia Shanghai Bell, Verizon |
| R4-2010739 | CR to TS 37.107 with introduction of NR-U feature | Nokia, Nokia Shanghai Bell |
| R4-2010962 | CR to 36.104: Introduction of Band n46 in 36.104 | ZTE Corporation |
| R4-2012768 | CR to 36.104: Introduction of NR-U co-existence requirements | Nokia, Nokia Shanghai Bell |
| R4-2012766 | CR to 37.104: Introduction of NR-U co-existence requirements | Nokia, Nokia Shanghai Bell |
| R4-2012767 | CR to 37.105: Introduction of NR-U co-existence requirements | Nokia, Nokia Shanghai Bell |

Following table collect companies comments:

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| --- | --- | --- |
| **CR No.** | **Company** | **Comments** |
| R4-2012608  CR to 38.104 | Charter Communications, Inc | We support this CR |
| Ericsson | Table 5.3.5-1 contains n96 definition without appropriate agreed note from agreement during GTW meeting. Note: “this band is *intended* for operations subject to FCC NPRM R&O”  Table 6.6.5.2.3-1, Table 6.6.5.2.4-1 which contains n96 definition see comment for Table 5.3.5-1 |
| Huawei | Comments applicable to BS and UE CR: there is no agreement on channelization. It should be further discussed especially after hearing the comments at Aug.27 GTW that proponents of option 2 (adopted in previous CR) emphasis option 2 is the best choice considering current status of uncertainty of IEEE draft standard. We may need the decision based on 3GPP study or have some coordination with IEEE to minimize the risk on the misalignment between NR-U and WIFI. The SU for 20 MHz with 60 KHz SCS is TBD for both single carrier case and wideband operation case. It is not acceptable since we had an agreement long time ago (R4-1910537) that 25 PRB should be adopted.  Comments to BS CR: as captured in the section chair Note, there is no agreements reached for ΔfOBUE and ΔfOOBB for 6GHz band for both NR-BS Type 1-C and NR-BS type 1-H, and no agreements on IBB and OOBB requirements, and no agreements on LO leakage for NR-U punctured channels. Without further technical evaluation and analysis we can not agree on the CR. Furthermore, as we comment last week, if introduce both n46 and 6GHz band, the co-existence between the two 3GPP bands should be addressed. There are lots of updates in the CR, which were new and provided in the last minute of RAN4#96e. We would like to take more time for review and will come back later. |
| AT&T | We support this CR and also any compromise proposal to list any items in brackets if companies want more time to review to allow n96 band definition in Rel-16 to support the US market. |
| Nokia | To Ericsson:  Table 5.3.5-1: Table includes Note in 5.2-1 that is aligned with UE CR: NOTE 4: This band is applicable in the USA only subject to FCC Report and Order [FCC 20-51]. We think there is no need to repeat this note in table 5.3.5-1 as table 5.2-1 introduce band definition. Otherwise, with this logic, almost all tables with band n96 would include such a note.  On Table 6.6.5.2.3-1, Table 6.6.5.2.4-1: It is not clear what would be the reason to include above note.  To Huawei:  On channelization: Proposal is according to GTW agreement, if there will be further updates, we will follow RAN4 agreement: "If there is updates from IEEE/WiFi Alliance, the channelization and related requirements should be further updated". We updated channel and sync raster points to the latest draft 802.11ax – i.e. shift of additional 10 MHz is taking into account (20MHz total), and alignment with Wi-Fi latest draft 802.11ax is achieved.  On ΔfOBUE and ΔfOOBB for 6GHz: since proposed values were not confirmed by RAN4, thus there are in brackets.  On IBB and OOBB requirements for 6 GHz: since some companies requested more time to study, the values are in brackets.  On LO exception leakage: We do not agree that we don’t have consensus. Current text with brackets comes from agreed WF in R4-2008766. Thus, we believe that text is still valid in brackets. As we discussed during GTW – we are open to further discuss this aspect in the next meeting.  On co-existence between 5GHz and 6 GHz: n46 and n96 co-existence requirements (e.g. protection of n96 by n46 as well as protection of n46 by n96) are included in this CR, it is not clear to us which additional co-existence aspects are not addressed? Note that channelization for 6GHz band already include 20 MHz guard band as IEEE. |
| ZTE | Regarding the NR-U 6GHz channelization, to change the channel arrangement at last day before the target completion date of core requirements is not very reasonable choice as lots of RF requirements will be impacted..  In additions, for NR-U BS at 6GHz, as recorded in GTW WF from chairman there was no agreements for ΔfOBUE and ΔfOOBB for 6GHz band for both NR-BS Type 1-C and NR-BS type 1-H yet, in addition, the channelization from proponent companies also changed and then which baseline assumption are used for such kind of analysis. and also no agreements on IBB and OOBB requirements, and no agreements on LO leakage for NR-U punctured channels.  In addition, the table tile might cause confusion that agreement for medium range NR-U BS. Co-location spurious emission requirement -52dBm/MHz for NR-U BS at 6GHz needs more discussion as mentioned before. |
| Huawei | To Nokia: the agreement “If there is updates from IEEE/WiFi Alliance, the channelization and related requirements should be further updated” is a sub-bullet of the agreements “Assuming the requirements for band plan (5925 – 7125 MHz) can be completed at this meeting, go with option2. If the requirements are not completed, channelization will be further discussed”. If we do not go option 2 then we should have further agreements on the channelization. Furthermore, even we agree on “the channelization and related requirements should be further updated” but there is no agreements on how.  On ΔfOBUE and ΔfOOBB, and IBB and OOBB requirements for 6 GHz, reuse the value of n46 with brackets is not acceptable to us. As we discussed in last two weeks, further technical evaluation and analysis are needed before a conclusion can be made.  On co-existence between 5GHz and 6 GHz: the two bands are adjacent each other, we agree with ZTE that -52 MHz/MHz need more discussion. |
| Ericsson | To Nokia: It would not make sense to apply this co-existence requirement upon any BS that is deployed outside of USA region. Therefore a note is needed in 36.104 and also 38.104 (where the band is specified). The coexistence requirements with n96 only applies in the region where this is deployed. |
| Nokia | To ZTE:  Current design of channel raster that is aligned with the latest IEEE 802.11ax includes 10 MHz guard band on top of 10 MHz that was considered before. It is not clear to us which BS requirements would be impacted since there is additional shift of 10MHz due to the latest channelization change. Please clarify.  ΔfOBUE and ΔfOOBB has not been agreed for bands above 900MHz so they are in [] since there was no other proposal than keeping the same values as for bands below 900MHz. Would changing proposed values to TBD satisfy your concern? For IBB and OOBB requirements we keep values in [] as well. Since there is no agreement on LO leakage for NR-U punctured channels, that text is in [] too.  -52dBm/MHz requirement is in [] and can be revisited in the coming meeting.  To Huawei:  We can keep channelization part in [] to reflect GTW agreement further updates might be needed. For ΔfOBUE and ΔfOOBB we can change to TBD (even there were no other proposals) as mentioned above.  For co-existence between 5GHz and 6GHz, we can treat these bands the same way as other adjacent TDD bands e.g. Band 42 and 43 – we will add a note these requirements do not apply to BS operating in these bands.  To Ericsson:  It is clear in 38.104 CR band n96 is applicable in USA only. We have number of bands defined already which are used in specific region/country only and it is clear requirements are applicable only to BSs which operate in that country (e.g. Band 41 BS does not need to protect Band 7 BS, etc.). We are not sure why this scenario is different and would need to be clarified further. However, if Ericsson think clarification is needed, we should clarify it in a generic way (to be applied to all regional bands). |
| CHTTL | We support Huawei’s view on the channelization. |
| Huawei | 1. The channelization was updated at the last day of meeting week. It will impact lots of requirements and also feasibility evaluation which should give some time for study.  2. On SU for 60 kHz, TBD is not acceptable to us since it does not include the previous agreements (R4-1910537). And it seems there is no negative comments on 25 RB SU during post-meeting email approval process.  3. There are some open issues for 6GHz, e.g. channelization, ΔfOBUE and ΔfOOBB, IBB and OOBB, co-existentce requirements and Medium Range BS requirements. Meanwhile it is not the case for 5 GHz n46. Hence we think it will be ok to complete the definition of n46. For n96 it need more time to conclude.  4. The handling of the remaining open issues under maintenance is not preferred.  5. It seems the revision of CRs are not available. |
| Charter Communications, Inc | To Huawei:  I want to ask you questions for clarification on your item below:  “The channelization was updated at the last day of meeting week. It will impact lots of requirements and also feasibility evaluation which should give some time for study.”  [FA] Can you be specific on what requirements are impacted by the channelization?  On your comment, “And it seems there is no negative comments on 25 RB SU during post-meeting email approval process.”  [FA] We had commented that adding the rb and reducing the guard band can cause potential interference and I believe other companies have commented as well.  Can you clarify your comment further?  Finally, Can you also clarify why handling remaining issues under maintenance is not preferred? What is the problem? |
| Huawei | To Charter:  [Liehai] Channel raster, sync raster, co-existence study, and feasibility study on the filter…  [Liehai] I mean during post-meeting email approval process, I did not see any negative comments. You may had some comments before. If your comment is valid, then for 15 kHz and 30 KHz SCS the guard band is even smaller the interference will be worse, so we should reduce the SU for 15 KHz and 30 KHz SCS? It is not the case, using 25 RB SU, it need to fulfil the same emission mask for co-existence hence it will not cause any interference issue.  [Liehai] in my view, the work is not good for arrangement in the maintenance. The progress is hard to guarantee actually, e.g. no dedicate agenda, no schedule… By the way, maybe it is out of the scope of email approval. |
| ZTE | 1) From the working procedure perspective, to change the channelization for 6GHz at the last day is not expected frankly speaking, this significant modification will impact the 6GHz band filter design, whether wide-band filter or narrow band filter should be used; to further shifting 10MHz from lower boundary, how to accomondate the EU's band plan on the high end of 6425MHz. In addition, proposals from BS and UE seems also not well aligned and some sync raster could be further discussed indeed.  2) There are a couple of open issues left for NR-U BS at 6GHz, we suggest to approve 5GHz at the first phase, then further evaluate the remaining requirements for 6GHz with at least one meeting cycyle, otherwise we are really not confident enough to agree that proposals.  3) Regarding the completion data for NR-U 6GHz, we don't see the urgency that at least for medium range BS, as AFC is still not well defined and completed in 3GPP and IEEE which should be critical for medium range BS. |
| Nokia | On channelization:  It was brought by Huawei during GTW session that IEEE changed channelization. Since it was discussed in the GTW session and brought up by companies even before that companies had enough time to double check the numbers and requirements implications. As pointed out by Nokia above there is additional guard band and there is no requirement implication.  Filter design is BS implementation issue, requirements shall be defined in such a way that various implementations (also with respect to filter design) are possible.  Since there were no concrete proposals, what would be the additional requirements implication, we propose to keep the channel raster and sync raster in brackets so companies may further check for coming RAN4 meeting.  Any misalignment between BS and UE CR can be covered in the future meeting by maintenance.  On EU band plan:  EU band plan will be discussed in the future in RAN4 once regulatory requirements will be finalized and shall not have any impact on n96 which is for US only.  On SU:  As already commented in UE RF thread there is no agreement on final number and further discussion is needed. That is why it is TBD in the CR.  On ΔfOBUE and ΔfOOBB, IBB and OOBB, co-existentce requirements and Medium Range BS requirements:  It was already commented before, the proposals are either TBD or in square brackets. So companies can confirm or revise these requirements in the coming meeting.  MR BS requirements for n96 are not included in the CR. We propose to further discuss it next meeting. |
| R4-2010739  CR to 37.107 | Charter Communications, Inc | We support this CR |
| Huawei | n96 should be removed if the requirement for n96 is not completed. |
| AT&T | We support this CR. |
| Ericsson | Small type-o in text, “Band n46 and Band n96”, “d” is missing from Band n96 in proposed text change. |
| Nokia | To Ericsson:  Thank you for pointing out typo. This can be corrected in the next meeting. |
| ZTE | Before core requirement for n96 is defined completely, n96 should be better to be removed. |
| CHTTL | Agree with Huawei and ZTE. |
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| R4-2010962  CR to 36.104 | Charter Communications, Inc | We do not support this CR |
| Huawei | OK with the CR |
| AT&T | We do not support this CR in its present form since it does not address the 6 GHz requirements for n96. |
| Nokia | We do not support this CR as it does not include band n96. |
|  | ZTE | OK with the CR |
| R4-2012768  CR to 36.104 | Charter Communications, Inc | We support this CR |
| Huawei | The co-existence between 5GHz band and 6 GHz band should be addressed. |
| Ericsson | Table 6.6.4.3.1-1, Table 6.6.4.4.1-2 contains n96 without appropriate agreed note from agreement during GTW meeting. Note: “this band is *intended* for operations subject to FCC NPRM R&O” |
| AT&T | We support this CR. We also support any compromise proposal to list items in brackets if companies want more time to review. |
| Nokia | To Ericsson:  Since Band n96 is not introduced in 36.104 specification (only co-existence requirements to protect n96), it is not clear to us why such a note would be needed?  To Huawei:  n46 and n96 co-existence requirements (e.g. protection of n96 by Band 46) are included in this CR, it is not clear to us which additional co-existence aspects are not addressed? |
| ZTE | Before core requirement for n96 is defined completely, n96 should be better to be removed. |
| Ericsson | To Nokia: It would not make sense to apply this co-existence requirement upon any BS that is deployed outside of USA region. Therefore a note is needed in 36.104 and also 38.104 (where the band is specified). The coexistence requirements for protection of n96 only applies in the region where this is deployed. |
|  | Nokia | To Ericsson: see comment in 38.104 CR |
| R4-2012766  CR to 37.104 | Charter Communications, Inc | We support this CR |
| Huawei | The co-existence between 5GHz band and 6 GHz band should be addressed. |
| Ericsson | Table 6.6.1.3.1-1, Table 6.6.1.4.1-1 and Table 7.5.2-1 contains n96 without appropriate agreed note from agreement during GTW meeting. Note: “this band is *intended* for operations subject to FCC NPRM R&O” |
| AT&T | We support this CR. We also support any compromise proposal to list items in brackets if companies want more time to review. |
| Nokia | To Ericsson:  Since Band n96 is not introduced in 37.104 specification (only co-existence requirements to protect n96), it is not clear to us why such a note would be needed?  To Huawei:  n46 and n96 co-existence requirements are included in this CR, it is not clear to us which additional co-existence aspects are not addressed? |
| ZTE | Before core requirement for n96 is defined completely, n96 should be better to be removed. |
|  | Ericsson | To Nokia: It would not make sense to apply this co-existence requirement upon any BS that is deployed outside of USA region. Therefore a note is needed in 36.104 and also 38.104 (where the band is specified). The coexistence requirements for protection of n96 only applies in the region where this is deployed. |
|  | Nokia | To Ericsson: see comment in 38.104 CR |
| R4-2012767  CR to 37.105 | Charter Communications, Inc | We support this CR |
| Huawei | The co-existence between 5GHz band and 6 GHz band should be addressed. |
| Ericsson | Table 7.5.2.2-1, Table 9.7.6.3.4.2-1, Table 9.7.6.4.4.2-1, Table 10.6.2.2-1, Table 10.6.3.2-1 and Table 10.6.4.2-1 contains n96 without appropriate agreed note from agreement during GTW meeting. Note: “this band is *intended* for operations subject to FCC NPRM R&O” |
| AT&T | We support this CR. We also support any compromise proposal to list items in brackets if companies want more time to review. |
| Nokia | To Ericsson:  Since Band n96 is not introduced in 37.105 specification (only co-existence requirements to protect n96), it is not clear to us why such a note would be needed?  To Huawei:  n46 and n96 co-existence requirements are included in this CR, it is not clear to us which additional co-existence aspects are not addressed? |
| ZTE | Before core requirement for n96 is defined completely, n96 should be better to be removed. |
| Ericsson | To Nokia: It would not make sense to apply this co-existence requirement upon any BS that is deployed outside of USA region. Therefore a note is needed in 36.104 and also 38.104 (where the band is specified). The coexistence requirements for protection of n96 only applies in the region where this is deployed. |
|  | Nokia | To Ericsson: see comment in 38.104 CR |

# Reference

1. R4-2012726, “Email discussion summary for [96e][305] NR\_unlic\_RF\_BS” Moderator (Nokia)