**3GPP TSG-RAN WG4 Meeting # 94-e-Bis R4-2011845**

**Electronic Meeting, 20 – 30 Apr., 2020**

**Agenda item:** 5.2 and 6.5.2

**Source:** Skyworks Solution Inc.

**Title:** Email discussion summary for [96e][105] LTE UE RF maintenance

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: 5 topics to be discussed for agenda:
* 5.2: LTE UE RFmaintenance up to R15
  + Topic 1.1: NB-IoT: FCC issue in 100kHz at band edge
  + Topic 1.2: NB-IoT: power control for TDD
  + Topic 2.1: H2 exception for B51 protection from B85
* 5.5.2: LTE UE RF maintenance up to R16
  + Topic 3.1: Corrections to Bands and CA:
  + Topic 4.1: CA\_48B A-MPR
  + Topic 5.1: DeltaT SRS for LTE
* 2nd round: TBA

# Topic #1: 5.2 NB-IoT

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2011336**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011336.zip)  Further considerations on NB-IoT to meet FCC regulatory requirements | Qualcomm Incorporated | Observation 1: **For FCC specification #27.53(c), the emission of -13dBm/30kHz is verifying at the band edge of Band 13 which spans from 777-787MHz.**  Observation 2: **Even with 100kHz exclusion, the devices which are based on 3GPP SEM could not meet the FCC requirements of -13dBm/30kHz at immediate 100kHz outside the channel edge.**  Proposal 1: **To meet FCC # 27.53 part (c) and part (g) requirements, 200kHz exclusion is needed for Band 13, 12, 17, 71 and 85.**  Proposal 2: **The exclusion of first and last 100kHz for Band 4, 66, 2, 25, and 5 is needed to meet FCC # 27.53 part (h), # 24.238, and # 22.917 band-edge requirement.**  Observation 3: **Multiple NS could solve the backward compatibility issue if NS\_04 is introduced to meet FCC regulation.**  Propose 3: **Modify the NS\_04 to exclude the first and last 200kHz for Band 13, 12, 17, 71, 85 and exclude the first and last 100kHz for Band 4, 66, 2, 25, 5 .** |
| [**R4-2010581**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010581.zip)  NBIOT standalone operation for FCC regulation considerations | MediaTek Inc. | Proposal 1: ***Proposal 1: We propose to modify NS\_04 for category NB1 and NB2 device for operating bands 2, 3, 4, 5, 12, 17, 25, 26, 66, 71, 85. The lower limit and upper limit of operating bands are 100KHz narrower from both lower and upper band edge defined in Table 5.5-1 to account for the FCC regulations.***  Proposal 2: ***We propose to introduce the new network signalling from Rel-14.***  Moderator: ***see associated CR below*** |
| [**R4-2011400**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011400.zip)  Test frequencies for NB-IOT UE in standalone operation | Sony | Observation 1: TS 36.104 test conditions (test frequencies) for both stand-alone and guard-band NB-IoT operation are conflicting with FCC band-edge spectrum emission requirements.  Observation 2: There is also an inconsistency between TS 36.508 and TS 36.104 regarding testing of NB-IOT UE in standalone operation.  Proposal 1: RAN4 to confirm there is inconsistency between TS 36.508 and FCC regulation and between TS 36.104 and TS 36.508.  Proposal 2: If so, send an LS to RAN5 with proposal to exclude the first and last EARFCNs in TS 36.104 test frequencies for both stand-alone and guard-band IoT operation modes for all frequency bands were FCC regulation applies. |
| [**R4-2010582**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010582.zip)  CR for TS 36.101: CR for category NB1 against FCC regulation in standalone mode | MediaTek Inc. | R14 CR: Comment in CR table: R15/16 Mirror CRs R4-2010583, R4-2010584 |
| [**R4-2010937**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010937.zip)  Update to NB-IOT aggregate power control tolerance for TDD | Huawei, HiSilicon | R15 CR Comment in CR table: R16 Mirror CR R4-2010963 |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

*Sub-topic description:* New FCC requirement in 100kHz of the US bands edges cannot be fulfilled by NB-IoT. Qualcomm paper is propsing a 200kHz exclusion in some bands

*Open issues and candidate options before e-meeting:* Introduce CR to enable NS\_04 to reduce bands by proper amount

**Issue 1-1: FCC rule in 100kHz**

* Proposals
  + Option 1: [**R4-2010581**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010581.zip)Modify NS\_04 for category NB1 and NB2 device for operating bands 2, 3, 4, 5, 12, 17, 25, 26, 66, 71, 85. The lower limit and upper limit of operating bands are 100KHz narrower from both lower and upper band
  + Option 2: [**R4-2011336**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011336.zip)Modify the NS\_04 to exclude the first and last 200kHz for Band 13, 12, 17, 71, 85 and exclude the first and last 100kHz for Band 4, 66, 2, 25, 5.
  + Option 3: [**R4-2011400**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011400.zip)Send an LS to RAN5 with proposal to exclude the first and last EARFCNs in TS 36.104 test frequencies for both stand-alone and guard-band IoT operation modes for all frequency bands were FCC regulation applies.
* Recommended WF
  + Proponents to align on need for CR or simple modification of test frequencies
  + Align on the list of bands
  + Agree if 200kHz exclusion is needed in some bands?
  + Align in MediaTek CR or send LS to RAN5

### Sub-topic 1-2

*Sub-topic description :*NB-IoT aggregate power control tolerance for TDD

*Open issues and candidate options before e-meeting:* introduce CR R4-2010937 to increase evaluation time to account for TDD operation

**Issue 1-2: Power control for TDD**

* Recommended WF
  + Introduce CR, CR to be commented in CR section

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Sub topic 1-1:  We understand a solution shoud be found to enable NB-IoT UE certification. As explained in previous meeting, specifying NS\_04 to address this issue looks very weird (if acceptable by FCC). If it’s not possible to add this restriction in the license agreement (in between FCC and operators then), we are still wondering if it won’t be better to clearly exclude the 100 kHz on band edge from the definition of those bands for NB-IoT SA. Note that this would require TS 36.104, TS 38.104 and TS 36.101 updates.  Option 2 is not acceptable, there is no evidence 200 kHz shall be excluded, that was not even requested in previous contributions.  Options 3 is based on wrong observations:  - As we explained in previous meeting, NB-IoT operation in guard band is not an issue as there won’t be any such NB-IoT carrier deployed at 100 kHz from band edge, this is specified via Table 6.6.2F.1-2 in TS 36.101.  - The 200 kHz frequency offset defined in TS 36.104) is used to specify where requirements (e.g. ACLR, OBUE, …) specification starts, and doesn’t specify any offset to band edge.  Sub topic 1-2:  We agree this CR is needed but we are wondering the rationale for the 81ms and 177ms values, how those values was calculated? |
| CHTTL | Sub topic 1-1:  In the last meeting, people are ok not to include the band 3 here, since band 3 is not a US band, is there any update on this? Cuz I saw band 3 is listed in Option 1. |
| MediaTek | Sub topic 1-1:  To CHTTL, sorry that I missed removing band 3. CRs will be corrected accordingly if they are agreed. The CRs may be further updated according to discussion outcome.  For option 2 observation, if we look at TS36.101 Table 6.6.2F.1-1, the emission mask of cat NB1/NB2 device is -8dBm/30KHz with ΔfOOB(starting from the ±edge of the assigned category NB1 or NB2 channel bandwidth) =150KHz which is obviously fail FCC regulation. Thus the proposal seems reasonable. |
| DISH | Sub-topic 1-1:  Option 2 is not acceptable at all.  We are ready to work on finding the best approach to address the 100kHz exclusion, but like said 200kHz is not ok. |
| Qualcomm | Sub topic 1-1:  For FCC # 27.53 part (c) and part (g), the SEM is -13dBm/30kHz at immediate 100kHz outside the channel edge. While in Table 6.6.2F.1-1 of TS36.101, the 3GPP SEM is -5dBm atΔfOOB of ± 100 kHz. That means even 100kHz offset is applied, NB-IoT devices which have been designing based on 3GPP SEM will not pass the FCC requirements.  Table 6.6.2F.1-1: category NB1 and NB2 UE spectrum emission mask   |  |  |  | | --- | --- | --- | | ΔfOOB (kHz) | Emission limit (dBm) | Measurement bandwidth | | ± 0 | 26 | 30 kHz | | ± 100 | -5 | 30 kHz | | ± 150 | -8 | 30 kHz | | ± 300 | -29 | 30 kHz | | ± 500-1700 | -35 | 30 kHz |   To align the SEM between FCC and 3GPP, 200kHz offset is needed for the bands which are related with 27.53 part (c) and part (g). For other bands, 100kHz is enough.  We prefer to use NS solution. Adding a note in the spec to indicate the restrictions of 100kHz/200kHz offset will not solve the FCC certification issues.  Sub topic 1-2:  The explanations on how to derive the values of 81ms and 177ms are needed. |
| Huawei | Sub-topic 1-1:  Option 1: Not sure if Multi-NS can really solve the backward compatibility issue. If a UE is allowed to fall back to NS\_01, it means NS\_04 is unnecessary. And from the spec point of view, it’s not clear if NS\_04 would be mandatory to be broadcasted when operating in the related bands. Overall, we do not object to exclude band edge frequencies for NB-IoT operations, but the proposed solution has some unanswered questions.  Option 2: Same comments on Multi-NS. Additionally, it’s not clear why 200 kHz offset might be needed. For example, in Fig 1 why would the out-of-band measurement filter overlap frequencies within the band?  Option 3: Agree with Ericsson. The said inconsistency is untrue.  Sub-topic 1-2:  The time duration values are calculated based on UL/DL configuration 1, NPDCCH period of 4 ms and scheduling delay of 8 ms. More details can be found in the spreadsheet shared in the draft folder   |  |  | | --- | --- | | icon | [NB-IoT\_TDD\_Aggregated\_Power\_Control\_by\_Huawei.xlsx](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Inbox/Drafts/%5B105%5D%20LTE_Maintenance/NB-IoT_TDD_Aggregated_Power_Control_by_Huawei.xlsx) |   . |
| Sony | Sub topic 1-1:  We think option 3 proposing 200kHz carrier offset (1 EARFCN exclusion) in BS spec TS 36.104 for both stand-alone and guard-band NB IoT modes is the simplest solution. This should be reflected also for the applicable test frequencies in TS 36.508 where we think a correction is needed. Correcting TS 36.508 doesn’t preclude the other options.  The network signalling solution for all FCC regulated bands (like modified NS\_04 Option 1 or Option 2) is also acceptable for us. However, corresponding update of test frequencies in TS 36.508 will also be required. (Currently there is no such exclusion on band edges for stand-alone and guard-band operation)  We agree also with QCOMM proposal (option 2). The 200kHz exclusion in Option 2 would provide alignment between 3GPP spectrum emission mask and FCC band edge requirements. Thus, the 3GPP compliance would guarantee compliance with FCC band-edge spectrum emission regulation providing formal matching between 3GPP spectrum emission mask requirements and FCC band-edge spectrum emission requirements. |
| T-Mobile USA | Sub topic 1-1: We think that more work is needed on this issue. For instance, we would like to get clarification from the FCC if the emission requirement of -13 dBm/30 kHz or -13 dBm/1% applies at the edge of the 3GPP band or the edge of the “FCC band.” As can be seen in this FCC document, the FCC acknowledges that the edge of the “FCC band” is not the same as the edge of the 3GPP band: <https://transition.fcc.gov/oet/ea/presentations/files/nov19/24-EMC-Measurement-Updates-DT.pdf>  Since 3GPP already built in a 1 MHz guardband at the lower edge of Band 12, that should be more than adequate to meet the emissions requirements at the low edge of the FCC band/operator’s license at 698 MHz. If we exclude 100 kHz or (hopefully not) 200 kHz at the bottom edge of 3GPP Band 12 for NB-IoT, then will the labs start testing emissions at 699.1 or 699.2 MHz? Where does it end?  As for the three options, we agree with DISH that Option 2 is completely unacceptable. While we understand Qualcomm’s point that based on the NB-IoT SEM 200 kHz offset would be required to meet -13 dBm/30 kHz, we think that the current NB-IoT SEM is extremely loose and we do not think that 200 kHz exclusion would be necessary. Simulations from Qualcomm and measurements from MediaTek have shown that -13 dBm/30 kHz can easily be met at 100 kHz. If there is concern about current designs not being able to meet -13 dBm/30 kHz at 100 kHz we think that NS signalling could be used to indicate a requirement of -13 dBm/30 kHz at 100 kHz from the NB-IoT channel edge.  As we know from other bands, the FCC labs do testing with NS signalling turned off. So if the NS signalling one of the proposed NS signalling approaches that has been proposed to exclude the band edge is chosen, a UE would need to look at the country code to determine that it is operating in the USA, then not transmit if the NB-IoT carrier is too close to the edge of the band. So once these NB-IoT devices are deployed, they will never be able to operate in the USA in the excluded spectrum, even if rules or testing procedures change so that operation at the edge of the band would be legal. And since NB-IoT devices have potentially extremely long operating lives, it would be best to make sure the solution is both necessary and adequate before proceeding.  We also think that clarification from the FCC is needed on whether the first measurement “bin” lies outside of the “band” or straddling the edge of the band. The FCC wording in 27.53 says “However, in the 100 kilohertz bands **immediately outside and adjacent to** a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.” But Figure 1 of R4-2011336 shows the 30 kHz measurement overlapping the Nb-IoT channel by 15 kHz. While that may be how labs are testing, we don’t think that is aligned with he wording in the regulations.  We are more aligned with Option 3, but we think that it needs to be clarified if this offset applies at the edge of the 3GPP bands or the “FCC bands.” As we said above, we think that the offset is not necessary at the lower edge of Band 12 because the lower edge of 3GPP Band 12 is at 699 MHz, but the lower edge of FCC Band 12 and the US A block license is at 698 MHz, so there is 1 MHz guard band built in. We think that 38.104 would need to be modified to indicate that the 200 kHz Foffset that applies for standalone operation also applies for Guardband operation. Also, as we said, we think that the NB-IoT SEM would need to be modified so that the requirement is -13 dBm at 100 kHz. Based on simulations from Qualcomm in R4-2007564 and measurements from MediaTek in R4-2003987 -13 dBm/30 kHz 100 kHz from the edge of the NB-IoT channel should be easily achievable.  For these reasons, we think that this issue needs further study and work with the FCC to find an acceptable solution. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2010582**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010582.zip)  R14 CR | CHTTL: same comment as in 1.3.1. |
| DISH: Needs work on second round based on company’s views |
| Qualcomm: Need to check if 200kHz is needed for some bands to align the SEM between 3GPP and FCC regulation.  T-Mobile USA: We do not agree with this CR. We think that NS signalling is an ugly solution. These NS values would never be transmitted because it would be like building a road and then putting up “Do Not Enter” signs everywhere. Also, we need FCC for clarification if the edge of the FCC band or the edge of the 3GPP band is where the emission requirements apply. |
| [**R4-2010937**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010937.zip)  R15 CR | Qualcomm: The explanations on how to derive the values of 81ms and 177ms are needed. |
| Huawei: Regarding the time calculation, please see my comments in 1.3.1. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

**Issue 1-1: FCC rule in 100kHz**

First Band 3 needs to be removed from the list of candidate bands: CRs must be revised for this

On the use of NS04 (or any NS): There are doubts from some companies that this will be able to solve the issue because test labs may not signal NS anyhow. So it may be useful to find other means to exclude 100 kHz from the band

There is no agreement that 200 kHz exclusion is needed depending on whether the measurement BW overlaps with the band or not. Based on NB-IoT SEM up to -5dBm/30kHz is allowed at 100kHz but this is for a 30kHz filter centered at 100kHz offset that would partially overlap the band.

There is consensus to find a solution to solve the 100kHz exclusion.

**Issue 1-2: Power control for TDD**

There is agreement that issue needs to be solved

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1-1** | *Tentative agreements:*  It is agreed that Band 3 is not part of this issue and needs to be removed from the list: Will ask chairman to add this in his notes  *Candidate options:*   * Solve issue for 100kHz offset and discuss the most appropriate solution in round2 * Further Discuss/study the need for up to 200 kHz offset and if no agreement postpone to next meeting.   *Recommendations for 2nd round:*   * Discuss the most appropriate solution for 100 kHz exclusion that solves the certification issue * Align understanding on 200 kHz issue or not. If needed a WF will can be assigned |
| **Sub-topic#1-2** | *Tentative agreements:* There is consensus that CR is needed but values should be justified  *Candidate options:* Values from CR [R4-2010937](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010937.zip) and justification from  [NB-IoT\_TDD\_Aggregated\_Power\_Control\_by\_Huawei.xlsx](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Inbox/Drafts/%5B105%5D%20LTE_Maintenance/NB-IoT_TDD_Aggregated_Power_Control_by_Huawei.xlsx)  *Recommendations for 2nd round:* Above values are verified by other companies and if no other values can be justified agreed CR (or revise CR is other values are justified and agreed) |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2010582**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010582.zip)  R14 CR | Needs revision in any case to remove Band 3. Beyond that it does not seem agreeable as is but may be revised to capture agreements on how to capture 100kHz exclusion |
| [**R4-2010937**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010937.zip)  R15 CR | Depending on agreement on time calculations the CR is agreed or revised |

## Discussion on 2nd round (if applicable)

### Sub-topic 1-1-1

*Sub-topic description:* Discuss the most appropriate solution for 100 kHz exclusion that solves the certification issue

### Sub-topic 1-1-2

*Sub-topic description:* justification of need to exclude 200 kHz or not

### Sub-topic 1-2

*Sub-topic description:* confirmation or correction of time duration values from Huawei proposal in order to agree or Revise CR

### Open issues for 2nd round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Sub topic 1-1-1: As proposed by T-Mobile, it’s better to first contact FCC (via a LS?) and work on a better solution to address this issue. Then, based on their feedback, if still needed, we could revisit the different options.  Sub topic 1-1-2: As said in 1st round, we agree with Dish and T-Mobile, this is not acceptable, based on the measurements shared in previous meetings.  Sub topic 1-1-3: Thanks for the rationale, we are fine with that CR and the proposed values. |
| Qualcomm | Sub topic 1-1-1: We agree with clarifications from FCC are needed but not sure if the LS is a feasible method. Did RAN4 send a LS to FCC and got the feedback? We need to get the FCC clarifications ASAP. From our point of view, at least we need to consider the following aspect:   * The emission requirement of -13 dBm/30 kHz or -13 dBm/1% in FCC applies at the edge of the 3GPP band or the edge of the “FCC band.”   By now, we don’t see other solution rather than NS solution which can solve the FCC certification issues.  Sub topic 1-1-2: As we explained in the first around, 200MHz offset is to align with the 3GPP SEM requirements. Based on the simulation/measurement results in previous meeting, we can see 100kHz offset is enough for the bands affected by # 27.53 part (c) and part (g) # 27.53 part (h), # 24.238, and # 22.917. But we could not guarantee 100kHz is enough for all the NB-IoT bands if 3GPP SEM is to be revisited. We could accept to have 100kHz exclusion for the affected bands with the condition that we should not change the legacy 3GPP SEM requirements since all the NB-IoT devices have been designed based on current 3GPP SEM.  Sub topic 1-2: Thanks for providing the details. The CR looks good to us. |
| Sony | Sub-topic 1-1   1. we agree with T-Mobile proposal, that clarification from FCC is needed for some bands but in other cases the FCC requirements are clear and (as agreed in the 1st round) can’t be met without at least 100kHz exclusion at the band edges in stand-alone and guard-band NB-IoT modes:    1. for  B13, the 3GPP band edges (777-787MHz) are 1MHz offset from the ”FCC band 776-788” although the FCC Labs are usually forcing to test the spectrum emission at the edges of 3GPP band (as also pointed by Qualcomm in R4-2011336) -  we support LS to FCC for clarifying test frequencies for this 3GPP band    2. for B12, the low edge of 3GPP band (699-716MHz) is 1MHz offset from the edge of ”FCC band 698-716MHz” that also may need FCC clarification, but the upper edge of B12 and B17 (716MHz) coincides with upper edge of ”FCC band 698-716” - need at least 100kHz exclusion at this band edge to meet FCC limit    3. for B71, the upper edge of 3GPP band (663-698MHz) coincides with lower edge of ”FCC band 698-716MHz” that also requires at least 100kHz exclusion at this band edge to meet FCC limit    4. for B85 – both lower and upper edges of B85 (698-716MHz) coincides with ”FCC band 698-716MHz” – need at least 100kHz exclusion at both band edges to meet FCC limit    5. for other bands where FCC rule of -13dBm/1% of ”emission BW” is set (as per 27.53(h), 24.238, 22.917), the FCC limit clearly applies in the 1MHz bands ” immediately outside and adjacent to the licensee’s frequency block”.   The ”emission bandwidth” here  is defined at -26dBc power level that may exceed 2kHz significantly, especially in case of 12SC transmission. Although this RBW requirement is easier than 30kHz BW in a)-d) above, it also requires 100kHz offset (exclusion) from the band edges to meet the required -13dBm /1% level. 2. regarding the RBW position in band-edge measurements – we agree, this point may be also clarified with FCC but according to FCC test reports we see the RBW/2=15kHz offset is commonly applied for -13dBm/30kHz certification.    1. we agree with T-Mobile that this approach is consistent with FCC wording in 27.53 saying “However, in the 100 kilohertz bands **immediately outside and adjacent to** a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.” This is  a significant relaxing factor comparing to Qualcomm’s assumption in R4-2011336 showing 30 kHz RBW is overlapping the NB-IoT channel by 15 kHz.    2. the 15kHz offset is also aligned with 3GPP approach using such offset in Spectrum Emission Mask measurements at channel edges according to TS 36.521-1 6.6.2.1F.5 (see Note 2 in Table 6.6.2.1F.5-1 : “At the boundary of spectrum emission limit, the first and last measurement position with a 30 kHz filter is the inside of +15 kHz and -15 kHz, respectively” 3. regarding the way the NB-IoT exclusion at the relevant band edges (defined after clarification with FCC) to be implemented   we still think the option 3 proposing such exclusion to be defined in both TS 36.104 and TS 36.508 is the straightforward solution  in this case it should be explicitly defined in 36.104 as exclusion for NB IoT stand-alone and guard-band BS operation rather than the current **Foffset** spec in Table 5.6-3A that refers to “NB-IoT standalone operation” only and can be interpreted as performance relaxation only (like in the 1st round Ericsson comments)  the option 3 proposal doesn’t preclude also NS or other solutions that can prevent the FCC violation by excluding NB-IoT operation at the band edges of FCC regulated bands.  in any case, the test frequencies for stand-alone and guard-band NB-IoT modes in TS 36.521-1 should be corrected accordingly |
| T-Mobile USA | Sub-topic 1-1-1: We think that Sony did an excellent job summarizing the situation above. We think that it is necessary to get feedback from the FCC to ensure that the changes that RAN4 makes are both necessary and sufficient.  Sub-topic 1-1-2: Based on the result presented previously by Qualcomm and Mediatek we think that a 100 kHz offset should be sufficient. Since legacy devices have already been certified obviously any changes can’t be applied to those UEs. |
| MediaTek | Sub-topic 1-1  we agree with majority view that FCC clarifications are necessary especially “The emission requirement of -13 dBm/30 kHz or -13 dBm/1% in FCC applies at the edge of the 3GPP band or the edge of the “FCC band.””  In response with Sony’s 2nd round comments in 1) b) for B12, d) for B85, referring to FCC 27.53 (g) it says “the 698-746 MHz band”. If FCC adopts “FCC band” rather than “3GPP band”, then the upper band edge of B12/17/85 would not need the 100KHz exclusion.  We do not object option 3, but our concern is the option 3 does not affect UE test condition for FCC conformance thus does not solve the regulation failure issue.  In response to Huawei’s question on backward compatibility, for legacy devices that had been certified, no change would be needed to those UEs. The legacy UE don't need to recognize the modified NS while the network will not allocate UEs to the band edges that may fail FCC regulations. For new devices, we do not see issue if UE applies “modified NS” with behavior explained in R4-2010581.  Though option 1 is our preference, but I agree we need the FCC clarifications first. |
| T-Mobile | To Mediatek: While we would prefer if for Band 12 that the upper edge did not require a 100 kHz exclusion, we think it would. 698-746 is the entire US lower 700 MHz band. When considering the UE Tx requirements, the FCC apparently considers the “FCC Band 12” uplink of 698-716. Please see slide 5 of this pdf from the FCC: <https://transition.fcc.gov/oet/ea/presentations/files/nov19/24-EMC-Measurement-Updates-DT.pdf> |
| Dish | Topic 1-1-2: Repeating what we said during first round, 100kHz is the max excludision that would be considered. |
| Huawei | From the discussions so far our observation is that there’re two problems to be solved: 1) 3GPP recommendation on meeting the ASE requirements by FCC; 2) FCC certification. For the 1st problem, the consensus seems to be excluding certain band edge frequencies from deployment. As long as the networks don’t use such frequencies, there’s no risk of violating the regulations regardless if the UE recognises the updated NS\_04 signal or not. However, this may not be sufficient to solve the 2nd problem. As pointed out by T-Mobile, the FCC tests don’t use NS signalling. Hence revising NS\_04 signal specification alone may not be enough. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

### Sub-topic 1-1-1

There is a clear consensus that the issue is serious and needs to be solved but there is uncertainty as to the correct way to fix the issue. At which point interested companies agreed that unless we have a clear view of FCC requirement and position on some of 3GPP questions the proposed solution may not fix the problem.

An LS to FCC to ask clarifying questions about the exclusion position and suitability of NS was requested by T-Mobile USA: R4-2011911 LS on NB-IoT certification testing. There was agreement amongst interested companies on the content but uploaded with editorial issues. A revision: R4-2011913 will need to be uploaded and is agreeable but due to late disclosure to the group we are waiting chairman guidance on whether it can be approved in this meeting or by email

### Sub-topic 1-1-2

There is also a clear position that a 100kHz exclusion is needed but there is no consent that 200kHz exclusion might be needed as claimed by some company. The questions that needs FCC confirmation of 3GPP understanding are based on the understanding that only 100kHz exclusion is needed.

### Sub-topic 1-2

No correction of time duration values from Huawei is needed CR agreeable as is.

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| [**R4-2010582**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010582.zip)  R14 CR | Not agreeable  No agreement on 200kHz exclusion and about NS being the right fix  The CR to fix the issue will have to wait input from FCC answer to LS  Still has band 3 => **Can chairman add in its notes that there is agreement that band 3 has no relation with the FCC issue.** |
| [**R4-2010937**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010937.zip)  R15 CR | Agreeable  There is no further comment about the time calculations. **R16 Mirror CR R4-2010963 needs uploading** and is agreeable |
| R4-2011913  LS on NB-IoT certification testing | Revision of R4-2011911 due to editorial issues. There is consensus in this thread that this is agreeable.  Waiting guidance from chair if approved or needs email approval due to late availability. May also be treated in GTW |

# Topic #2: 5.2 Band 85 spurious emmisions

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2009546**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009546.zip)  Correction to band 85 spurious emission limits UE co-existence | Sequans Communications | R15 CR Comment in CR table: R16 Mirror CR R4-2009547 |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:* Request of an exception to band protection for harmonic 2 of band 85 in band 51

*Open issues and candidate options before e-meeting:*

**Issue 2-1: H2 exception for band 51 protection by band 85**

* Recommended WF
  + Discuss validity of exception in the CR comment

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  ….  Others: |
| Sony | We support the Proposal in R4-2009546 |
| T-Mobile USA | We agree with the need to note the harmonic exception. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2009546**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009546.zip)  R15 CR | T-Mobile USA: We agree with the CR. |
| Mediatek: Agree with the CR. The uplink 2nd harmonic exception need to be considered. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

No opposing comment to the CR and supported by two companies

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2009546**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009546.zip)  R15 CR | Agreeable, with R16 mirror CR R4-2009547 |

# Topic #3: 6.5.2 Corrections to Bands and CA

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2009938**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009938.zip)  Coexistence cleanup for 36101 Rel16 | Apple Inc. | Removes some band protections in CA\_4\_28  Moderator: R16 CR, Comment in CR table |
| [**R4-2011521**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011521.zip)  CR to 36.101 Removal band 10 protection | Skyworks Solutions Inc. | E-UTRA Band 10 protection: removed from E-UTRA bands 2,4,5,7,13,14,24,25,26,27,30,38,41,42,43,66,70,85  Moderator: R16 CR, Comment in CR table |
| [**R4-2010702**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010702.zip)  CR to 36.101 to correct band combinations in Rel-16 | Ericsson | This CR correct the following band combinations:CA\_20A-41A, CA\_20A-41C, CA\_20A-41D  Moderator: R16 CR, Comment in CR table |
| [**R4-2011525**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011525.zip)  CR to 36.101 Removal of CA\_NS\_08 | Skyworks Solutions Inc. | CA\_NS\_08 is no longer needed as B42 networks are synchronized Moderator: R16 CR, Comment in CR table |
| [**R4-2011526**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011526.zip)  CR to 36.101 Correction to CA\_NS\_10 | Skyworks Solutions Inc. | CA\_NS\_10: A-MPR for some region border RB allocations is undefined  Moderator: R16 CR, Comment in CR table |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1

*Sub-topic description:* Corrections of band protections

### Sub-topic 3-2

*Sub-topic description;* Corrections of CA\_20-41 cases

### Sub-topic 3-2

*Sub-topic description;* Corrections of NS\_08 and NS\_10

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1:  Sub topic 3-2:  Sub topic 3-3: |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2009938**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009938.zip)  R16 CR | Skyworks. Thanks for bringing the clean-up CR.  It seems further simplification could be achieved in this CR by removing e-utra band 28 from the first row as suggested below (see yellow highlight).    Justification: Band 28 Rx band is protection is already guaranteed by the last two rows in frequency ranges 758-773 (-32dBm/MHz), and 773-803 (-50 dBm/MHz). So B28 protection level of -50dBm/MHz in first row can be removed. We believe this is a copy and paste inheritance from the band 4 protection list.  See below:  Band 4 protection list:    Band 28 protection list: |
| Apple: Sounds fine for us. Changes will be provided in a revision. |
|  |
| [**R4-2010702**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010702.zip)  R16 CR | Company A |
| Company B |
|  |
| [**R4-2011521**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011521.zip)  R16 CR | Huawei: Question for clarification: please explain why band 10 protection becomes unnecessary. |
| Skyworks: To Huawei, the rationale is that as far as we are aware, we believe band 10 has never been deployed. |
| To Huawei: also, Band 10 is a subset of Band 66, so Band 10 protection is redundant. In fact, Band 4 is also a subset of Band 4 so is redundant in combinations that protect both Band 4 and Band 66. |
| **[R4-2011525](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011525.zip)**  R16 CR | Nokia: What about single carrier A-MPR and NS-signaling for bands 42 and 43, Anyway we are ok with this as there are no un-synchronized networks as far we know. |
| Huawei: Question for clarification: please explain why the ASE requirement becomes unnecessary. The cover sheet says it’s because B42 networks are synchronized. If so, what about NS\_22 and NS\_23 for non-CA? |
| Skyworks: To Huawei. Good point. The motivation is that as far as we are aware, there are no un-synchronized networks, that’s why we propose this CR. For your question about NS\_22, and NS\_23, you are making a good point. We received similar offline comments and we intend to file a CR for NS\_22 and NS\_23 at next meeting unless we are allowed to make that change in a revision of this CR at this meeting. |
|  |
| [**R4-2011526**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011526.zip)  R16 CR | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

Please find below the recommended WF in the CR/TP section

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2009938**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2009938.zip) | To be revised to remove B28 from CA\_4-28 protected band list as the B28 frequency range has already specified protection levels. |
| [**R4-2010702**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010702.zip) | Agreeable as there is no comment |
| [**R4-2011521**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011521.zip) | Huawei to confirm if Skyworks’ answer is acceptable. If so CR is agreable |
| [**R4-2011525**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011525.zip) | Comments from companies’ question why some other NS are not removed since the same reasoning applies. After further consolidation of all NS that can be removed due to B42 synchronous operation, the CR is revised to include those |
| [**R4-2011526**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011526.zip) | Agreeable as there is no comment |

## Discussion on 2nd round (if applicable)

### Sub-topic 3-1

*Sub-topic description:* consolidation of all NS that can be removed due to B42 synchronous operation to revise [**R4-2011525**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011525.zip)

### Open issues for 2nd round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | A revision has been provided for R4-2009938 on the server. If no further issues are stated, we ask to agree on CR and provide a new tdoc number. |
| Skyworks | Removal of NS\_22 and NS\_23 has been proposed in a revision of R4-2011525 , in filename “DraftR4-2011778 rev of R4-2011515 CR to Rel 16 38.101-3 - Correction cross band isolation MSD tables and DC\_42\_n79” for review. Based on reflector’s comments from Huawei, we suggest to revert back to our original CR proposal that was targeting the removal of CA\_NS\_08 only. We invite interested companies to make further checks for removal of NS\_22 / NS\_23 and come back to this topic at the next meeting. |
| Huawei | Regarding R4-2011521, with the clarification we’re fine with the CR.  Regarding R4-2011525, we think CA\_NS\_08 and NS\_22/23 are defined for similar purposes. Why not consider them together? As commented in the email reflector, NS\_XX messages are in general defined as per regional regulations. Before removing some of them, should RAN4 seek confirmation from the regulators first? For example, B42 is deployed in Europe. Should we send a LS to CEPT first before removing the ASE requirements? |
| Skyworks | To Apple: Thank you for the revision, we are fine with this CR.  To Huawei: Agree to handle NS\_22 and NS\_23 at next meeting.  To make progress on un-necessary CA\_NS\_08, we would like to return to the original CR R4-2011525 and ask chairman to not pursue revised CR R4-2011698.  Is R4-2011525 agreeable? |
| Huawei | Regarding R4-2011525, I don’t understand the rationale why it’s OK to remove CA\_NS\_08 but not NS\_22/23. As it’s related to regional regulations, we’d like to double check with our colleagues in ECC/ETSI. If it’s not urgent, can we decide this CR in the next meeting? |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| **R4-2011697** | Revision of R4-2011697. Rd1 comments are addressed. Agreeable |
| [**R4-2011521**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011521.zip) | Agreeable |
| [**R4-2011525**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011525.zip) | Postponed Comments from companies that B42 synchronous/asynchronous operation should be checked in Europe |

# Topic #4: 6.5.2 CA\_48B A-MPR

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2010227**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010227.zip)  A-MPR definition for CA\_48B | Nokia | E-UTRA UL CA configuration CA\_48B is already specified in clause 5 but A-MPR is missing. This CR is based on simulation results presented in R4-2006493.  Moderator: Comment in CR table |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 4-1

*Sub-topic description:*A-MPR for CA\_48B is proposed

*Open issues and candidate options before e-meeting:*

**Issue 4-1: CA\_48B A-MPR**

* Recommended WF
  + Moderator note: Similar discussion is happening for CA\_n48B with input from more companies, which for DFT-s-OFDM 15kHz cases is comparable with CA\_48B with only some RB allocation differences.
  + WF: Align outcome with CA\_n48B if possible

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Sub topic 4-1:  We prefer to re-use NS\_27 A-MPR. The discussion for NR CA\_n48 is ongoing. Suggest to aligning A-MPR between LTE and NR.  Others: |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2010227**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010227.zip)  R16 CR | Skyworks: We suggest aligning A-MPR definitions between NR DFT-s-OFDM NR and LTE for CA\_48B. This is discussed in thread [113]. |
| Qualcomm: We prefer to re-use NS\_27 A-MPR. The discussion for NR CA\_n48 is ongoing. Suggest to aligning A-MPR between LTE and NR. |
| Nokia: We are ok with moderator proposal, we do not think it is easy to use single carrier A-MPR for UL CA. We have done the simms, why not use the results. |
| Huawei: Share similar views with Skyworks and Qualcomm. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

This topic is linked to same discussion in NR in #113 and it is suggested to adopt the same solution and values than what is proposed for NR DFT-s-OFDM NS27 for n48B. For NR there is consensus that non-contiguous outer allocations A-MPR is higher than what is proposed here. CR [**R4-2010227**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010227.zip)is revised to capture these agreements.

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2010227**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010227.zip) | CR is revised to capture agreements based on n48B discussion in #113 |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| **[R4-2010227](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2010227.zip)** | Skyworks: We are fine to use Nokia’s proposal with just adding an offset needed to account for low VCC data from Skyworks and results from Qualcomm. The high A-MPR plateau needs to reach 20dB for the case IMD3 falls in the -40dBm/MHz, 13dB for the case IMD5 falls in the -40dBm/MHz. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

Content of CR has been aligned between interested companies based on the work done on NR for the same UL CA case. Content is agreeable but CR needs revision due to editorial issues

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2011699 | Rev of R4-2010227A-MPR definition for CA\_48B. To be revised (request done) due to editorial issues. The revision is agreeable |

# Topic #5: 6.5.2 DeltaT SRS for LTE

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2011527**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011527.zip)  DeltaTRxSRS for LTE Pcmax | Skyworks Solutions Inc. | Proposal 1**: Introduce** **ΔTRxSRS term in LTE Pcmax equation for operation in bands whose FUL\_high is lower than 4.4 GHz.**  Proposal 2: **For LTE operation in bands whose FUL\_high is lower than 4.4GHz, adopt ΔTRxSRS = [3dB].** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 5-1

*Sub-topic description:* SRS switching is a feature in LTE and DeltaT SRS is missing

*Open issues and candidate options before e-meeting:*

**Issue 5-1: DeltaTRxSRS in LTE**

* Proposals
  + Option 1: Introduce ΔTRxSRS term in LTE Pcmax equation for operation in bands whose FUL\_high is lower than 4.4 GHz. ΔTRxSRS = [3dB]
  + Option 2: TBA
* Recommended WF
  + Discuss need and value in Round 1
  + If introduction is agreed in round1 a CR can be allocated.

### Sub-topic 5-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 5-2: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Sub topic 5-1:  Clarification questions: Does the DeltaTRxSRS only for LTE TDD bands? What’s release will be impacted?  Sub topic 5-2:  ….  Others: |
| Huawei | Sub-topic 5-1:  Which release would this CR target for? Note that the LTE specs are already very stable, the impact to existing networks should be minimized. Additionally, LTE SRS-TxSwitching is a bit different from NR, e.g. LTE supports 2T4R-3pairs. Further study may be needed. |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2011527**](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011527.zip)  R15 CR | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

There is more discussion needed to introduce DeltaTRxSRS for LTE. Discussion can continue in round 2 to allow WF for next meeting. There is no formal objection to the introduction but mare questions needs to be addressed by proponent.

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

### Sub-topic 5-1

*Sub-topic description:* SRS switching is a feature in LTE and DeltaT SRS is missing

*Open issues for second round:*

**Issue 5-1:** which release will be impacted?

**Issue 5-2:** introduced only for LTE TDD bands?

**Issue 5-3:** applicability of NR requirement to LTE specifics.

### Open issues for second round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | To Qualcomm: the intention was to mirror in LTE what was agreed in NR as much as possible. TDD bands would be priority considering SRS-AS usage.  To Huawei: Thank you for pointing out the differences. Since this is a discussion paper, would you consider bringing further proposals at next meeting to further refine the introduction of DeltaTrxSRS in 36.101?  To moderator: We suggest interested companies to come back at next meeting to address Issues 5-1, 5-2, 5-3. |
| Huawei | LTE is a legacy system. Back-porting a NR agreement to LTE could be problematic. For any proponent the impact to the existing LTE networks should be thoroughly investigated. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

More discussion is needed in future meetings to assess system impact but without DeltaTRxSRS for LTE, UE implementation of the feature may be problematic. [R4-2011527](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_96_e/Docs/R4-2011527.zip) is noted.

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |