**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-210XXXX**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 9.3

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98-bis-e][142] FS\_NR\_600MHz\_ext

**Document for:** Information

# Introduction

This email discussion is divided into three topics

1. Reply LS from APT/AWG-27
2. Coexistence with other services, AI 9.3.3
3. Frequency arrangement, AI 9.3.4

It may be useful to recall the SID objectives:

“Specifically, this study item includes the following objectives:

* Regulatory study of the frequency range around 600MHz in Region 3
* Co-existence study for the frequency range of 612-652/663-703 MHz such as with DTV (if needed)
* Study potential frequency arrangements and conclude the possible implications (such as insertion loss, transmitter and receiver characteristics for both BS and UE, system limitations such as channel bandwidths, etc.) of different duplex filter implementations.
* Consider options B1 and B2 from AWG LS, but other options are not precluded.
* Answer the request from AWG regarding the technical feasibility of option B1 and B2, respectively. Further options are not precluded and may be included in LS to AWG.

NOTE: Since regulatory study of frequency range around 600MHz is for Region 3, the SI outcome will not impact any requirements defined for US 600MHz band.”

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

* 1st round: a short-list of filter configurations for B1 and B2 (or other arrangement) for further study
* 2nd round: consensus on coexistence requirements (other services and 3GPP) to be considered for the band arrangement, and what to cover in the SID conclusions (see objectives above).
* Possibly a joint TP to the technical report with agreed text (all topics).
* Reply LS to APT if needed (otherwise in September 2021 as per the SID)

# Topic #1: Reply LS from APT/AWG-27

*A letter of Mr. Masanori Kondo, Secretary General, Asia-Pacific Telecommunity (APT) regarding ‘Reply Liaison Statement to 3GPP RAN, 3GPP RAN4 by the 27th Meeting of the APT Wireless Group (AWG-27)’ for appropriate action. The LS is for information and comment.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2105105](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2105105.zip) | APT/AWG-27 | Title: FREQUENCY ARRANGEMENTS FOR IMT IN THE BAND 470 – 703 MHz  The main part of the LS copied below for convenience:  “AWG would like to make the following comments and considerations specifically to the RAN4 on their current direction.   1. **Options B1 and B2**    1. AWG primary priority is to determine the technical feasibility of options B1 and B2, as requested in our liaison statement to 3GPP and to understand the best options for implementation into terminal devices and network equipment, considering the substantial technical development ongoing. AWG kindly asks 3GPP to consider B1 from a technical implementation perspective. For option B2 the question from AWG is whether this is at all feasible to implement in a single duplexer that would then contain the 3GPP band 71/n71, OR if a second duplexer is needed, what is the best size of the second duplexer to ensure efficient performance aspects in the implementation in particular in the terminal devices. AWG will later consider the regulatory aspects such as licensing when the response from 3GPP is conveyed.    2. AWG request that the 3GPP prioritize to complete the technical feasibility analysis of option B1 and B2 before studying other options in detail. If option B2 can be implemented using a single duplexer this should be considered a variant of B2 but with a different filter implementation. This variant should also be considered before considering other options. 2. **Economies of scale of Band n71**    1. Option B2 has two overlapping duplexers (or one duplexer if that is possible). One of these implementation options is similar to that of Band n71. This can be considered as a starting point to evaluate option B2 possible to create a large ecosystem for both Region 3 and Region 2. However, other filter arrangements such as the variation of option B2 as described in point 1b above, and are independent from Band N71, may also be considered. 3. **Two bands: Band 71 + Band nX**    1. The two-band approach is not the current priority of AWG. If there are severe difficulties with the option B1 or B2 as suggested by AWG that is found by the 3GPP study, it is of interest to consider this onwards, but AWG requests feedbacks on the technical feasibility of B1 and B2 first.    2. Base stations and handsets will have to support both bands, and ENDC band combinations available for Band n71, may not be available for bands allowed in region 3. 4. **Requirements to support Band n71.**    1. In doing the feasibility studies for options B1 and B2. The constraints to meet the requirements of n71 must include flexibility to cater for differences in regulatory requirements in markets in R1, R2 and R3.It would be desirable if some economies of scale in duplexer design can be taken advantage of.” |

## 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 Reply LS from APT/AWG-27

*Sub-topic description: the APT/AWG-27 LS for’ information and comments’. One issue is listed below: whether to reply at this meeting or later (the items of the LS covered by the topics below).*

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

**Issue 1-1-1: Reply LS to APT/AWG**

* Proposals
  + Option 1: Reply at this meeting
  + Option 2: Reply after RAN4#100-e (August) according to the SID
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by m*

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| **Company** | **Comments** |
| Nokia | Sub topic 1-1-1: Option 2. It is not necessary to start drafting reply LS this meeting, as the next AWG is September. We can compile the technical information and decisions in RAN4 August meeting. |
| Spark | At this stage there is no need to send a LS to AWG as they are not meeting until September. It is expected that in the RAN 4 meetings later this year more information will be available on the feasibility of options B1 and B2 and we should present this to AWG with the advantages and advantages of each. We could indicate a preference for an option if both are feasible but leave the decision to AWG. |

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

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

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

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| **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 (if applicable)

# Topic #2: Coexistence with other services

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2104717](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104717.zip) | Nokia, Nokia Shanghai Bell, CBN | Title: Coexistence for APT 600 MHz  ***Observation 1: Option B1 and B2 can coexist with the broadcast service below 610 and 605 MHz, respectively, assuming the minimum guard-band of 7 MHz.***  ***Observation 2: Option B2 may require vacating one more TV channel depending on TV channel raster.***  ***Proposal 1: No specific BS spurious emission requirement to protect the broadcast service is considered in this study item.***  ***Observation 3: The coexistence requirement with radio astronomy are out of scope of 3GPP.***  ***Proposal 2: No specific BS spurious emission requirement to protect the radio astronomy service is considered in this study item.***  ***Proposal 3: UE coexistence with band 28 shall be based on the protection level of -50 dBm/MHz.***  ***Proposal 4: For the protection of own downlink band, NS and A-MPR solution is further discussed.*** |
| [R4-2104931](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104931.zip) | ZTE Corporation | Title: Coexistence study for extended 600 MHz NR frequency band  **Observation 1: For option B1, only the DTV service below 605MHz can coexist with extended 600MHz. For option B2, the DTV service below 610MHz can coexist with extended 600MHz. This difference may cause Option B1 and Option B2 to encounter different coexistence restrictions. For option B1, this restriction may cause the DTV system to concede an additional channel.**  **Observation 2: For option B2, DTV system with various channel rasters(6/8MHz) will not exceed the coexistence boundary of 610MHz.** |
| [R4-2105094](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2105094.zip) | Xiaomi | Title: Further discussion on frequency arrangement for extended 600MHz NR Band  **Proposal 1: Still insist on a high priority of Option B1.**  **Proposal 2: An asymmetric band could be considered as well, i.e., UL: 663MHz-703MHz, DL: 617MHz-652MHz.** |
| [R4-2107348](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107348.zip) | Qualcomm Incorporated | Title: Filtering for extended 600 MHz band  Conclusions [excerpt]:  […]. A single filter is highly preferred over a dual filter solution, if feasible. The key aspect explored in this contribution is whether the single filter supporting the extended 600 MHz frequency range could still be used by the UE to meet Band 71/n71 requirements. […] |

## Open issues summary

### Sub-topic 2-1 BS coexistence with RAS

*Sub-topic description: BS coexistence with RAS, considerations of methods other than geographical separation*

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

**Issue 2-1-1: Frequency separation between the Extended 600 MHz band and RAS (BS)**

* Proposals
  + Option 1: Consider frequency separation to RAS as discussed in R4-2106891. State why.
  + Option 2: Do not consider frequency separation to RAS as discussed in R4-2105094. State why not.
* Recommended WF
  + TBA

**Issue 2-1-2: Spurious emissions limit for protection of RAS (BS)**

* Proposals
  + Option 1: No limit as proposed in R4-2104717. State why.
  + Option 2: Specify a limit (3GPP only).
  + Option 3: No limit, but consider methods for BS coexistence with RAS
  + Option 4: Reuse recommendations based on FCC (TR 36.755)
* Recommended WF
  + TBA

### Sub-topic 2-2 Coexistence with Broadcast Services

*Sub-topic description: coexistence with Broadcast services, both BS and UE*

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

**Issue 2-2-1: Frequency separation to Broadcast (DTV) for BS**

* Proposals
  + Option 1: Consider/reuse the FCC frequency separation (7 MHz) for protection of Broadcast as discussed in R4-2104717 and R4-2104931
  + Option 2: Other separation or method for coexistence (state what)
* Recommended WF
  + TBA

**Issue 2-2-2: BS spurious emissions limit for protection of Broadcast**

* Proposals
  + Option 1: No limit as proposed in R4-2104717. State why.
  + Option 2: Specify a limit (3GPP only).
* Recommended WF
  + TBA

**Issue 2-2-3: Blocking requirement for UE for protection against Broadcast (DTV)**

* Proposals
  + Option 1: needed for interferers below 608 MHz (or other interferer range, state which)
  + Option 2: needed for protection from US CH36 (602-608 MHz) for operations in Band n71, if applicable, reuse n71 blocking requirement
  + Option 3: the n71 blocking requirement for CH36 protection not feasible for B1/B2 or other, state for which frequency arrangement
  + Option 4: not needed as discussed in R4-2107348
  + Option 45: other
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by m*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Skyworks | **Issue 2-2-3:** As explained in our contribution R4-2104817, the option B1 has serious issues in allowing enough attenuation of the TV channel 36. The same issue is also visible from simulations in R4-2107348. Potential UE receiver blocking needs further analysis before B1 can be claimed to be reusable for n71. For B2 however if split duplexer is used then n71 performance stays untouched. For Aisa, the nearest TV channel should be known to decide if the same blocking issue may arise. This is not only a matter of requirement on 3GPP side and it is unclear if it is suggested that n71 blocking requirements should change. |
| Nokia | **Issue 2-1-1: Frequency separation between the Extended 600 MHz band and RAS (BS)**  Neither option. Coexistence with RAS is up to each administration; no detail is available to RAN4. It may be treated as regional specific requirement later if some inputs are available from administrations.  **Issue 2-1-2: Spurious emissions limit for protection of RAS (BS)**  Option 1: Coexistence with RAS is up to each administration; no detail is available to RAN4. It may be treated as regional specific requirement later if some inputs are available from administrations. The protection mechanism may not be based on BS spurious emission limit like in the FCC case.  **Issue 2-2-1: Frequency separation to Broadcast (DTV) for BS**  Option 1: Reusing the same assumption as band 71 is proposed.  **Issue 2-2-2: BS spurious emissions limit for protection of Broadcast**  Option 1: Reusing the same assumption as band 71 is proposed.  **Issue 2-2-3: Blocking requirement for UE for protection against Broadcast (DTV)**  Option 5: For B2, we are fine with Option 2, i.e., the same in-band and out-of blocking requirement as band 71 is applied for the lower side of duplex. For B1, the Option 1 would be required, i.e., the in-band/out-of-band blocking frequency is shifted downward by 5 MHz, so that the same guard band size is assumed. CH36 would need to be vacated in B1 option. Coexistence with CH36 is not possible for B1. |
| Spark | **Issue 2-1-1: Frequency separation between the Extended 600 MHz band and RAS (BS)**  **There are two foot notes 5.305 and 5.307 in the radio regulations about RAS in China and India respectively. These footnotes can only be removed by a WRC and by people authorised to speak on behalf of their respective Administrations. Therefore, it is best to leave this issue to the individual Administration.**  **Issue 2-1-2: Spurious emissions limit for protection of RAS (BS)**  **This issue should also be left to individual Administration.** |

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

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

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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 (if applicable)

# Topic #3: Frequency arrangement for Extended 600 MHz NR band

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2104495](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104495.zip) | Spark NZ Ltd | Title: Option B2 for Extended 600MHz NR band  This contribution presents two variants of options B2 that could be further studied and are presented to RAN 4 for further study. |
| [R4-2104718](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104718.zip) | Nokia, Nokia Shanghai Bell | Title: Frequency arrangements for APT 600 MHz  ***Observation 1: The ecosystem of band n71 should be maximally reused for APT.***  ***Observation 2: The passband bandwidth extension is not practically feasible without significant degradation from band n71 due to its larger insertion loss.***  ***Observation 3: Option B2 is more harmonized with band n71 in terms of UE implementation and duplexer performance.***  ***Observation 4: Option B2 is a natural extension of n71 and is not harmful to n71 ecosystem.***  ***Proposal 1: Option B1 shall be discouraged for APT/AWG to proceed.***  ***Observation 5: The upper duplexer passband bandwidth can be up to UE implementation as far as UE can support any channel bandwidth in any carrier frequency within the band and can meet the same requirement as band n71 for the entire frequency range.***  ***Proposal 2: UE RF requirement such as MOP and REFSENS shall be the same as n71.***  ***Proposal 3: For the protection of own downlink band, NS and A-MPR solution is further studied.***  ***Observation 5: Single duplexer implementation is not excluded as far as the requirement baseline based on dual duplexer assumption is fulfilled.***  ***Proposal 4: Other duplexer implementation than B2 is not precluded but the frequency arrangement and RF requirement baseline should be based on Option B2.*** |
| [R4-2104817](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104817.zip) | Skyworks Solutions Inc. | Title: Discussion on Extended 600MHz Band Implementation Options  **Proposal:**   * **To enable n71 eco-system reuse together with guaranteed n71 performance a split duplexer approach is selected** * **Degradation of the DL upper 5MHz band protection and blocking performance needs to be accommodated.** * **Both B2 (two 2x35MHz duplexer) and B2- with 2x35MHz + 2x25MHz solutions are accommodated with additional BW constraint in the upper duplexer.** |
| [R4-2104891](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104891.zip) | Apple | Title: TP on band plan for 600 MHz  Proposal 1: It is proposed to approve the text proposal provided in this contribution. |
| [R4-2105094](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2105094.zip) | Xiaomi | Title: Further discussion on frequency arrangement for extended 600MHz NR Band  **Proposal 1: Still insist on a high priority of Option B1.**  **Proposal 2: An asymmetric band could be considered as well, i.e., UL: 663MHz-703MHz, DL: 617MHz-652MHz.** |
| [R4-2106593](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106593.zip) | ZTE Corporation | Title: Discussions on Option B1 and B2 for extended 600MHz  **Observation 1: there should be no issues between extended 600MHz and n28;**  **Observation 2: both Option B1 and B2 should be feasible from BS perspective;**  **Observation 3: it might be not easy to support 30MHz with single duplexer from UE perspective;**  **Observation 4: to reuse asymmetric UL 20MHz/DL 35MHz bandwidth configuration in n71 UE side for extended 600MHz;** |
| [R4-2106891](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106891.zip) | Ericsson | Title: APT 600 MHz band – frequency arrangements  **Proposal1: Consider frequency arrangement option B2 for the new 600MHz band.**  **Proposal 2: the bandwidth support and performance requirements should be based on a 2 x 30 MHz split duplexer with due allowance to facilitate implementation of a single 40 MHz filter.** |
| [R4-2107301](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107301.zip) | Huawei, HiSilicon | Title: Feasibility analysis of 600MHz duplexer  ***Observation 1: From the evaluation, it is observed that full band duplexer with 11MHz gap in B1 and dual-duplexer in B2 are both implementation feasible, while full band duplexer with 6MHz gap is not feasible for the current filter implementation.***  ***Observation 2: For Option B1, a full band duplexer could have identical performance as existing B71/n71 duplexer while it may have worse Rx blocking issue as the Rx frequency range is closer to DTV CH36.***  ***Observation 3: Option B2 needs to pay more attention to the co-existence issue for the duplexer design. The existing B71/n71 duplexer cannot be reused.***  ***Proposal 1: It is proposed to focus on the band plan option B1 based on the duplexer feasibility analysis.*** |
| [R4-2107348](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107348.zip) | Qualcomm Incorporated | Title: Filtering for extended 600 MHz band  Conclusions [excerpt]:  […]. A single filter is highly preferred over a dual filter solution, if feasible. The key aspect explored in this contribution is whether the single filter supporting the extended 600 MHz frequency range could still be used by the UE to meet Band 71/n71 requirements. […] |
|  |  |  |

## Open issues summary

### Sub-topic 3-1 Filter configuration and requirements for B1

*Sub-topic description: filter configuration for B1 (SI conclusions) and associated requirements*

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

**Issue 3-1-1: Filter configuration for B1**

* Proposals
  + Option 1: Single 2 x 40 MHz duplexer
  + Option 2: Split duplexer, at least one of the duplexers with 35 MHz passband
  + Option 3: Split duplexer, other passband sizes
* Recommended WF
  + TBA

**Issue 3-1-2: Band coexistence requirements for B1 (with other 3GPP bands)**

* Proposals
  + Option 1: reuse the (3GPP) band coexistence requirements applicable for B71/n71
  + Option 2: other
* Recommended WF
  + TBA

**Issue 3-1-3: Protection of own DL**

* Proposals
  + Option 1: use the standard requirement (-50 dBm/MHz) and implied blocking requirement (‘standard’ TX rejection at RX)
  + Option 2: use NS signalling and A-MPR for protection of own DL
  + Option 3: other
* Recommended WF
  + TBA

**Issue 3-1-4: MOP and REFSENS**

* Proposals
  + Option 1: same as B71/n71
  + Option 2: other
* Recommended WF
  + TBA

### Sub-topic 2-2 Filter configuration and requirements for B2

*Sub-topic description: filter configuration for B2 (for SI conclusions) and associated requirements*

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

**Issue 3-2-1: Filter configuration for B2**

* Proposals
  + Option 1: Consider single 2 x 40 MHz duplexer (any feasible technology if applicable)
  + Option 2: Split duplexer, at least one of the duplexers with 35 MHz passband
  + Option 3: Split duplexer, other passband sizes
* Recommended WF
  + TBA

**Issue 3-2-2: Band coexistence requirements for B2 (with other 3GPP bands)**

* Proposals
  + Option 1: reuse the (3GPP) band coexistence requirements applicable for B71/n71
  + Option 2: other
* Recommended WF
  + TBA

**Issue 3-2-3: Protection of own DL**

* Proposals
  + Option 1: use the standard requirement (-50 dBm/MHz) and implied blocking requirement (‘standard’ TX rejection at RX)
  + Option 2: use NS signalling and A-MPR for protection of own DL
  + Option 3: other
* Recommended WF
  + TBA

**Issue 3-2-4: MOP and REFSENS**

* Proposals
  + Option 1: same as B71/n71
  + Option 2: other
* Recommended WF
  + TBA

### Sub-topic 3-3 Other band arrangements

*Sub-topic description: one proposal is to use band 71/n71 for covering the frequency range 663-698MHz for UL and 617-652MHz for DL in the APT region and specify a new band covering at least the additional 2x 5MHz spectrum proposed in the SI.*

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

**Issue 3-3-1: Option B2a**

* Proposals
  + Option 1: Consider arrangement B2a as proposed in R4-2104891
  + Option 2: Only B1 and B2
  + Option 3: other
* Recommended WF
  + TBA

### Sub-topic 3-4 Maximum channel bandwidth

*Sub-topic description: the filter configuration assumed for the minimum requirements will determine the maximum channel bandwidth supported.*

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

**Issue 3-4-1: Maximum channel bandwidth supported (any frequency arrangement)**

* Proposals
  + Option 1: 40 MHz
  + Option 2: 35 MHz
  + Option 3: 30 MHz
  + Option 4: 20 MHz
  + Option 5: other
* Recommended WF
  + TBA

**Issue 3-4-2: Asymmetric channel bandwidth**

* Proposals
  + Option 1: Support asymmetric bandwidth as discussed in R4-2106593
  + Option 2: No, only symmetric channel bandwidths
* Recommended WF
  + TBA

### Sub-topic 3-5 Leverage Band 71/n71 for the Extended 600 MHz band?

*Sub-topic description: use B71/n71 to leverage the Extended 600 MHz? Either from an implementation perspective and/or for network operations.*

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

**Issue 3-5-1:**

* Proposals
  + Option 1: use B71/n71, state how
  + Option 2: do not use B71/n71 as leverage, state why not
* Recommended WF
  + TBA

### Sub-topic 3-6 Band arrangement(s) for SI conclusion

*Sub-topic description: what to capture in the SID conclusion?*

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

**Issue 3-6-1: frequency arrangement(s) for the SI conclusion**

* Proposals
  + Option 1: include B1, B2 and any other arrangement studied as stated in the SID objective
  + Option 2: conclusion with preferred frequency arrangement
* Recommended WF
  + TBA

### Sub-topic 3-7 Preferred band arrangement

*Sub-topic description: can consensus on one frequency arrangement be achieved during the study phase? (Note that this is not listed as a SID objective.) Find a poll below.*

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

**Issue 3-7-1: Preferred frequency arrangement**

* Proposals
  + Option 1: B1
  + Option 2: B2
  + Option 3: other
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |

**Example 2**

Sub topic 3-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | Issue 3-1-1: In our view if B1 is studied it should be for full duplexer only as split duplexer approach can't reuse the band n71 filter as is. With current analysis our preference is B2 anyhow.  Issue 3-1-2: In the case of full duplexer B1, band 71/n71 coexistence requirement should applyIssue 3-1-3: for B1 -50dBm/MHz can be targeted as the duplex gap is 11MHz as for n71, it is not possible to relax band 71 own DL protectionIssue 3-1-4: Use Same MOP than b71/n71 is fine but same REFSENS cannot be concluded depending on other requirements that may affect the filter IL and desense from UL. Note that n71 is up to 20MHz channel BW so far.  Others: |
| Nokia | **Issue 3-1-1: Filter configuration for B1**  Option 1.  **Issue 3-1-2: Band coexistence requirements for B1 (with other 3GPP bands)**  Option 2: The coexisting 3GPP bands are based on the bands used in APT region. (i.e., US 700 MHz bands are not needed).  **Issue 3-1-3: Protection of own DL**  Option 1 is ok if it is feasible. Otherwise, we propose option 2.  **Issue 3-1-4: MOP and REFSENS**  Option 1 |
| Spark | **Issue 3-1-1: Filter configuration for B1**  **We are obliged to study the technical feasibility of option B1 and B2. Therefore, to suggest below as is the case in a submission to this meeting is premature:**  *Reusing band 71/n71 as is without adding the 5 MHz below and above seems to be the only alternative to a single duplexer solution*  This seems like a proposal to suggest band n71 instead of studying option B1. We don’t support adding this text before a quantitative study of B1 is completed  **Also we cannot “ insist” on B1 without analysing both options B1 and B2 respectively.** |

Sub topic 3-2

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| **Company** | **Comments** |
| Skyworks | Issue 3-2-1: Option 1 is not feasible without severe performance issues with a 6MHz duplex gap. Option 2 with split duplexer with one duplexer being n71 duplexer  Issue 3-2-2: option 1 band coexistence requirements for n71 (for the n71 frequncy range as there is overlap with n85) then n28 coexistence for Asia  Issue 3-2-3: -50dBm/MHz is used for n71 frequency range but the upper 5MHz of B2 DL need relaxation, this can use NS signaling for this part,  Issue 3-2-4: MOP and REFSENS can be reused for the n71 frequency range, the upper 5MHz may depend on upper duplexer BW choice for REFSENS but MOP should be the same |
| Nokia | **Issue 3-2-1: Filter configuration for B2**  We support Option 2. However, Option 1 is also fine as far as band 71/n71 requirements can be fulfilled with a single 2x40 MHz duplexer.  **Issue 3-2-2: Band coexistence requirements for B2 (with other 3GPP bands)**  Option 1 is ok if it is feasible. Otherwise, we propose option 2.  **Issue 3-2-3: Protection of own DL**  Option 1 is ok if it is feasible. Otherwise, we propose option 2.  **Issue 3-2-4: MOP and REFSENS**  Option 1. |
| Spark | **Issue 3-2-1: Filter configuration for B2**  **We are obliged to study the technical feasibility of option B1 and B2. Therefore, to suggest below as is the case in a submission to this meeting is premature:**  “*We propose to re use band 71/n71 to cover most of the frequency range and specify a new band using the additional spectrum available in APT countries”*  This is akin to band 71 plus band nX that is not an option preferred by APT. The intention of this study item is to study options B1 and B2. We don’t support adding this text before a quantitative study of B2 is completed |

Sub topic 3-3

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| **Company** | **Comments** |
| Skyworks | Issue 3-3-1: B2a arrangement should be considered with potentially further discussion on the BW in realation with the split duplexer approach.. |
| Nokia | **Issue 3-3-1: Option B2a**  Option 2, as recommended by APT/AWG LS. |

Sub topic 3-4

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| **Company** | **Comments** |
| Skyworks | Issue 3-4-1: with split duplexer 40MHz cannot be supported, in any case like already agreed for n71 the UL BW should be limited to 20MHz to avoid significant de-sense. As of today we suggest 35MHz DL and 20MHZ UL in the band n71 frequency range and further discussion needed for other ranges.  Issue 3-4-2: As discussed above asymmetric BW support is needed with UL limited to 20MHz. |
| Nokia | **Issue 3-4-1: Maximum channel bandwidth supported (any frequency arrangement**  Option 5: First we would need to agree the filter configuration. The maximum channel bandwidth is equal to or smaller than the filter passband bandwidth.  **Issue 3-4-2: Asymmetric channel bandwidth**  Option 2: It is premature to discuss this issue. We expect UE supports band 71 so asymmetric bandwidth would be supported, but it is up to market demand if such asymmetric configuration is included in the new band. |

Sub topic 3-5

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| **Company** | **Comments** |
| Skyworks | Issue 3-5-1: in any case band n71 should be leveraged for the UE at least for the corresponding frequency range to be able to claim the economy of scale. |
| Nokia | **Issue 3-5-1:**  Option 1. |

Sub topic 3-6

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| **Company** | **Comments** |
| Nokia | **Issue 3-6-1: frequency arrangement(s) for the SI conclusion**  Option 2: One harmonized band should be pursued in 3GPP. |

Sub topic 3-7

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| **Company** | **Comments** |
| Nokia | **Issue 3-7-1: Preferred frequency arrangement**  We prefer B2 as it is more harmonized with band 71 ecosystem. |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

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

### 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 (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2104495 | Option B2 for Extended 600MHz NR band | Spark NZ Ltd. |  |  |
| R4-2104717 | Coexistence for APT 600 MHz | Nokia, Nokia Shanghai Bell, CBN |  |  |
| R4-2104718 | Frequency arrangements for APT 600 MHz | Nokia, Nokia Shanghai Bell |  |  |
| R4-2104931 | Coexistence study for extended 600 MHz NR frequency band | ZTE Corporation |  |  |
| R4-2104817 | Discussion on Extended 600MHz Band Implementation Options | Skyworks Solutions Inc. |  |  |
| R4-2104891 | TP on band plan for 600 MHz | Apple |  |  |
| R4-2105094 | Further discussion on frequency arrangement for extended 600MHz NR Band | Xiaomi |  |  |
| R4-2105105 | [LS on] FREQUENCY ARRANGEMENTS FOR IMT IN THE BAND 470 – 703 MHZ | APT/AWG-27 | Noted |  |
| R4-2106593 | Discussions on Option B1 and B2 for extended 600MHz | ZTE Corporation |  |  |
| R4-2106891 | APT 600 MHz band – frequency arrangements | Ericsson |  |  |
| R4-2107301 | Feasibility analysis of 600MHz duplexer | Huawei, HiSilicon |  |  |
| R4-2107348 | Filtering for extended 600 MHz band | Qualcomm Incorporated |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents