**3GPP TSG RAN meeting #91e RP-21xxxx**

**Electronic Meeting, March 16-26, 2021**

## Status Report to TSG

**Agenda item:** 9.6.16

|  |  |
| --- | --- |
| **WI / SI Name** | Study on extended 600MHz NR band |
| included in this status report | Study Item: Yes | Core part:  | Performance part: | Testing part: |
| **Acronym** | FS\_NR\_600MHz\_ext |
| **Unique ID** | 900059 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-202924  |
| **Target Completion Date****(indicate if changed)** | Study Item: 09/2021 | Core part: | Performance part: | Testing part: |
| **Overall Completion level** | Study Item: 10 % | Core part:  | Performance Part: | Testing part: |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN 4 |
| **Rapporteur** | **Name** | Mansoor Shafi |
| **Company** | Spark NZ Ltd |
| **Email** | mansoor.shafi@spark.co.nz |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

## 2.1 RAN1

#### 2.1.1 Agreements

#### 2.1.2 Remaining Open issues

## 2.2 RAN2

#### 2.2.1 Agreements

#### 2.2.2 Remaining Open issues

## 2.3 RAN3

#### 2.3.1 Agreements

#### 2.3.2 Remaining Open issues

## 2.4 RAN4

#### 2.4.1 Agreements

RAN4#98-e (Online, 25th Jan 2020 – 5th Feb 2021)

The study item has been triggered during RAN4#98-e meeting. Contributions in [1-22] were discussed during RAN4#98-e meeting.

Summary of the email discussion for [98e][148] FS\_NR\_600MHz\_ext topic during the RAN4#98-e meeting was captured in [1].

Work plan for the RAN4 work on FS\_NR\_600MHz\_ext study item was approved in [4], as extracted below:

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Item | Tasks | Date of Completion/Meeting Number |
| 1 | Band Name | APT 600 Mhz band | RAN4 98 e Jan 2021 |
| 2 | Consider options B1 and B2 from AWG LS, but other options are not precluded and agree blank TR.  | Determine the feasibility of B1 and B2Explore other options- if B1 and B2 are not feasible.Agree optionsAgree TR contents  | RAN4 98 e Jan 2021 |
| 3 | Regulatory study of the frequency range around 600MHz in Region 3 | Explore what regulatory constraints are there in the 600 MHz band in Region 3- and reference relative footnotes in RR. For each option in (2):Leverage relevant n 71 studiesdefine the operating band and channel bandwidth look at full band and split duplexer architecturesadjacent 3GPP and non 3GPP bandsdocument any findings in draft TR | RAN4 98 e Jan 2021 |
| 4 | Interim report to TSG RAN | Prepare interim report to TSG RAN | RAN4 98 e Jan 2021 |
| 5 | Requirements of Co-existence  | For each option in item 2, explore the requirements of co-existence between 3GPP and non 3GPP services. Specifically:Leverage relevant n 71 requirementsBand 28 co existenceDTV co-existenceWireless Microphones in the center band gapRASEmission restrictions??Update Draft TR | RAN4 99e May 2021 |
| 6 | 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 | For each option:Duplex filter implementation challenges, filter roll off, duplexer switch loss if dual duplexer used, special considerations due to reduced center band gap. Compare the above with 3GPP band 28.UE Tx requirementsUE Rx requirementsOwn Rx interference from own TxRx blockingFilter characteristics for to/from DTV co existenceBS issuesOut of band emissionsSpurious emissionsCo existence with other BSsUpdate Draft TR | RAN4 99e May 2021 |
| 5 | Report back to TSG RAN. | Completion of TRSummarise findings to TSG | RAN 4, 100, Aug 2021 |

Skeleton for the Technical Report on “Technical feasibility of options in extended 600 MHz NR band” was agreed in [13], capturing the following outline:

[*4 Background*](#_Toc63243579)

[*4.1 Options for study: B1*](#_Toc63243580)

[*4.2 Options for study: B2*](#_Toc63243581)

[*4.3 Options for study: Other Bx (if required)*](#_Toc63243582)

[*5 Frequency band arrangements and regulatory background*](#_Toc63243583)

[*5.1 Operating band and channel bandwidth*](#_Toc63243584)

[*5.2 Adjacent 3GPP bands*](#_Toc63243585)

[*5.3 Nearby non-3GPP Services*](#_Toc63243586)

[*5.3.1 Introduction*](#_Toc63243587)

[*5.3.2 Coexistence between 600 MHz and TV Services*](#_Toc63243588)

[*5.3.3 Coexistence between 600 MHz Radio Astronomy Service (RAS)*](#_Toc63243589)

[*5.4 Duplex filter implementation issues*](#_Toc63243590)

[*6 List of band specific issues for APT600 MHz frequency band*](#_Toc63243591)

[*7 Study of NR specific issues*](#_Toc63243592)

[*7.1 UE aspect issues*](#_Toc63243593)

[*7.1.1 UE transmitter requirements*](#_Toc63243594)

[*7.1.2 UE receiver requirements*](#_Toc63243595)

[*7.2 BS aspect issues*](#_Toc63243596)

During the meeting, the work was organized in [1] into the following areas:

1. General (work plan and TR): discussed based on tdocs in [4, 13]

2. Regulatory aspects: discussed based on tdocs in [6-8]

3. Need for coexistence studies: discussed based on tdocs in [9-11]

4. Band plan and feasibility of implementation: discussed based on tdocs in [5, 12, 14-21]

5. Reply LS to AWG: discussed based on tdoc in [22]

The following TP was agreed for the Technical Report:

* R4-2103267 Regulatory aspects for the 600MHz range in APT region

The following Way Forward was agreed during the meeting:

* R4-2103266 Way forward on regulatory requirements for protection of other services identified for Region 3 and coexistence with Band 28/n28 [2]

WF in R4-2103268 (Way forward on bands plans for further study and duplex filter options [3]) was discussed during the meeting, but consensus was not achieved and it was Noted.

#### 2.4.2 Remaining Open issues

Based on study item objectives, the following open issues were identified:

* 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.

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

[1] R4-2103335 Email discussion summary for [98e][148] FS\_NR\_600MHz\_ext, Moderator (Ericsson)

[2] R4-2103266 Way forward on regulatory requirements for protection of other services identified for Region 3 and coexistence with Band 28/n28, ZTE

[3] R4-2103268 Way forward on bands plans for further study and duplex filter options, Nokia, Nokia Shanghai Bell

[4] R4-2103270 Work plan of study on extended 600MHz NR band, Spark NZ Ltd

[5] R4-2102589 Band Plan for 600MHz SI, Apple

[6] R4-2100744 Regulatory study for APT 600 MHz, Nokia, Nokia Shanghai Bell

[7] R4-2102162 Extended 600MHz band - Regulatory aspects, Ericsson

[8] R4-2103267 Regulatory aspects for the 600MHz range in APT region, Huawei

[9] R4-2100745 Coexistence for APT 600 MHz, Nokia, Nokia Shanghai Bell, CBN

[10] R4-2101957 Coexistence study for extended 600MHz NR band, ZTE Corporation, CBN

[11] R4-2102573 Initial considerations on the coexistence studies for 600MHz SI , Huawei

[12] R4-2100056 Frequency band arrangements and duplexer options for extended 600MHz NR band, Spark NZ Ltd

[13] R4-2103265 Blank TR for extended 600MHz NR band, Spark NZ Ltd

[14] R4-2100501 Consideration on extended 600MHz NR band, CATT, CBN

[15] R4-2100542 Extended 600MHz NR Duplexer Feasibility and Band Arrangement, Skyworks Solutions Inc.

[16] R4-2100746 Frequency arrangements for APT 600 MHz, Nokia, Nokia Shanghai Bell

[17] R4-2101372 Discussion on frequency arrangement for extended 600MHz NR Band, Xiaomi

[18] R4-2101958 Discussions on Option B1 and B2 for extended 600MHz, ZTE Corporation, CBN

[19] R4-2102161 Extended 600MHz band - frequency arrangement, Ericsson

[20] R4-2102407 600 MHz band for Region 3, Qualcomm Incorporated

[21] R4-2102574 Feasibility analysis of the frequency arrangement in 600MHz range for APT, Huawei, CBN

[22] R4-2103269 [DRAFT] Reply LS on technical feasibilities for frequency arrangements for IMT in 470 – 703 MHz band, Huawei, CBN

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template