**3GPP TSG RAN meeting #93e Revised RP-211931**

**Electronic Meeting, Sep. 13-17, 2021** (revision of RP-211599)

**Source: Ericsson**

**Title: Revised Basket WID on adding channel bandwidth support to existing NR bands**

**Document for: Approval**

**Agenda Item:**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: New basket WID on adding channel bandwidth support to existing NR bands.

## Acronym: NR\_BW\_Bands

## Unique identifier: *880092*

NOTE: For new WIs/SIs leave the Unique identifier empty and make a proposal for an Acronym.

 For a revised WI/SI: Take Unique identifier and acronym as shown in 3GPP workplan.

 If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI.

 Please tick (X) the applicable box(es) in the table below:

 Either:

|  |  |
| --- | --- |
| **This WID includes a Core part** | **X** |
| **This WID includes a Performance part** |  |

Potential target Release: Rel-17.

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  | X |  |  |  |
| **No** | X |  | X | X | X |
| **Don't know** |  |  |  |  |  |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a … *{Tick one box. "***Feature** */* **Building Block** */ Work Task" form a hierarchical structure. E.g. no Building Block can be proposed without a corresponding parent Feature. The full structure of all existing Work Items is shown in the 3GPP Work Plan in* *ftp://ftp.3gpp.org/Information/WORK\_PLAN* *}*

|  |  |
| --- | --- |
| X | Feature |
|  | Building Block |
|  | *Work Task* |
|  | Study Item |

NOTE: Normally, Core/Perf./Testing parts in RAN WIDs are Building Blocks. Only if they are under an SA or CT umbrella, we define them as work tasks. If you are in doubt, please contact MCC.

### 2.2 Parent Work Item

*{Not applicable for* **Feature** *nor for a* **Study Item***}*

*{For a* **Building Block***: list here the parent* **Feature** *}*

*{For a* Work Task*: list here the parent* **Building Block** *}*

|  |
| --- |
| Parent Work Items  |
| Unique ID | Title |
|  |  |

NOTE: RAN agreed some time ago, that it describes the feature WI + Core/Perf. part WI or Testing part WI in one WID. Therefore the table above should just include the feature WI Unique ID and title.

### 2.3 Other related Work Items and dependencies

*{List here other Work Items which relate to the proposed one, such as preceding SI or a preceding WI (e.g. if further enhancing a feature).}*

|  |
| --- |
| Other related Work Items (if any) |
| Unique ID | Title | Nature of relationship |
|  |  | *{optional free text}*  |
|  |  | *{optional free text}*  |

NOTE: Also related or dependent WIs/SIs in other TSGs should be indicated.

## 3 Justification

Many E-UTRA re-farmed bands were specified considering only specified E-UTRA channel bandwidth (5, 10, 15 and 20 MHz). But operators might have larger allocated spectrum and would expect deploying BS/UEs supporting the wider NR channel bandwidth for a more efficient use of their available spectrum. New requests still emerge for existing bands and whenever a new band is specified, it would create a potential for new requests.

The preconditions:

For a specified NR band, to propose list of channel bandwidth(s) and associated sub-carrier spacing to be supported. Clause 4.1 will be updated based on approved requests.

## 4 Objective

### 4.1 Objective of SI or Core part WI or Testing part WI

### 4.1.1 Objective and scope

* Specify channel bandwidth – sub-carrier spacing combinations to be supported for each considered band according to Table 4.1.3-1.
	+ The channel bandwidth should be one of the following list:
		- FR1: {5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 35 MHz, 40 MHz, 45 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz}.
		- FR2: {50 MHz, 100 MHz, 200 MHz, 400 MHz}
	+ The band should be a specified NR band, including SUL and SDL bands.
* Analyze and specify requirements:
	+ Reference sensitivity and associated RB allocation.
	+ When needed:
		- MPR (relative bandwidth criteria)
		- Additional Maximum Power Reduction (A-MPR)
		- NS signalling.
	+ Any other RF requirement which might be relevant.
* CA or EN/DC combinations updates are not in the scope of this WI.

### 4.1.2 Way of working

The new request adding support for channel bandwidth in existing NR band should be submitted on RAN4 reflector before tdoc submission deadline the next RAN4 meeting (1 week before the meeting).

The basket WI will then be updated with the new request (section 4.1.3, Table 4.1.3-1) and submitted to next RAN4 meeting for endorsement, before submission to RAN meeting for approval.

When the work is completed, all draft CRs related to one request will be submitted in the same RAN4 meeting to check consistency. If they are endorsed, the basket WI Rapporteur will merge all draft CRs from all requests in big CRs (one per TS specification) .

After the RAN4 meeting preceding a RAN meeting, those big CRs will be sent on RAN4 reflector for email approval (1 week) and, if agreed, they will be submitted to following RAN meeting for approval.

Following figure is summarizing the proposed way of working:



### 4.1.3 Requests overview

Table 4.1.3-1: Requests tracking

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Band** | **Channel bandwidth****and SCS** | **Contact name, company** | **Contact email** | **Other supporting companies** | **Justification** | **Additional information** | **status** |
|  |  |  |  | *Note: minimum 3* | *Note: Spectrum information and usage that would justify introducing support for the new channel bandwidth(s) in the considered band.* | *Note: any specific technical challenge should be triggered and highlighted here* |  |
| n41 | 70 MHz(30-60kHz SCS) | Nelson Ueng, T-Mobile USA | Neng-Tsann.Ueng@T-Mobile.com | Ericsson, Nokia, Deutsche Telekom  | The amount of spectrum owned by T-Mobile US varies throughout the US, with 70MHz contiguous in some places.  | n41 already supports 60 and 80MHz CBW, no major issue is expected. | Done |
| n48 | 70 MHz – DL only(30-60kHz SCS) | Nelson Ueng, T-Mobile USA | Neng-Tsann.Ueng@T-Mobile.com | Ericsson, Nokia, Deutsche Telekom, Federated Wireless | 70MHz has already been added to bands n77 and n78. It would make sense to add it also for n48. | As this channel BW was already added for n77 and n78, no major issue is expected. | Done |
| n83 | 30MHz(15-30kHz SCS) | Zhang, Meng, Huawei | zhangmeng62@huawei.com | HiSilicon, CMCC, Spreadtrum, CBN, Mediatek | Both 20MHz and 30MHz have been added for band n28, which has the same UL frequency with n83. | None is expected. | Done |
| n84 | 25MHz, 30MHz, 40MHz, 50MHz All SCS-s | Zhang, Meng, Huawei | zhangmeng62@huawei.com | HiSilicon, Spreadtrum, Mediatek, China Unicom | All listed bandwidths have been added for band n1, which has the same UL frequency with n84. | None is expected. | Done |
| n80 | 40 MHzAll SCS | Zhang, Meng, Huawei | zhangmeng62@huawei.com | CITC, CKH IOD UK, Etisalat, HiSilicon | 40MHz channel bandwidth has been added in Rel-16 for n3, which has the same UL frequency with n80. | No major issue is expected. | Done |
| n83 | 40 MHz for BS(15-30kHz SCS) | Zhang, Meng, Huawei | zhangmeng62@huawei.com | CBN, CITC, CKH IOD UK, Etisalat, HiSilicon | 40MHz BS channel bandwidth has been added in Rel-16 for n28, which has the same UL frequency with n80. | No major issue is expected. No requirement for UE 40MHz on band n83. | Done |
| n40 | 90 and 100 MHz for UE90 MHz for BS(30-60kHz SCS) | Dai, Xizeng, Huawei | daixizeng@huawei.com | CITC, CKH IOD UK, HiSilicon | 100MHz bandwidth is already supported by the BS on band n40. To fully utilize the bandwidth of n40, 90 and 100MHz UE channel bandwidth are proposed to be added as optional support. | No major issue is expected. Delta MPR is needed for 100MHz UE bandwidth. | Done |
| n48 | 30MHz (15-30-60kHz) | Antti Immonen, DISH Network | antti.immonen@dish.com | Verizon, Nokia, Altiostar, Ericsson, Charter Communications Inc. | Operators own 3 PAL licenses (30MHz) in many locations as a result in recent CBRS auction in the US. Currently 10/20/40MHz can all be supported using single CC. Adding 30MHz channel bandwidth would allow using up to 4 adjacent licenses without Intra-band CA | No major issues expected as both 20MHz and 40MHz are already supported for n48 and 30MHz is already supported for n77. A-MPR simulations for the UE emissions (NS\_27) are needed which should be straightforward yet require work | Done |
| n2 | 25MHz, 30MHz, 40MHz(All SCS) | Ron Borsato, AT&T | ronald.borsato@att.com | Nokia, Qualcomm, Intel, Ericsson, Verizon, Telefonica, Huawei, HiSilicon | This amount of spectrum is available to AT&T in key markets in the US. In order to fully utilize the bandwidth of n2, it is proposed to introduce 25MHz, 30MHz, and 40MHz UE/BS RF channel BWs for n2 into specification. Adding the additional channel bandwidths allow for flexibility to optimize channel allocation in particular markets without Intra-band CA given that the available bandwidth varies across markets. | No major issues expected as both 25MHz, 30MHz, and 40MHz are already supported for n25 (mostly equivalent band to n2) and n3. Should be able to re-use most of the NR Band n2 work. | Done |
| n5 | 25MHz(All SCS) | Ron Borsato, AT&T | ronald.borsato@att.com | Nokia, Qualcomm, Intel, Ericsson, Verizon | This amount of spectrum is available to AT&T in key markets in the US. In order to fully utilize the bandwidth of n5, it is proposed to introduce 25MHz UE/BS RF channel BW for n2 into specification. Adding the additional channel bandwidths allow for flexibility to optimize channel allocation in particular markets without Intra-band CA given that the available bandwidth varies across markets. | No major issues expected as even larger BWs are already requested for low bands such as n71 which likely share PA and n5 duplexer spacing should be sufficient with full channel allocation. Some straightforward  work required for DL and UL requirements.MSD shall be evaluated, limitation in the UL allocation might be considered | Done |
| n3 | 50 MHz(15-30-60kHz) |  Basaier Jialade, China Unicom;Bo Liu, China Telecom |  basejld@chinaunicom.cn; liubo1@chinatelecom.cn | Huawei, HiSilicon, ZTE, Sanechips, CATT, Nokia, Nokia Shanghai Bell | Band n3 might be deployed in China by co-construction and sharing business mode. To further improve the efficiency of Band n3 utilization, it is proposed to add 50MHz channel bandwidth for Band n3.  | None is expected. | Done |
| n71 | 25, 30 MHz(15-30 kHz) | Bill Shvodian, T-Mobile USA | bill.shvodian@t-mobile.com | Deutsche Telekom, Ericsson, Nokia, Skyworks Solutions | 35 MHz is being added to n71 in the 35 and 45 MHz WI. 25 and 30 MHz should also be added for use where operators have more than 20 but less than 35 MHz of n71  | 25 and 30 MHz are for downlink only | Started |
| n46 | 100MHz(30-60 kHz) | Gene Fong, Qualcomm | gfong@qti.qualcomm.com | Ericsson, Qualcomm, , Charter Communications Inc., Skyworks, HPE, Nokia, Cablelabs | 100MHz bandwidth is added to improve shared spectrum throughput and utillization | The same importance shall be given to ensuring co-existence with other technologies (e.g. WiFi) as for other channel bandwidths, taking into account the regulatory requirements that apply in different regions. | Started |
| n96 | 100MHz(30-60 kHz) | Gene Fong, Qualcomm | gfong@qti.qualcomm.com | Ericsson, Qualcomm, , Charter Communications Inc., Skyworks, HPE, Nokia, Cablelabs | 100MHz bandwidth is added to improve shared spectrum throughput and utillization | The same importance shall be given to ensuring co-existence with other technologies (e.g. WiFi) as for other channel bandwidths, taking into account the regulatory requirements that apply in different regions. | Started |
| n40 | 70 MHz(30-60kHz SCS) | Liu, Liehai, Huawei | liuliehai@huawei.com | CITC, CMCC, CATT, HiSilicon | 60 and 80 MHz bandwidths are already supported on band n40. To fully utilize the bandwidth of n40, 70MHz channel bandwidth are proposed to be added. | No major issue is expected.  | New |
| n97 | 70, 90 and 100 MHz for UE70 and 90 MHz for BS(30-60kHz SCS) | Liu, Liehai, Huawei | liuliehai@huawei.com | CITC, CMCC, CATT, HiSilicon | 90 and 100 MHz channel bandwidths have been added for n40, which has the same UL frequency with n97. In addition, 70 MHz channel bandwidth are also proposed to be added for n40. | No major issue is expected.  | New |
| n79 | 10, 20, 30 MHz (15-30-60 kHz), 70, 90 MHz (30-60 kHz) | Taekhoon Kim, Samsung | kuhn.kim@samsung.com | LGE, Intel, ETRI | This band is one of the important 5G bands in Korea which is announced for local 5G uses recently. In order to fully utilize the possible channel bandwidth of the national spectrum plan on n79, i.e., 10MHz block, it is proposed to introduce 10, 20, 30MHz, and 70, 90MHz which are not specified for n79 currently. | Channel raster design needs to be revisited due to the change of the minimum channel bandwidth upon the addition of the new channel bandwidths to n79.  | New |
| n41 | 25, 35, 45 MHz (15-30-60 kHz) | Bill Shvodian, T-Mobile USA | bill.shvodian@t-mobile.com | [Ericsson], [Nokia], [Deutsche Telekom] | The amount of spectrum owned by T-Mobile US varies throughout the US, with 35 or 45 MHz contiguous in some places. | None is expected | New |

### 4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

None.

### 4.3 RAN time budget request (not applicable to RAN5 WIs/SIs)

NOTE: For all new RAN related WIs/SIs which are not led by RAN WG5 the WI/SI rapporteur has to fill out the attached Excel table to request time budgets for corresponding RAN WG meetings.
The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI.
One time unit (TU) corresponds to ~ 2 hours in the meeting.
If no TU is needed, then leave the field empty otherwise enter a number >0 in the field.

 For revisions of already approved WI/SI descriptions: Please remove the Excel table from the WID/SID's zip file. The time budgets are already recorded. If you want to modify them, then this has to be done via the status report and not via a revised WID/SID.

 If this WID is covering Core and Performance part, then please fill out one line for each part in the attached Excel table.

**additional comments to the time budget request in the attached Excel table:**

## 5 Expected Output and Time scale

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Remarks |
|  |  |  |  |  |  |

*{Note 1: Only TSs may contain normative provisions. Study Items shall create or impact only TRs.
"Internal TR" is intended for 3GPP internal use only whereas "External TR" may be transposed by OPs.}*

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
By default a new specs can only be new for one of both parts.

|  |
| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| TS 38.101-1 | NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone | RAN #95 | Core part |
| TS 38.101-2 | NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone | RAN #95 | Core part |
| TS 38.104 | NR; BS Radio transmission and reception  | RAN #95 | Core part |

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

## 6 Work item Rapporteur(s)

Dominique Evereare, Ericsson, dominique.everaere@ericsson.com

## 7 Work item leadership

R4

## 8 Aspects that involve other WGs

*{Specify all the other WG(s) to be involved and, if specific, their task. E.g.: "SA2, SA3, SA5. CT6 for storage, and potentially SA4". If not applicable, indicate "None" or "None identified yet".}*

NOTE: For RAN WIs: Section 8 applies only toWGs outside of TSG RAN because RAN WG aspects have to be covered in section 4.

## 9 Supporting Individual Members

*{At least 4 supporting Individual Members are needed. There is an expectation that these companies will provide resources to progress the work. Note that having 4 supporting companies is a necessary but not sufficient condition: the usual TSG approval process by consensus is needed for the WID approval.}*

|  |
| --- |
| Supporting IM name |
| Ericsson |
| AT&T |
| Verizon |
| T-Mobile USA |
| Telstra |
| CITC |
| Etisalat |
| BT |
| Huawei |
|  |