**3GPP TSG RAN Meeting #90e RP-202832**

**Electronic Meeting, December 07 – 11, 2020**

*NOTE: RAN specific additions are added in blue.*

**Source: Ericsson, T-Mobile USA**

**Title: New WID: Introduction of bandwidth combination set 4 (BCS4) for NR**

**Document for: Approval**

**Agenda Item: 9.1.4**

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: Introduction of bandwidth combination set 4 (BCS4) for NR

## Acronym: NR\_BCS4

## Unique identifier:

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** |  |

 or:

|  |  |
| --- | --- |
| **This WID includes a Testing part** |  |
| **and it addresses the following 3GPP work area:** | **Radio Access** |  |
| **Core Network** |  |
| **Services** |  |

Potential target Release: {Rel-17}.

Note that this field above indicates the proposed Release at the time of submission of the WID to TSG approval. It can later be changed without a need to revise the WID. The updated target Release is indicated in the Work Plan. NOTE: In case of contradiction with the target dates of clause 5, clause 5 determines the target release.

## 1 Impacts

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

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

### 2.1 Primary classification

This work item is a …

|  |  |
| --- | --- |
| 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, they are defined as work tasks. If you are in doubt, please contact MCC.

### 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| NR\_BCS4 | RAN4 |  | Introduction of BCS4 |

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 data (In case the feature covers Core and Perf. part, please list under Working Group the leading WG of the Core part).

### 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}*  |

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

**Dependency on non-3GPP (draft) specification**:

## 3 Justification

RAN4 has been spending a lot of time creating new NR-CA and SUL band combinations as requested by operators. In addition, as new channel bandwidths have been added to existing bands, operators have to go back and create new Bandwidth Combinations Sets or BCSs for existing band combinations in order to be able to use those new channel bandwidths in NR-CA and SUL. One way to reduce the workload in RAN4 is to not have to create new BCSs. BCS4 would allow a UE to indicate that it supports up to all of the channel bandwidths for the band in the band combination, without creating new BCSs.

Adding BCS4 itself would be fairly trivial and could be done with a TEI CR, but the real challenge is ensuring that all of the MSD analysis is done for all of the band combinations. Therefore, RAN4 decided that a Work Item is needed.

During the discussions some enhancements were proposed that could help customize the UE capabilities with BCS4. This WI will also analyze those enhancements.

The new channel bandwidths 35 MHz and 45 MHz and the new channel bandwidths added via Rel-17 basket WI adding new channel bandwidth(s) support to existing NR bands, which are part of another WIs, are currently not within the scope of this WI but can be added later if so needed. This WID should be updated to reflect that CRs, which introduce new channel bandwidth(s) for a given band, should include that the MSD analysis is performed for all the band combinations for each band.

Irregular BWs studied under separate SI are currently not within the scope of this WI. A potential WID resulting from this SI should reflect that CRs, which introduce new channel bandwidth(s) for a given band, should include that the MSD analysis is performed for all of the band combinations for each band.

## 4 Objective

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

The objectives of this work item are:

1. Introduce BCS 4 for SUL, inter-band and intra-band NR-CA, which shall indicate that for the band combination the UE supports all of the possible combinations of bandwidths based on the bandwidths the UE supports for each band as indicated in the UE capabilities and restricted by the notes in Table 5.3.5-1 in 38-101-1, and the maximum bandwidth for the band in the band combination as indicated in the UE capabilities. The BCS table does not need to fill in the channel bandwidths for BCS4 for new band combinations.

Study and define the most suitable UE capabilities signalling methods to enable BCS4 support after technically confirm what each of the following methods can realize and compare the cost versus the benefits. The candidate methods are:
* Signalling of BCS4 support per band combination
* BCS4 signalling with additional minimum channel bandwidth for each CC in NR band within a band combination
* BCS4 signalling with additional UE signalling multiple feature sets with different maximum and minimum channel bandwidth supporting on each CC for the same band combination.
* Other methods are not precluded
1. Ensure that all required analysis including MSD, etc. be performed for BCS4 for every existing band combination configuration (up to 3 bands)

It need to be studied further whether MPR/A-MPR is needed to be included in this WI.

Below are some guidelines.

Guideline 1: To ease the concerns of vendors concerned that IoDT will increase with BCS4, RAN4 shall allow new BCSs to be created as requested for band combinations, but BCSs will not be required for new band combinations.

Guideline 2: Future band combinations may include BCSs, but they will not be required to have any other than BCS4.

Guideline 3: In order to ensure that MSD analysis is complete for BCS4 for SUL and NR CA band combinations that have already been requested but CRs have not yet been agreed by RAN4, the TPs and draft CRs and CRs with those band combinations shall include MSD analysis for all channel bandwidths for each band in the band combination.

Guideline 4: Until BCS4 CR(s) are agreed, TPs and Draft CRs should include the BCSs that were requested for already requested band combinations. After BCS4 CR(s) are agreed, it should be up to the proponents whether TPs and draft CRs include the BCS(s) that were requested and recorded in the WID, or if the TPs and draft CRs only include BCS4. If BCS4 is preferred, the exceptional case of inconsistent information between the basket WID and the TPs/draft CRs is acceptable until the WID is fixed accordingly.

Guideline 5: BCS4 CRs should be allowed to be introduced before all the MSD analysis is completed to avoid the situation where traditional BCSs are still required. All MSD analysis should be completed by the end of Rel-17. To facilitate the adoption of BCS4 prior to the completion of MSD analysis, MSD for missing channel BWs in existing band combinations shall be listed as infinity until the MSD analysis is complete. These infinite MSD’s are only placeholders which will be clarified in a note saying so in the initial CR.

Guideline 6: BCS4 doesn’t change anything with regard to mandatory or optional channel BWs. UE capabilities still indicate channel BWs per band, and maximum channel BW per band in the band combination.

### 4.2 Objective of Performance part WI

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

### 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: 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 |
| 38.101-1 | NR; UE Radio transmission and reception | RAN#95 | Core UE 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)

**Name: Per Lindell**

**Company: Ericsson**

**Email: per.lindell@ericsson.com**

## 7 Work item leadership

RAN4

## 8 Aspects that involve other WGs

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

|  |
| --- |
| Supporting IM name |
| T-Mobile USA |
| AT&T |
| Bell Mobility |
| CMCC |
| Deutsche Telekom |
| Ericsson |
| KDDI |
| Nokia |
| Rogers |
| Telecom Italia |
| Telstra |
| TELUS |
| Verizon |
| Vodafone |
| Qualcomm |