3GPP TSG RAN Meeting #90-e
December 7-11, 2020
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Motivation on new SID: Study on optimization for specifying band combination

Background

- The topic of simplifications of band combinations has been intensively discussed in the past RAN4 meetings.
  - A WF (R4-2016935) for rules on request sheet and notations of CA/DC configurations have been approved in RAN4#97-e.
    - It seems to be useful to have such a document to capture all the necessary agreements and relevant files such as request sheet template in a single file/new TR, which needs a SI or WI to be agreed by RAN plenary.
    - Interested companies are encouraged to propose a SI to next RAN meeting.
- Compared with previous generations, 5G NR have much more complex band combination configurations being specified due to the number of bands, multiple numerologies, larger channel bandwidth, size of channel bandwidth set, and etc.
  - The situation is becoming worse and worse with the increasing number of band combinations introduced in RAN4.
    - The excessive number of columns in the configuration table bring much trouble to introduce the CA/DC, especially when some new channel bandwidths are added to the constitute band.
    - It is difficult for the trackability and editability of the tables. When a new band combination configuration is added, it is not convenient to follow lexicographical order, in particular for a huge table.
  - RAN4 specifications have become more and more complex and redundant.
    - Some information in current band combination tables is redundant and can be optimized.

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Motivation

-------- *Extracted from TS 38.101-2* --------

Complex Table

5.5A.1 Configurations for intra-band contiguous CA

Table 5.5A.1-1: NR CA configurations, bandwidth combination sets, and fallback group defined for intra-band contiguous CA

NR CA configuration / Bandwidth combination set / Fallback group												
NR CA configuration	**Uplink CA configurations**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**$BW_{Channel}$ (MHz)**	**Maximum aggregated BW (MHz)**	**BCS**	**Fallback group**
CA_n257B	CA_n257B	50, 100, 200, 400	400							800	0	1
CA_n257C	CA_n257B	50, 100, 200, 400	400	400						1200	0	1

5.5A.2 Configurations for intra-band non-contiguous CA

Configurations listed in this clause apply to downlink carrier aggregation only.

Table 5.5A.2-1: NR CA configurations with single CA bandwidth class defined for intra-band non-contiguous CA

NR CA configuration / Bandwidth combination set																	
NR configuration	**Uplink CA configurations**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**Sub-block**	**$\Sigma(BW_{Channel,block})$ (MHz)**	**BCS**

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Motivation

-------- *Extracted from TS 38.101-1* --------

Table 5.5A.3.1-1: NR CA configurations and bandwith combinations sets defined for inter-band CA (two bands)

NR CA configuration	Uplink CA configuration	NR Band	SCS (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz	Bandwidth combination set
CA_n1A-n3A	CA_n1A-n3A	n1	15	Yes	Yes	Yes	Yes										0
			30		Yes	Yes	Yes										
			60		Yes	Yes	Yes										
		n3	15	Yes	Yes	Yes	Yes	Yes	Yes								
			30		Yes	Yes	Yes	Yes	Yes								
			60		Yes	Yes	Yes	Yes	Yes								
CA_n1B-n3A	CA_n1A-n3A	n1	See CA_n1B Bandwidth Combination Set 0 in Table 5.5A.1-1														0
		n3	15	Yes	Yes	Yes	Yes	Yes	Yes								
			30		Yes	Yes	Yes	Yes	Yes								
			60		Yes	Yes	Yes	Yes	Yes								

Complex Table

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Motivation

-------- *Extracted from TS 38.101-3* --------

Table 5.5A.1-1: Inter-band CA configurations and bandwidth combinations sets between FR1 and FR2 (two bands)

NR CA configuration	Uplink CA configuration	NR Band	SCS (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz	200 MHz	400 MHz	Bandwidth combination set
CA_n1A-n257A	CA_n1A-n257A	n1	15	Yes	Yes	Yes	Yes												0
			30		Yes	Yes	Yes												
			60		Yes	Yes	Yes												
		n257	60								Yes					Yes	Yes		
			120								Yes					Yes	Yes	Yes	

The SCS information for inter-band CA shown as in the table is duplicated with that in Table 5.3.5-1 of TS 38.101-1/2. This will increase the risk of potential inconsistencies within RAN4 specs.

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Objective

- The objective of this study item is to optimize specification of the band combination in the current RAN4 specifications. The study proceeds within the following scopes.
  - Analyse the redundant contents which will cause potential conflicts in RAN4 specifications.
  - Study potential future-proof solutions for band combination configuration tables in RAN4 specifications for concise representation, better readability and better trackability.
  - Study the potential influence on request sheet template due to RAN4 spec optimization.
  - Study the possible optimizations on band combination indication.

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Proposal

- New SID on optimization for specifying band combination in RAN4 specifications.
  - Analyse the redundant contents which will cause potential conflicts in RAN4 specifications.
  - Study potential future-proof solutions for band combination configuration tables in RAN4 specifications for concise representation, better readability and better trackability.
  - Study the potential influence on request sheet template due to RAN4 spec optimization.
  - Study the possible optimizations on band combination indication.

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Thanks

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