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(54) **METHOD AND APPARATUS OF USING REDUNDANT BITS IN SEMI-STATICALLY CONFIGURED HARQ-ACK CODEBOOK**

(57) The present application is related to a method and apparatus of using redundant bits in semi-statically configured HARQ-ACK feedback. A method of receiving information according to one embodiment comprises receiving a first number of code block groups from a base unit, wherein each code block within a code block group is independently decodable; determining a (HARQ-ACK) codebook size corresponding to the first number of code block groups; and transmitting a HARQ-ACK codebook to the base unit, wherein the HARQ-ACK codebook comprises the first number of HARQ-ACK bits with each bit corresponding to one code block group and a second number of padded bits. The first number plus the second number is equal to the determined HARQ-ACK codebook size. The present application enhances the downlink (DL) transmission performance and the uplink (UL) HARQ-ACK transmission reliability.

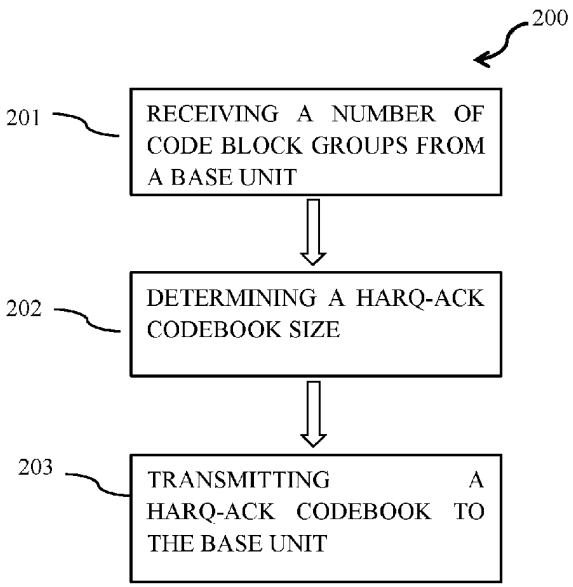

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 7880

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	SAMSUNG: "Overview of CBG-based retransmission in NR", 3GPP DRAFT; R1-1705401 - OVERVIEW OF CBG-BASED RETRANSMISSION IN NR, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FR , vol. RAN WG1, no. Spokane, USA; 20170403 - 20170407 2 April 2017 (2017-04-02), XP051243531, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN1/Docs/ [retrieved on 2017-04-02]	1,2,5,6, 9,10,13, 14	INV. H04W16/14 H04L1/00 H04L1/18 H04L1/1829 H04L1/1867
A	* Sections 1 and 2 *	3,4,7,8, 11,12,15	

X	NTT DOCOMO ET AL: "CBG based (re)transmission, preemption indication and subsequent trasnmission in NR", 3GPP DRAFT; R1-1708484, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. RAN WG1, no. Hangzhou; 20170515 - 20170519 14 May 2017 (2017-05-14), XP051273676, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN1/Docs/ [retrieved on 2017-05-14]	1,2,5,6, 9,10,13, 14	TECHNICAL FIELDS SEARCHED (IPC) H04L
A	* Sections 1 and 2.2 *	3,4,7,8, 11,12,15	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 January 2024	Gabry, Frederic

CATEGORY OF CITED DOCUMENTS

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Application Number
EP 23 20 7880

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	EP 3 619 856 A1 (IDAC HOLDINGS INC [US]) 11 March 2020 (2020-03-11) * paragraph [0133] - paragraph [0148] * * figures 7-8 * -----	1,2,5,6, 9,10,13, 14	

TECHNICAL FIELDS SEARCHED (IPC)

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10-01-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3619856 A1	11-03-2020	BR 112019023046 A2	09-06-2020
		CN 110574319 A	13-12-2019
		CN 115603868 A	13-01-2023
		CN 115603869 A	13-01-2023
		EP 3619856 A1	11-03-2020
		JP 6835984 B2	24-02-2021
		JP 2020519132 A	25-06-2020
		KR 20200012840 A	05-02-2020
		KR 20230164216 A	01-12-2023
		RU 2731035 C1	28-08-2020
		TW 201906354 A	01-02-2019
		US 2020059327 A1	20-02-2020
		US 2022311552 A1	29-09-2022
		WO 2018204491 A1	08-11-2018

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