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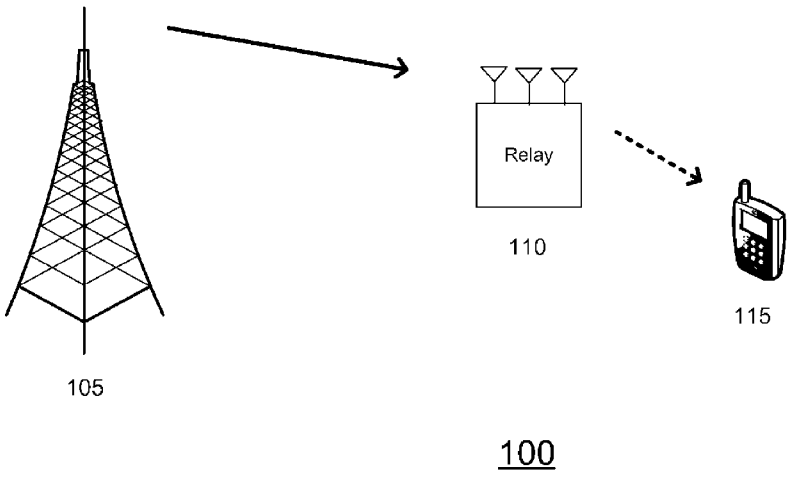
— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
29 July 2010

(54) Title: METHOD AND APPARATUS FOR HARQ OPERATION WITH NETWORK CODING

[Fig. 1]



(57) Abstract: For use in a wireless communication network, methods for encoding information bit streams at a relay station are provided. Each method includes receiving data packets from a base station and a mobile station. Each method also includes decoding the packets and re-encoding the packets. Each method further includes combining the re-encoded packets into another packet using an XOR operation, and transmitting the other packet to the base station and the mobile station.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2009/006695

A. CLASSIFICATION OF SUBJECT MATTER

H04B 7/14(2006.01)i, H04L 1/18(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: H04B 7/14, H04L 1/18, H04Q 7/24, H04B 7/26, H04L 27/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords : relay, XOR, uplink

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-0787969 B1 (NDUSTRY-ACADEMIC COOPERATION FOUNDATION, YONSEI UNIVERSITY) 14 December 2007 see abstract, fig.3 and claims 1-13	1,2,8,10,12,14,15
A	US 2008/0219229 A1 (RUOBIN ZHENG) 11 Spetember 2008 see abstract, fig.5 and paragraphs 204-210	1,2,8,10-15
A	US 2007/0280188 A1 (HYUN-JEONG KANG et al.) 6 December 2007 see abstract, fig.3 and paragraphs 38-42	1,2,8,10-15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 MAY 2010 (24.05.2010)	**25 MAY 2010 (25.05.2010)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2009/006695

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 9
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claim 9 is unclear because it refers to claim 7 which does not comply with PCT Rule 6.4(a).

3. ☒ Claims Nos.: 3-7
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-0787969 B1	14.12.2007	NONE	
US 2008-0219229 A1	11.09.2008	CN 101160997 A	09.04.2008
		CN 101160997 A0	09.04.2008
		EP 1931155 A4	22.07.2009
		EP 1931155 A1	11.06.2008
		KR 10-2008-0054422 A	17.06.2008
		WO 2007-036161 A1	05.04.2007
US 2007-0280188 A1	06.12.2007	AU 2007-250653 A1	22.11.2007
		CA 2651608 A1	22.11.2007
		CN 101444011 A	27.05.2009
		EP 1855428 A2	14.11.2007
		JP 2009-536496 A	08.10.2009
		KR 10-2007-0109810 A	15.11.2007
		KR 10-0884756 B1	20.02.2009
		WO 2007-133022 A1	22.11.2007