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[Continued on next page]

(54) Title: METHODS, COMPUTER PROGRAM PRODUCTS AND APPARATUS PROVIDING IMPROVED QUANTIZATION

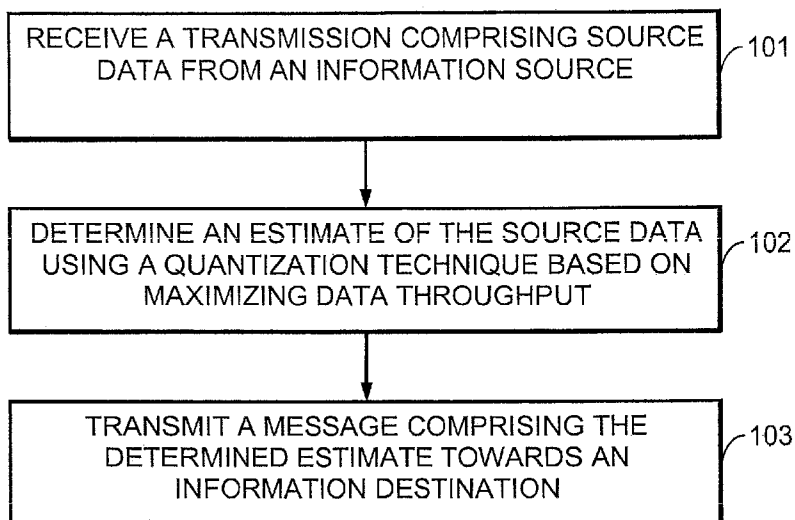


FIG.10

(57) Abstract: Thus, the exemplary embodiments of the invention describe methods, computer program products and apparatus that provide improved quantization, as may be useful within the context of a communication system (e.g., a wireless communication system) that has a relay node. In one non-limiting, exemplary embodiment, a method includes: receiving a transmission having source data from an information source; determining an estimate of the source data using a quantization technique based on maximizing data throughput; and transmitting a message including the determined estimate towards an information destination.

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B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) H03M H04L H04B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MICHAEL KATZ AND SHLOMO SHAMAI (SHITZ): "Relaying Protocols for Two Colocated Users" IEEE TRANSACTIONS ON INFORMATION THEORY, vol. 52, no. 6, June 2006 (2006-06), pages 2329-2344, XP002517149 Piscataway, NJ, USA	1-3, 6-13, 16-29
Y	paragraphs [000I], [00IV] page 2, column 1 ----- -/--	5,15
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		
<input type="checkbox"/> 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 document 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 another 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 5 March 2009	Date of mailing of the international search report 25/03/2009	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Belardinelli, Carlo	

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International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AVI STEINER AND SHLOMO SHAMAI (SHITZ): "Single-User Broadcasting Protocols Over a Two-Hop Relay Fading Channel" IEEE TRANSACTION ON INFORMATION THEORY, [Online] vol. 52, no. 11, November 2006 (2006-11), pages 4821-4838, XP002517150 Piscataway, NJ, USA page 3, column 1, line 30 - line 35 page 9, paragraph VII - page 13, paragraph IX	1,2,6,7, 9,11,12, 17,19, 21-24,27
X	----- MOHAMMAD ALI KHOJASTEPOUR, XIAODONG WANG, AND MOHAMMAD MADIHIAN: "Throughput Maximization In Multiple Antenna Communication Systems Through Quantized Rate Control" CONFERENCE ON SIGNALS, SYSTEMS AND COMPUTERS, 2005. CONFERENCE RECORD OF THE 39TH ASILOMAR, October 2005 (2005-10), pages 638-642, XP002517151 Pacific Groove, CA, USA page 2, paragraph III - page 4	1-3, 11-13, 21,27
Y	----- ARNAB CHAKRABARTI, ALEXANDRE DE BAYNAST, ASHUTOSH SABHARWAL, AND BEHNAAM AAZHANG: "Half-Duplex Estimate-and-Forward Relaying: Bounds and Code Design" PROCEEDINGS OF ISIT 2006, 9 July 2006 (2006-07-09), pages 1239-1242, XP002517152 Seattle, USA cited in the application page 5, line 7	5,15
A	the whole document	
A	----- JING LI (TIFFANY) AND RUIYUAN HU: "Slepian-Wolf Cooperation: A Practical and Efficient Compress-and-Forward Relay Scheme" PROCEEDING OF 43RD ANNUAL ALLERTON CONFERENCE ON COMMUNICATION, CONTROL, AND COMPUTING, September 2005 (2005-09), XP002517153 Champaign, IL, USA the whole document	4,14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2008/052731

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.: **4, 14**
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:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
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 additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

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

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 4,14

No opinion can be given on the subject-matter of claims 4 and 14 since the description does not disclose how a Slepian-Wolf coder would simulate the operation of a Wyner-Ziv coder nor what would be the subsequent effect of a Slepian-Wolf coder simulating the operation of a Wyner-Ziv coder.

The simulation of a the operation of a Wyner-Ziv coder by means of a Slepian-Wolf coder is not part of the invention and, being it not completely disclosed within the description but just mentioned, it is not apparent what the simulation has to do with the invention itself and how this operation should be carried out within the invention.

The Wyner-Ziv coding constitutes in fact a specialization of the solution to the problem solved by the Slepian-Wolf coding. It is therefore not clear how the simulation of the Wyner-Ziv coding by means of a Slepian-Wolf coder would be realized.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2)PCT declaration be overcome.