



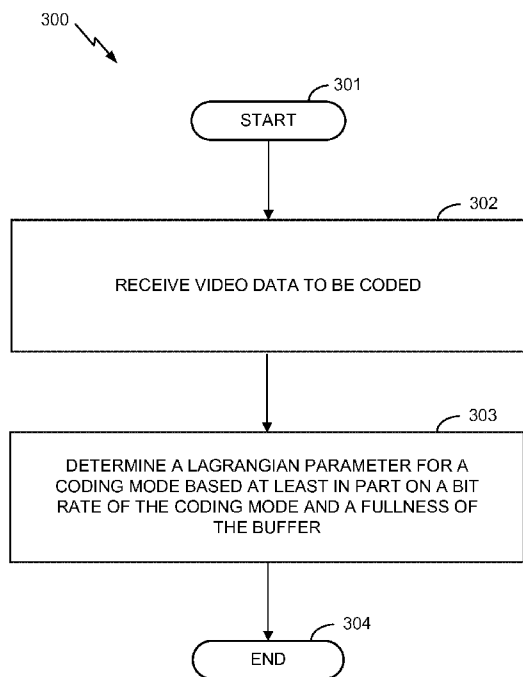
- (51) International Patent Classification:  

<i>H04N 19/176</i> (2014.01)	<i>H04N 19/11</i> (2014.01)
<i>H04N 19/19</i> (2014.01)	<i>H04N 19/152</i> (2014.01)
<i>H04N 19/147</i> (2014.01)	
- (21) International Application Number: PCT/US2015/025782
- (22) International Filing Date: 14 April 2015 (14.04.2015)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:

61/979,985	15 April 2014 (15.04.2014)	US
62/034,080	6 August 2014 (06.08.2014)	US
14/685,453	13 April 2015 (13.04.2015)	US
- (71) Applicant: QUALCOMM INCORPORATED [US/US];  
ATTN: International IP Administration, 5775 Morehouse Drive, San Diego, California 92121-1714 (US).
- (72) Inventors: THIRUMALAI, Vijayaraghavan; 5775 Morehouse Drive, San Diego, California 92121-1714 (US). JOSHI, Rajan Laxman; 5775 Morehouse Drive, San Diego, California 92121-1714 (US). JACOBSON, Natan Haim; 5775 Morehouse Drive, San Diego, California 92121-1714 (US).
- (74) Agent: ABUMERI, Mark M.; Knobbe Martens Olson & Bear LLP, 2040 Main Street, Fourteenth Floor, Irvine, California 92614 (US).
- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR LAGRANGIAN PARAMETER CALCULATION FOR DISPLAY STREAM COMPRESSION (DSC)



(57) Abstract: According to certain aspects, an apparatus for coding video data includes a memory for storing the video data and a processor. The memory includes a buffer. The processor is configured to receive the video data to be coded. The processor is further configured to determine a Lagrangian parameter for a coding mode based at least in part on a bit rate of the coding mode and a fullness of the buffer.

FIG. 3

WO 2015/160826 A3



DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,

LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

**Published:**

- 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:**

6 May 2016

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2015/025782

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. H04N19/176 H04N19/19 H04N19/147 H04N19/11 H04N19/152  
 ADD.  
 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)  
 H04N  
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/063051 A1 (KWON DO KYOUNG [KR] ET AL) 13 March 2008 (2008-03-13)  paragraphs [0028] - [0029], [0041] - [0044], [0046], [0053] - [0054], [0067] - [0073]; figures 6,9 -----	1-8, 11-18, 21-30
X	EP 1 563 688 B1 (APPLE COMPUTER [US]) 29 December 2010 (2010-12-29) paragraphs [0042] - [0058]; figures 1,4 -----	1,11,21, 26
A	US 2004/264571 A1 (ZHANG XIMIN [US] ET AL) 30 December 2004 (2004-12-30)  paragraphs [0037] - [0066], [0073], [0079], [0081], [0083]; figure 3 ----- -/--	1-8, 11-18, 21-30

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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  11 December 2015	Date of mailing of the international search report  21/03/2016
---	--

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  Seeger, Alexander
--	---

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2015/025782

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2014/092957 A1 (MACINNIS ALEXANDER GARLAND [US]) 3 April 2014 (2014-04-03)  paragraphs [0099] - [0116], [0176] - [0179]; figures 2,7,8,9,13,14 -----	1-8, 11-18, 21-30

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2015/025782

## 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.:  
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:
  
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:

see additional sheet

1.  As all required additional 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 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.:

1-8, 11-18, 21-30

### 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**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 11-18, 21-30

Per block determination of a Lagrangian parameter for rate control in video encoding.

---

2. claims: 9, 10, 19, 20

Per line determination of a Lagrangian parameter for rate control in video encoding.

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No <b>PCT/US2015/025782</b>
--

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
US 2008063051	A1	13-03-2008	CN 101141636 A	12-03-2008
			TW 200814788 A	16-03-2008
			US 2008063051 A1	13-03-2008
-----				
EP 1563688	B1	29-12-2010	AT 493845 T	15-01-2011
			AU 2003286800 A1	03-06-2004
			EP 1563688 A1	17-08-2005
			EP 2271104 A2	05-01-2011
			HK 1076219 A1	01-04-2011
			JP 4480671 B2	16-06-2010
			JP 5021502 B2	12-09-2012
			JP 2006506032 A	16-02-2006
			JP 2008160864 A	10-07-2008
			US 2004184546 A1	23-09-2004
			US 2006193382 A1	31-08-2006
			US 2010329333 A1	30-12-2010
			WO 2004045218 A1	27-05-2004
-----				
US 2004264571	A1	30-12-2004	NONE	
-----				
US 2014092957	A1	03-04-2014	NONE	
-----				