(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 November 2004 (04.11.2004)

PCT

(10) International Publication Number
WO 2004/095201 A3

(51) International Patent Classification:
G11B 7/004 (2006.01)

(21) International Application Number:
PCT/US2004/002183

(22) International Filing Date: 27 January 2004 (27.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/461,664 9 April 2003 (09.04.2003) US

(71) Applicant *(for all designated States except US)*: **INTERVIDEO INC.** [US/US]; 46430 Fremont Blvd., Fremont, California 94538 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LAI, Yung-Hsiao** [—/US]; 39475 Gallaudet Drive, #124, Fremont, California 94538 (US). **HUNG, Andy, Chao** [US/US]; 12849 Canario Way, Los Altos, California 94022 (US).

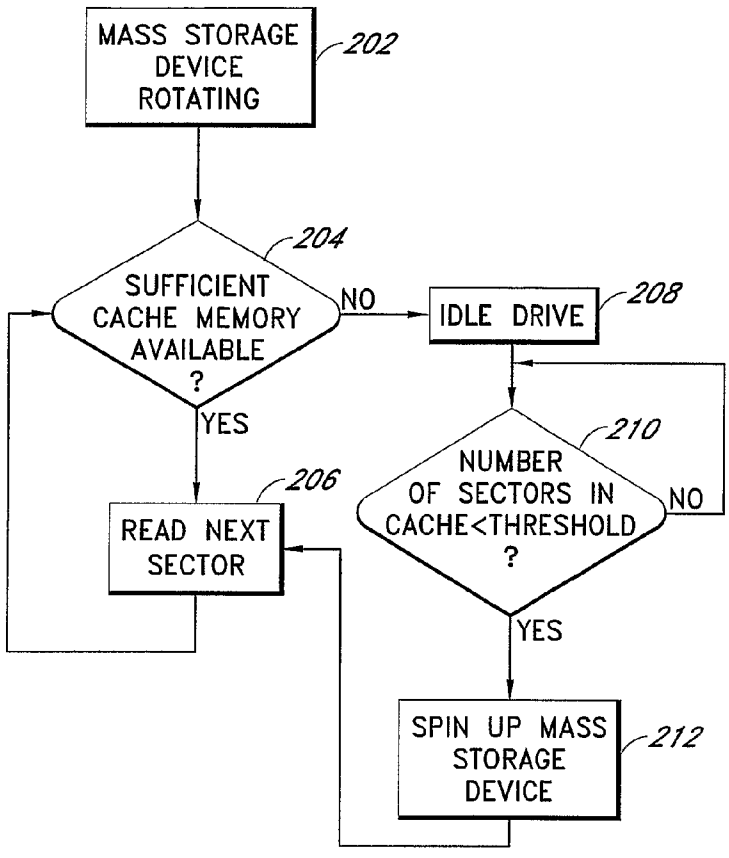
(74) Agent: **CHEN, Ivan**; Intervideo, Digital Tech., 6F. No. 3-2 Yuan Qu Street, Nankang Software Park, Taipei, Taiwan 115 (TW).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,

[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR CACHING MULTIMEDIA DATA



(57) Abstract: Systems and methods are provided for caching media data to thereby enhance media data read and/or write functionality and performance. A multimedia apparatus, comprises a cache buffer configured to be coupled to a storage device, wherein the cache buffer stores multimedia data, including video and audio data, read from the storage device. A cache manager coupled to the cache buffer, wherein the cache buffer is configured to cause the storage device to enter into a reduced power consumption mode when the amount of data stored in the cache buffer reaches a first level.

WO 2004/095201 A3

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
21 June 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/02183

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G11B 7/004
US CL : 369/47.33,47.32

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)
U.S. : 369/47.33,47.32 711/119

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-014869 (MATSUSHITA ELECTRIC IND. CO. LTD) 18 January 2002 (18.01.02), Abstract, paragraphs [0025]-[0045], Figures 10,2,3,5,8	1-13
A	U.S. 6,131,138 A (PACKER et al.) 10 October 2000 (10.10.00), Abstract, colum 5, line 18 to column 8, line 34, Figures 4a-8	1-13
A	U.S. 5,974,223 A (UCHIDE) 26 October 1999 (26.10.99), Abstract, column 4, line 6 toc ol. 8, line 40, Figures 1-10	1-13
Y	JP 08-212015 (MATSUSHITA ELECTRIC IND. CO.) 20 August 1996 (20.08.96), Abstract, paragraphs [0021]-[0055] Figures 1-5	1-13
A	JP 2002-024087 (MATSUSHITA ELECTRIC IND CO.) 25 January 2002 (25.1.02), Abstract, paragraphs [0010]-[000020] Figures 1-10	1-13
A	U.S. 5,822,288 A (SHINADA) 13 October 1998 (13.10.98), Figures 1-12	1-13

☐ 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 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
26 April 2005 (26.04.2005)

Date of mailing of the international search report
01 MAR 2007

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (703)305-3230

Authorized officer
David Ometz

Telephone No. (571) 272-7593

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/02183

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

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

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

2. ☐ Claim 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. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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 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.: 1-13

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I, claim(s) 1-13, drawn to a multimedia playback apparatus.

Group II, claim(s) 14-18, drawn to a method of controlling a multimedia storage device.

Group III, claim(s) 19-31, drawn to a method of processing multimedia data.

Group IV, claim(s) 32, drawn to method of processing multimedia data when a storage device is idle.

Group V, claim(s) 33-39, drawn to a multimedia apparatus.

Group VI, claim(s) 40-51, drawn to multimedia apparatus.

Group VII, claim(s) 52-56, drawn to a method of processing media data to be written in a non-volatile storage device.

The inventions listed as Groups I-VII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature of Group I invention is the track buffer that stores a first amount of the multimedia data read from the cache buffer. The special technical features of Group II invention is the step of transferring the corresponding multimedia data from the multimedia cache to a track buffer for rendering when the multimedia data corresponding to a scan command is stored in the multimedia cache. The special technical feature of Group III invention is the determination of quantity of multimedia data to spin up the storage device. The special technical feature of Group IV invention is writing multimedia data from a cache buffer to a track buffer for rendering while the storage device is idle. The special technical feature of Group V invention is the particular claimed cache manager that controls the storage device into a reduced power consumption mode. The special technical feature of Group VI invention is the particular claimed write cache buffer that caches the multimedia data from the write track buffer particularly the write cache buffer is several times the size o f the write track buffer. The special technical feature of Group VII invention is determining quantity of media data stored in a cache buffer and causing a non-volatile storage device to spin down. Thus the special technical features of the seven grouping are not the same nor are they corresponding.