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(54) **MULTIMEDIA PLAYER DISPLAYING OPERATION PANEL DEPENDING ON CONTENTS**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,746,919 A 5/1988 Reitmeier
4,825,209 A 4/1989 Sasaki et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CA 2482234 A1 11/2003
EP 1376321 1/2004
(Continued)

OTHER PUBLICATIONS

Motorola Mobility LLC v. *Maxell, Ltd.*, Petition for Inter Partes Review of U.S. Pat. No. 8,170,394, Inter Partes Review No. IPR2022-01348 filed Aug. 18, 2022.
(Continued)

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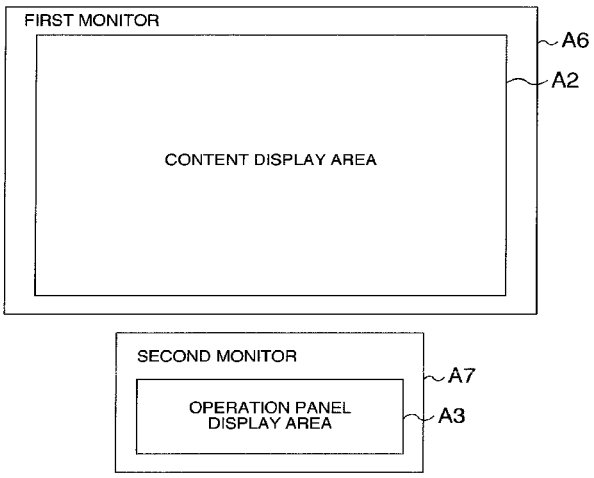
(57) **ABSTRACT**

A digital content operating apparatus, including: a communication unit which communicates with an external device which has a display for displaying the digital content; a user operation interface which receives a user operation to control the digital content which is displayed on the external device; a display which displays either a linear content operation panel or an interactive content operation panel; and a controller which controls the user operation interface corresponding to information on the digital content which is displayed on the external device; wherein either the linear content operation panel or the interactive content operation panel is displayed alternatively as the user operation interface on the display.

20 Claims, 11 Drawing Sheets



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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,315,999	A	5/1994	Kinicki et al.	
5,367,316	A	11/1994	Ikezaki	
5,416,535	A *	5/1995	Sato	H04B 1/202 348/E5.103
5,428,730	A	6/1995	Baker et al.	
5,517,257	A	5/1996	Dunn et al.	
5,606,374	A	2/1997	Bertram	
5,648,824	A	7/1997	Dunn et al.	
5,721,829	A	2/1998	Dunn	
5,801,747	A *	9/1998	Bedard	H04N 21/44224 725/13
5,809,204	A	9/1998	Young et al.	
5,831,664	A	11/1998	Wharton et al.	
5,850,218	A	12/1998	LaJoie	
5,914,941	A	6/1999	Janky	
5,929,850	A	7/1999	Broadwin et al.	
6,025,869	A *	2/2000	Stas	H04N 21/4314 725/27
6,055,413	A	4/2000	Morse	
6,100,883	A	8/2000	Hoarty et al.	
6,141,003	A	10/2000	Chor	
6,154,771	A	11/2000	Rangan et al.	
6,177,931	B1	1/2001	Alexander et al.	
6,233,389	B1	5/2001	Barton et al.	
6,240,555	B1	5/2001	Shoff et al.	
6,297,856	B1	10/2001	Nakamura et al.	
6,348,932	B1	2/2002	Nishikawa	
6,378,130	B1	4/2002	Adams	
6,392,664	B1	5/2002	White	
6,404,418	B1	6/2002	Leem	
6,407,779	B1	6/2002	Herz	
6,446,040	B1	9/2002	Socher	
6,493,038	B1	12/2002	Singh et al.	
6,603,488	B2	8/2003	Humpleman	
6,609,253	B1	8/2003	Swix et al.	
6,628,302	B2	9/2003	White et al.	
6,636,157	B1	10/2003	Sato	
6,678,891	B1	1/2004	Wilcox et al.	
6,690,431	B1	2/2004	Yang et al.	
6,732,367	B1 *	5/2004	Ellis	H04N 21/84 725/27
6,757,907	B1	6/2004	Schumacher et al.	
6,804,825	B1	10/2004	White et al.	
6,930,730	B2	8/2005	Maxon	
6,976,216	B1	12/2005	Peskin et al.	
6,993,722	B1	1/2006	Greer	
7,043,477	B2	5/2006	Mercer et al.	
7,071,865	B2	7/2006	Shibamiya et al.	
7,073,189	B2	7/2006	McElhatten et al.	
7,126,587	B2	10/2006	Kawakami et al.	
7,155,674	B2	12/2006	Breen et al.	
7,174,518	B2	2/2007	Kim	
7,194,701	B2	3/2007	Stavely et al.	
7,257,775	B1	8/2007	Jivakov et al.	
7,293,276	B2	11/2007	Phillips et al.	
7,365,782	B2	4/2008	Tanaka et al.	
7,392,532	B2	6/2008	White et al.	
7,475,349	B2	1/2009	Wagner et al.	
7,522,087	B2	4/2009	Shibamiya et al.	
7,523,478	B2	4/2009	Blackketter et al.	
7,536,647	B2	5/2009	Walker et al.	
7,546,537	B2	6/2009	Crawford	
7,590,997	B2	9/2009	Perez	
7,595,846	B2	9/2009	Moon	
7,650,621	B2	1/2010	Thomas et al.	
7,667,123	B2	2/2010	Phillips et al.	
7,673,250	B2	3/2010	Taylor	
7,797,718	B2	9/2010	Stecyk	
7,899,915	B2	3/2011	Reisman	
7,917,933	B2	3/2011	Thomas et al.	
8,068,718	B2	11/2011	Hamasaka et al.	
8,086,093	B2	12/2011	Stuckman	
8,112,711	B2	2/2012	Ackley	
8,151,210	B2	4/2012	Nezu et al.	
8,170,394	B2	5/2012	Machida et al.	
8,181,205	B2	5/2012	Russ et al.	
8,245,250	B2 *	8/2012	Casement	H04N 21/4751 725/50
8,352,986	B2	1/2013	Uchida	
8,402,505	B2	3/2013	Alten	
8,418,202	B2	4/2013	Ahmad-Taylor	
8,516,520	B1	8/2013	Look et al.	
8,601,514	B1	12/2013	Kellum et al.	
8,707,354	B1	4/2014	Moreau et al.	
8,773,360	B2	7/2014	Uchida et al.	
9,065,979	B2	6/2015	Cohen et al.	
9,489,985	B2	11/2016	Machida	
2002/0021306	A1	2/2002	Gehrke et al.	
2002/0054028	A1	5/2002	Uchida et al.	
2002/0059586	A1	5/2002	Carney et al.	
2002/0060750	A1	5/2002	Istvan et al.	
2002/0065927	A1	5/2002	Janik et al.	
2002/0132216	A1	9/2002	Dohrmann	
2002/0162117	A1	10/2002	Pearson et al.	
2003/0037068	A1	2/2003	Thomas	
2003/0050885	A1	3/2003	Cohen et al.	
2003/0113100	A1	6/2003	Hecht	
2003/0147635	A1	8/2003	Jung et al.	
2003/0149988	A1	8/2003	Ellis	
2003/0163811	A1	8/2003	Luehrs	
2003/0214604	A1	11/2003	Lee	
2003/0234805	A1	12/2003	Toyama et al.	
2004/0001703	A1	1/2004	Kang	
2004/0028375	A1	2/2004	Kim et al.	
2004/0040041	A1	2/2004	Crawford	
2004/0047588	A1	3/2004	Okada	
2004/0059790	A1	3/2004	Austin-Lane	
2004/0060063	A1	3/2004	Russ	
2004/0063479	A1	4/2004	Kimura	

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0075670	A1	4/2004	Bezine et al.	
2004/0103434	A1	5/2004	Ellis	
2004/0117831	A1	6/2004	Ellis	
2004/0131335	A1	7/2004	Halgas et al.	
2004/0133923	A1	7/2004	Watson et al.	
2004/0154040	A1	8/2004	Ellis	
2004/0194139	A1	9/2004	Rao et al.	
2004/0249925	A1	12/2004	Jeon	
2005/0024341	A1	2/2005	Gillespie et al.	
2005/0028204	A1	2/2005	Nakamura et al.	
2005/0053356	A1	3/2005	Mate et al.	
2005/0097600	A1	5/2005	Heer	
2005/0132420	A1	6/2005	Howard et al.	
2005/0134746	A1	6/2005	Brandt	
2005/0160458	A1	7/2005	Baumgartner	
2005/0160461	A1	7/2005	Baumgartner et al.	
2005/0160465	A1	7/2005	Walker	
2005/0166230	A1*	7/2005	Gaydou	G11B 27/105 348/E7.071
2005/0172332	A1	8/2005	Fukuda	
2005/0188408	A1	8/2005	Wallis et al.	
2005/0198663	A1	9/2005	Chaney	
2005/0240961	A1	10/2005	Jerding	
2005/0262535	A1	11/2005	Uchida et al.	
2005/0267676	A1	12/2005	Nezu et al.	
2006/0010099	A1	1/2006	Takeda et al.	
2006/0015911	A1	1/2006	Dean	
2006/0020969	A1	1/2006	Utsuki	
2006/0020982	A1	1/2006	Jerding	
2006/0041655	A1*	2/2006	Holloway	H04N 21/42224 709/223
2006/0050059	A1	3/2006	Satoh	
2006/0161954	A1	7/2006	Hamada et al.	
2006/0242106	A1	10/2006	Bank	
2006/0256241	A1	11/2006	Suzuki	
2006/0271971	A1	11/2006	Drazin	
2007/0003220	A1	1/2007	Hamasaka et al.	
2007/0044015	A1	2/2007	Ikeda	
2007/0106945	A1	5/2007	Kim	
2007/0124765	A1	5/2007	Bennett et al.	
2007/0185968	A1	8/2007	White et al.	
2008/0184297	A1	7/2008	Ellis et al.	
2011/0061078	A1	3/2011	Rothschild	
2012/0227075	A1	9/2012	Asmussen	

FOREIGN PATENT DOCUMENTS

GB	2535309	A	8/2016
JP	08079647		3/1996
JP	09168131		6/1997
JP	11298822		10/1999
JP	2000-206949	A	7/2000
JP	2000287159		10/2000
JP	2003-209710	A	7/2003
JP	2005006144		1/2005
JP	2005073022		3/2005
WO	9844732		10/1998
WO	0133344	A2	5/2001
WO	03/026275	A2	3/2003
WO	2005024828		3/2005
WO	2005/065166	A2	7/2005

OTHER PUBLICATIONS

Myers, B. A., "A Taxonomy of Window Manager User Interfaces", IEEE Computer Graphics & Applications, Sep. 1988, pp. 65-84.

Press, L., "Personal Computing: Compuvision or Teleputer?", Communication of the ACM, Sep. 1990, pp. 29-36, vol. 33, No. 9.

"ARIB Technical Report TR-B14 Version 2.8", Association of Radio Industries and Businesses, May 29, 2006, pp. 1-564, vol. 3.

Blackberry Corporation v. *Maxell, Ltd*., Petition for Inter Partes Review of U.S. Pat. No. 8,170,394, Inter Partes Review No. IPR2019-00089, Mar. 29, 2019.

Excerpts from File History of U.S. Pat. No. 8,170,394.

Excerpts from Sony's Digital Dreams Publication, 1999.

Excerpts from Apple's Macintosh Human Interface Guidelines, 1992.

Overview and Amendment History of Amendment History of ARIB Technical Report TRB14, 2018.

Vizio, Inc. v. *Maxell, Ltd*., Petition for Inter Partes Review of U.S. Pat. No. 8,170,394, Inter Partes Review No. IPR2023-00316 filed Mar. 3, 2023, pp. 1-86.

Certain Mobile Electronic Devices' Respondents' Initial Invalidity Contentions which were filed in the following Investigation No. 337-TA-1324 (Washington, D.C.), filed Dec. 7, 2022, pp. 1-93.

Certain Mobile Electronic Devices' Expert Report of Benjamin B. Bederson, PH.D., Regarding Invalidity of U.S. Pat. No. 8,17,394 which was filed in the following Investigation No. 337-TA-1324 (Washington, D.C.), executed Feb. 3, 2023, pp. 1-165.

Certain Mobile Electronic Devices' Respondents' Supplemental Invalidity Contentions which were filed in the following Investigation No. 337-TA-1324 (Washington, D.C.), filed Jan. 17, 2023, pp. 1-101.

"EchoStar and WebTV Networks Deliver Digital Video Recording for Satellite TV Customers", Dish Press Releases, Dec. 14, 1999, pp. 1-5.

"Facts about the Hughes HDVR2 of DIRECTV", http://tivopedia.com/model-hughes-hdvr2.php, Copyright 2009-2022, pp. 1-3.

"Comcast Launches HDTV", Corporate Comcast, URL: https://corporate.comcast.com/news-information/news-feed/comcast-launches-hdtv, Oct. 29, 2001, pp. 1-3.

Lu, K. Y., "Interaction Design Principles for Interactive Television", In Partial Fulfillment of the Requirements for the Degree Master of Science in Information Design and Technology, May 2005, pp. 1-202.

"Toshiba Digital Media Server SD-H400 Installation Guide", Copyright 2003, pp. 1-151.

Falcone, J., Pioneer DVR-810H (80-hour TiVo) review: Pioneer DVR-810H (80-hour TiVo), https://cnet.com/reviews/pioneer-dvr-810h-80-hour-tivo-review/, Jun. 10, 2004, pp. 1-7.

"Comcast and TiVo Announce Strategic Partnership", Corporate Comcast, URL: https://corporate.comcast.com/news-Information/news-feed/comcast-and-tivo-announce-strategic-partnership, Mar. 15, 2005, pp. 1-4.

"Facts about the TiVo TCD230040", https://tivopedia.com/model-att-tcd230040.php, Copyright 2009-2022, pp. 1-3.

"Philips AOL TV Internet TV" Philips Manual, URL: https://www.download.p4c.philips.eom/files/w/wvh111_17/wvh111_17_pss_aenus.pdf, pp. 1-2, Copyright 2000.

"W VH 111 User Manual AOL TV", AOL TV, Copyright 2000, pp. 1-35.

"Communication Technology", Official Trade Journal of the Society of Cable Telecommunications Engineers, Jun. 1999, pp. 1-158.

Angwin, J., "AOL Launches Set-Top Boxes That Let Users Chat Online While Watching TV", WSJ, URL: https://www.wsj.com/articles/SB961362519698697717, Jun. 19, 2000, pp. 1-3.

"TiVo DVR User's Guide", Copyright 2004, pp. 1-180.

"WebTV Networks Takes the Lead in Personal TV Services", Microsoft, Jan. 6, 2000, pp. 1-6.

Pelline, J., "Time Warner to Shutter ITV Effort", CNET, May 1, 1997, pp. 1-2.

Jackson, K., "Netflix, Disney Plus, HBO Max: Save on Streaming with One Clever Trick", CNET, Aug. 13, 2022, pp. 1-4.

"Comcast Enhances on Demand Lineup with Programming From MTV Networks BET and CBS", Comcast Television, Apr. 8, 2004, pp. 1-3.

"DVR-810H-S", URL: https://pioneerelectronics.com/PUSA/Home?Blu-ray-Disc/Pioneer-DVD-Players/DVR-810H-S#specs, retrieved Jul. 27, 2022, pp. 1-3.

"HR10-250 DirectTV HD Tivo DVR Reviewed", Home Theater Review, Apr. 15, 2004. pp. 1-19.

Arlen, G., "AOLTV Tries to Leverage Online Audience into Hybrid Convergence, Battling Microsoft", URL: https://www.digitalbroadcasting.com/doc/aoltv-tries-to-leverage-online-audience-into-0001, Jul. 10, 2000, pp. 1-2.

(56) **References Cited**

OTHER PUBLICATIONS

"Facts about the Pioneer 810H", URL: https://tivopedia.com/model-pioneer-810h.php, retrieved Jul. 27, 2022, pp. 1-3.
Hogan, M., "AOL TV Sees Mid-July Launch for Interactive-Television Test", URL: https://nexttv.com/news/aoltv-sees-mid-july-launch-interactive-television-test-142758, Jun. 25, 2000, pp. 1-8.
"Comcast Reports Second Quarter 2004 Results", Comcast Investor, Jul. 28, 2004, pp. 1-9.
"DISHPlayer500 Personal TV Remote Control", Microsoft webtv, Copyright 2000, pp. 1-36.
Lee, J., "Interactive TV is Finally Here, Sort of", The New York Times, Apr. 4, 2002, pp. 1-5.
Deboer, C., "Humax Announces TiVo-Powered DRT-800 DVR and DVD Recorder", Udioholics Online A/V Magazine, Oct. 14, 2004, pp. 1-3.
"Features of the Echostar's DISH Player", URL: www.dishretailer.com/psda/dishplay.htm, Retrieved: Jul. 27, 2022.
"TiVo Service Number and Model Number Table for Series 3 and earlier", URL: https://tivoidp.tivo.com/tivoCommunitySupport/article/TiVo-Service-Number-and-Model-Number-Table-for-Series-3-and-eariier, retrieved Jul. 27, 2022, pp. 1-6.
"Comcast 2004 Annual Report", Comcast, pp. 10-80.
"Comcast and Microsoft Announce Licensing Agreement for Microsoft TV Software", Comcast Corporate, May 20, 2004, pp. 1-3.
"Directv HD DVR User's Guide", DIRECTV, Copyright 1999, 2004 by TiVo Inc., pp. 1-175.
Falcone, J., "Humax DRT TiVo/DVD recorder review: Humax DRT TiVo/DVD recorder", CNET, Nov. 15, 2004, pp. 1-8.
Brown, M. et al., "The Dish That Does More", PC Magazine, Feb. 22, 2000, pp. 1-2.
"Comcast and Best Buy Expand Philadelphia Retail Program for HDTV and Digital Cable to New Markets", Comcast Corporate, Apr. 8, 2003, pp. 1-5.
"Comcast Reports Third Quarter 2004 Results", Comcast Investor, Oct. 27, 2004, pp. 1-7.
Falcone, J., "Toshiba SD-H400 (80-hour TiVo)", CNET, URL: https://www.cnet.com/reviews/toshiba-sd-h400-80-hour-tivo-preview/, Jun. 10, 2004, pp. 1-2.
"Digital Satellite Recorder User's Guide", DIRECTV, Copyright 1999, 2002 by TiVo Inc., pp. 1-164.
"DIRECTV DVR User's Guide", DIRECTV, Copyright 1999, 2002 by TiVo Inc., pp. 1-164.
"Pioneer DVD Recorder with TiVo User's Guide", Pioneer, Copyright 2003, pp. 1-174.
"Time Warner Cable's Full Service Network unveils new navigator", Business Wire, Apr. 30, 1996, pp. 1-6.
Khan, J. et al., "Bluetooth-Based Wireless Personal Area Network for Multimedia Communication", Proceedings of the First IEEE International Workshop on Electronic Design, 2002.
Ahmad, M. et al., "Multimedia Transmission over Interworking of Bluetooth WPAN and IEEE 802.11g WLAN Networks", 2005, pp. 380-383.
Vilovic, I. et al., "Performance of the Bluetooth-Based WPAN for Multimedia Communication", 4th EURASiP Conference focused on Video/Image Processing and Multimedia Communication, Jul. 2-5, 2003, pp. 783-788.
"Linksys Wireless A/G USB Network Adapter User Guide", Cisco Systems, 2004, pp. 1-45.
"User Guide Wireless-G USB Network Adapter Model: WUSB54G", Cisco Systems, 2007, pp. 1-37.
"Wireless-G USB Network Adapter Quick Installation Model: WUSB54G", Cisco Systems, 2004.
"ANSI/IEEE Std 802.11, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications", LAN MAN Standards Committee of the IEEE Computer Society, 1999, pp. 1-512.
"ANSI/IEEE Std 802.11a, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: High-speed Physical Layer in the 5 GHZ Band", LAN MAN Standards Committee of the IEEE Computer Society, 1999, pp. 1-82.
"Nokia Eseries—Nokia E90 Communicator User Guide", Nokia, 2007, pp. 1-93.
"HP MediaSmart HDTV User's Guide", HP Invent, 2006, pp. 1-92.
"Transmission of Non-Telephone Signals Information Technology—Generic Coding of Moving Pictures and Associated Audio Information: Systems", International Telecommunication Union, 1995, pp. 1-119.
Lindblad, C. J. et al., "ViewStation Applications Implications for Network Traffic", IEEE Journal on Selected Areas in Communications, vol. 13, No. 5, Jun. 1995, pp. 768-778.
Lindblad, C. J. et al., "The VuSystem: A Programming System for Compute-Intensive Multimedia", IEEE Journal on Selected Areas in Communications, 1996, pp. 1-19.
Lindblad, C. J. et al., "ViewStation Applications: Intelligent Video Processing Over a Broadband Local Area Network", 1994.
Wong, D. et al., "Soft Handoffs in CDMA Mobile Systems", IEEE Personal Communications, Dec. 1997.
Lupo, G. et al., "Dynamic Resource Allocation with a Soft Handover Procedure for Application in a Broadband System", IEEE, 1999, pp. 2111-2115.
Forsberg, D. et al., "Increasing communication availability with signalbased mobile controlled handoffs" IP based Cellular Networks Conference IPCN, 2000.
Kim, S. H. et al., "Soft QOS-Based Vertical Handover Scheme for WLAN and WCDMA Networks Using Dynamic Programming Approach", Jan. 2002, pp. 1-5.
Beyah, R. A. et al., "A Mobility Enhancement for Switched Wireless Ethernet for Soft Handoff", 2002.
"Fujitsu 5906i comes with AuthenTec/TruNav: iPhone Competitor, Smart in Technology", Aug. 2008.
"ARIB Technical Report TR-B14", 2006.
"Microsoft Press Computer Dictionary, 3rd Ed.", Microsoft, 1997.
Rong, L. et al., "Application Level Session Hand-Off Management in a Ubiquitous Multimedia Environment", 2004, pp. 223-229.
Komiya, D. et al., "Use Cases for Session Mobility in Multimedia Applications", Matsushita Electric (Panasonic), Feb. 2006.
Mate, S. et al., "Movable-Multimedia: Session Mobility in Ubiquitous Computing Ecosystem", 2006.
Bovik, A., "Handbook of Image & Video Processing (2nd Ed.)", 2005.
Bovik, A., "Handbook of Image & Video Processing (1st Ed.)", 2000.
"Real Player Plus Real Player 8 Plus User Manual", Real Networks, 2000, pp. 1-106.
Per Johansson, "Bluetooth: An Enabler for Personal Area Networking", Ericsson Research, 2001.
"Mobile and Wireless Design Essentials", Martyn Mallick, John Wiley & Sons, 2003, pp. 1-352.
Busatto, F., "TCP Keepalive HOWTO Revision 1.0", May 4, 2007, pp. 1-11.
"Transmission Control Protocol", RFC 793, Sep. 1981.
Newton, H., "Newton's Telecom Dictionary", 2004.
Apostolopoulos et al., "Video Streaming: Concepts, Algorithms, and Systems", 2002, pp. 1-34.
Ribas-Corbera, J. et al., "A Flexible Decoder Buffer Model for JVT Video Coding", 2002, pp. 193-196.
Sheu, T. et al., "A Buffer Allocation Mechanism for VBR Video Playback", 2000, pp. 1641-1644.
Cui, Y. et al., "Seamless User-Level Handoff in Ubiquitous Multimedia Service Delivery", 2004, pp. 137-170.
Bederson, B., "PhotoMesa: A Zoomable Image Browser Using Quantum Treemaps and Bubblemaps", 2001, pp. 71-80.
Ethington, B., "Introducing Microsoft Windows 95" with authenticating declaration of Carmen Debord, 1995.
Furnas, G. W. et al., "Multitrees: Enriching and Reusing Hierarchical Structure" with authenticating declaration of Scott Delman, 1994, pp. 330-336.
"Microsoft Computer Dictionary, 4th Ed.", Microsoft, 1999.
Cohoon, J. P. et al., "C++ Program Design: An Introduction to Programming and Object-Oriented Design, 3rd Ed.", 2002.

(56) **References Cited**

OTHER PUBLICATIONS

Machine generated translation of JP 2005-006144 to Suda et al. Jun. 2005.

* cited by examiner

FIG. 1

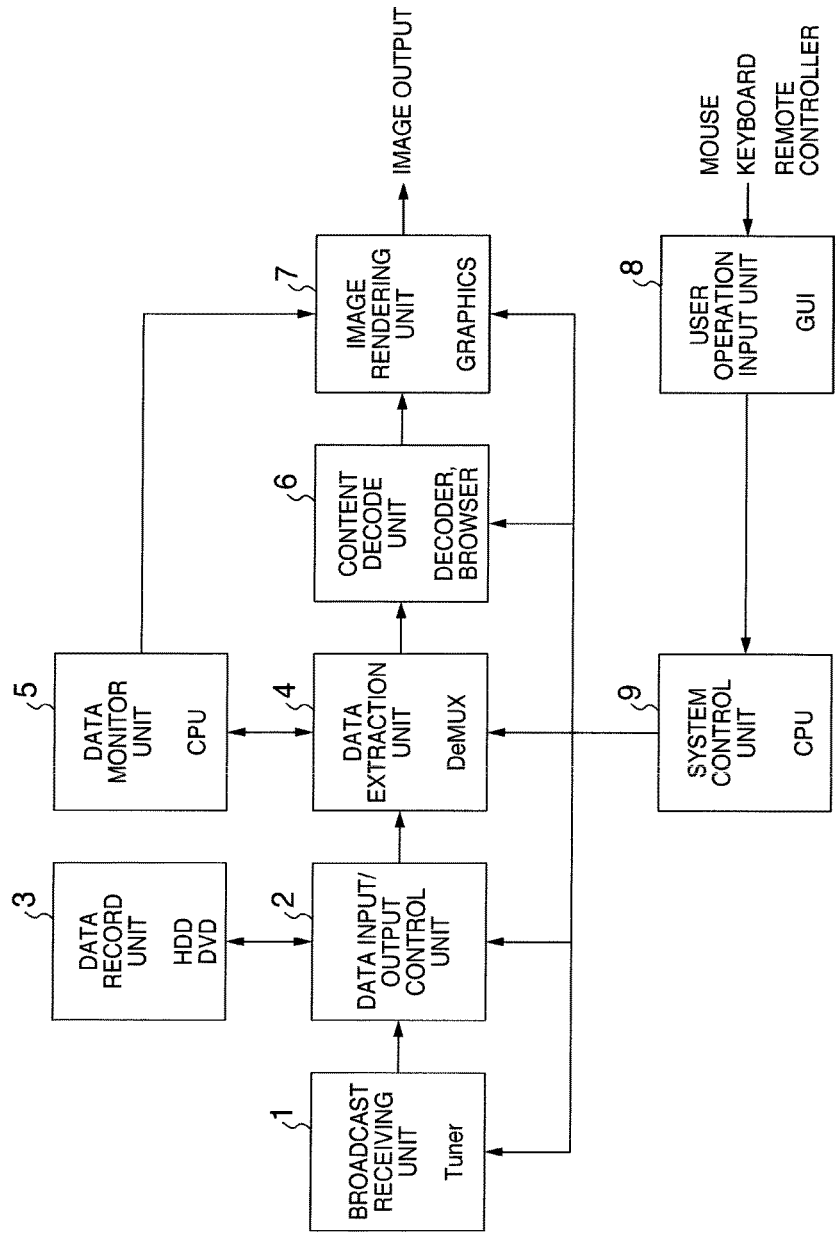
BROADCAST RECEIVING UNIT
Tuner
1
DATA INPUT/ OUTPUT CONTROL UNIT
2
DATA RECORD UNIT
HDD DVD
3
DATA EXTRACTION UNIT
DeMUX
4
DATA MONITOR UNIT
CPU
5
CONTENT DECODE UNIT
DECODER, BROWSER
6
IMAGE RENDERING UNIT
GRAPHICS
7
IMAGE OUTPUT
USER OPERATION INPUT UNIT
GUI
8
MOUSE
KEYBOARD
REMOTE CONTROLLER
SYSTEM CONTROL UNIT
CPU
9

FIG. 2

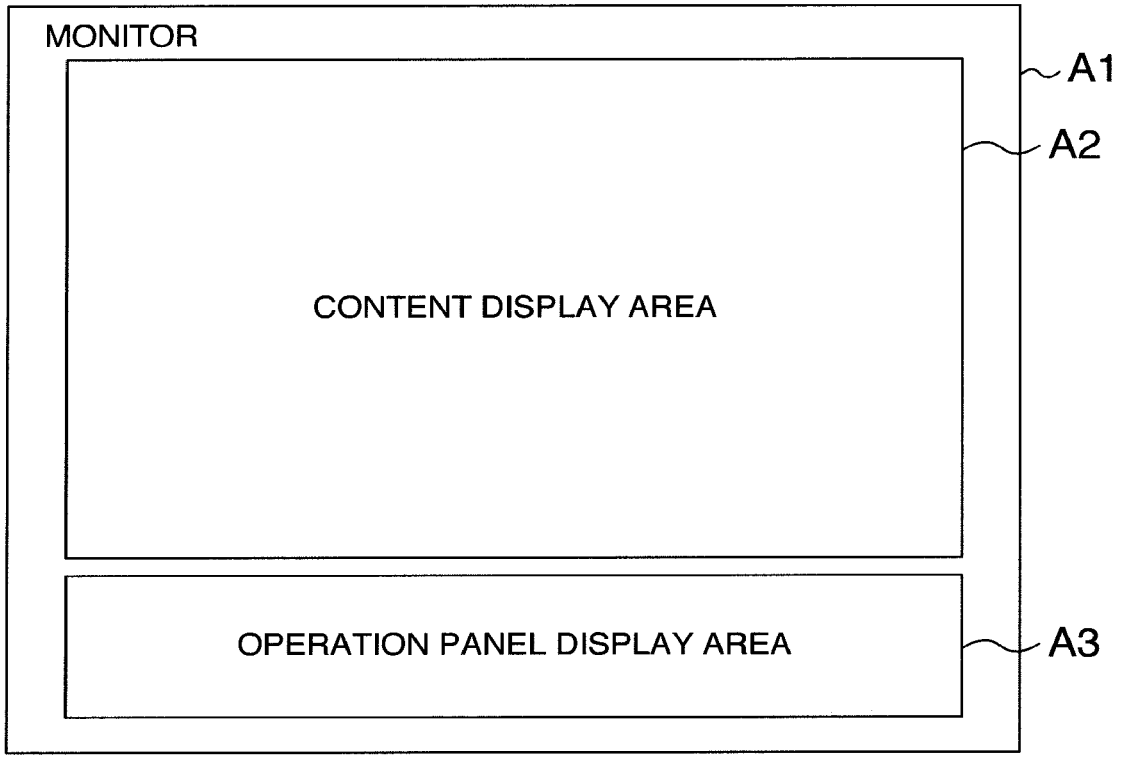

FIG. 3

FIG. 4

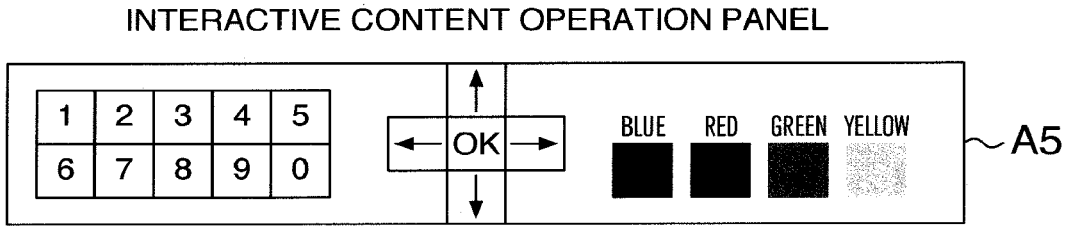

FIG. 5

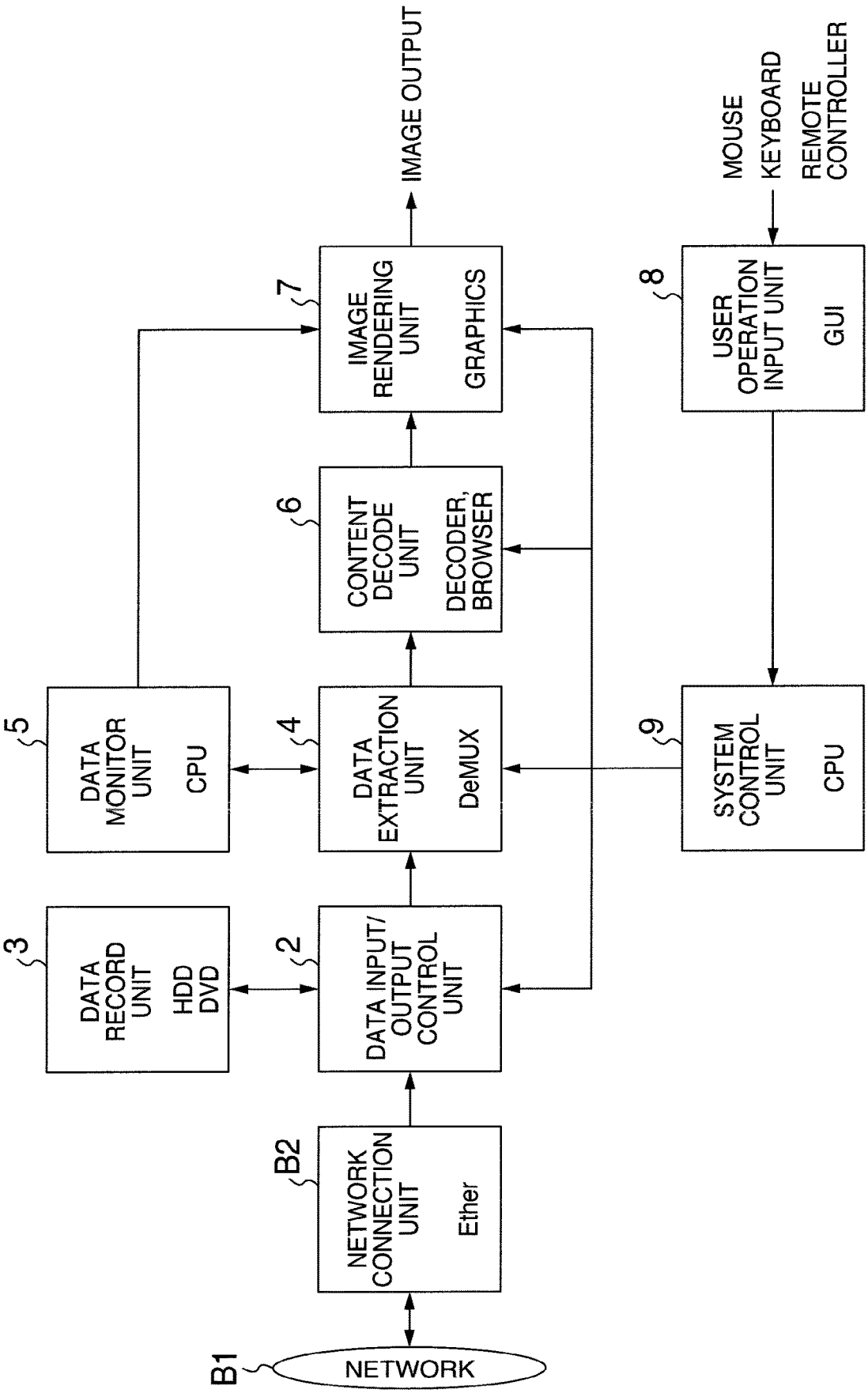
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER
7
IMAGE RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
6
CONTENT DECODE UNIT
DECODER, BROWSER
5
DATA MONITOR UNIT
CPU
4
DATA EXTRACTION UNIT
DeMUX
9
SYSTEM CONTROL UNIT
CPU
3
DATA RECORD UNIT
HDD
DVD
2
DATA INPUT/ OUTPUT CONTROL UNIT
B2
NETWORK CONNECTION UNIT
Ether
B1
NETWORK

FIG. 6

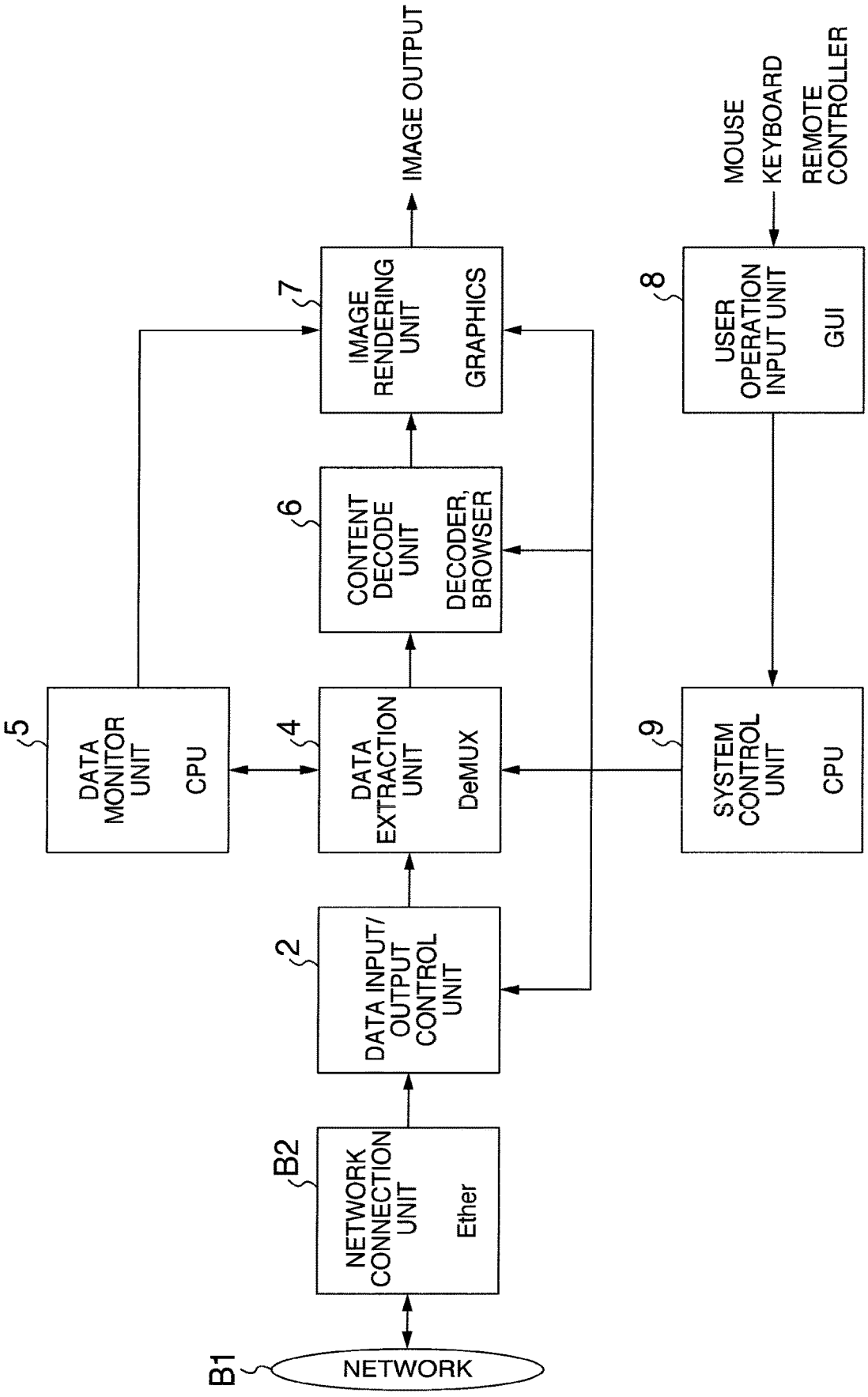
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER
7
IMAGE RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
6
CONTENT DECODE UNIT
DECODER, BROWSER
5
DATA MONITOR UNIT
CPU
4
DATA EXTRACTION UNIT
DeMUX
9
SYSTEM CONTROL UNIT
CPU
2
DATA INPUT/ OUTPUT CONTROL UNIT
B2
NETWORK CONNECTION UNIT
Ether
B1
NETWORK

FIG. 7

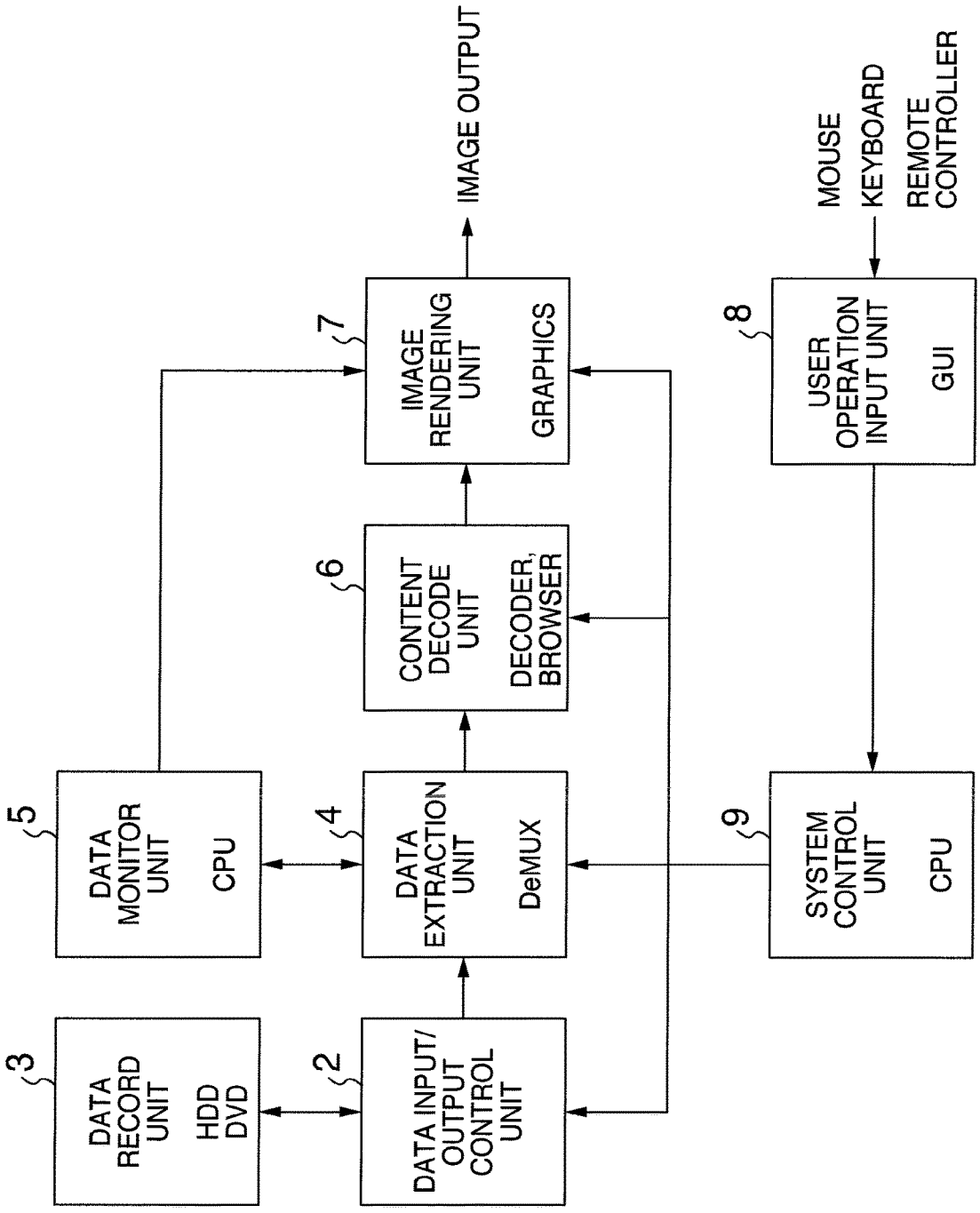
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER
7
IMAGE RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
6
CONTENT DECODE UNIT
DECODER, BROWSER
5
DATA MONITOR UNIT
CPU
4
DATA EXTRACTION UNIT
DeMUX
9
SYSTEM CONTROL UNIT
CPU
3
DATA RECORD UNIT
HDD
DVD
2
DATA INPUT/ OUTPUT CONTROL UNIT

FIG. 8

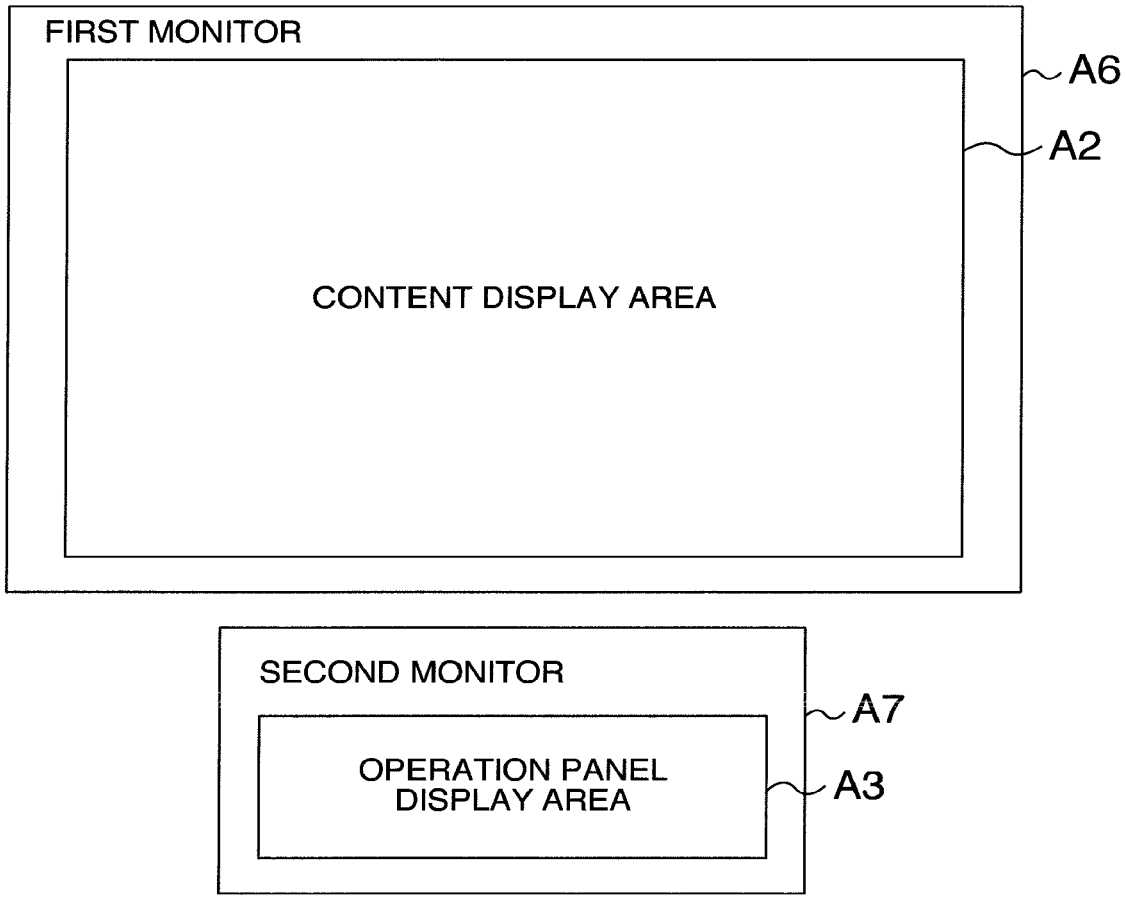
FIRST MONITOR
A6
A2
CONTENT DISPLAY AREA
SECOND MONITOR
A7
OPERATION PANEL DISPLAY AREA
A3

FIG. 9

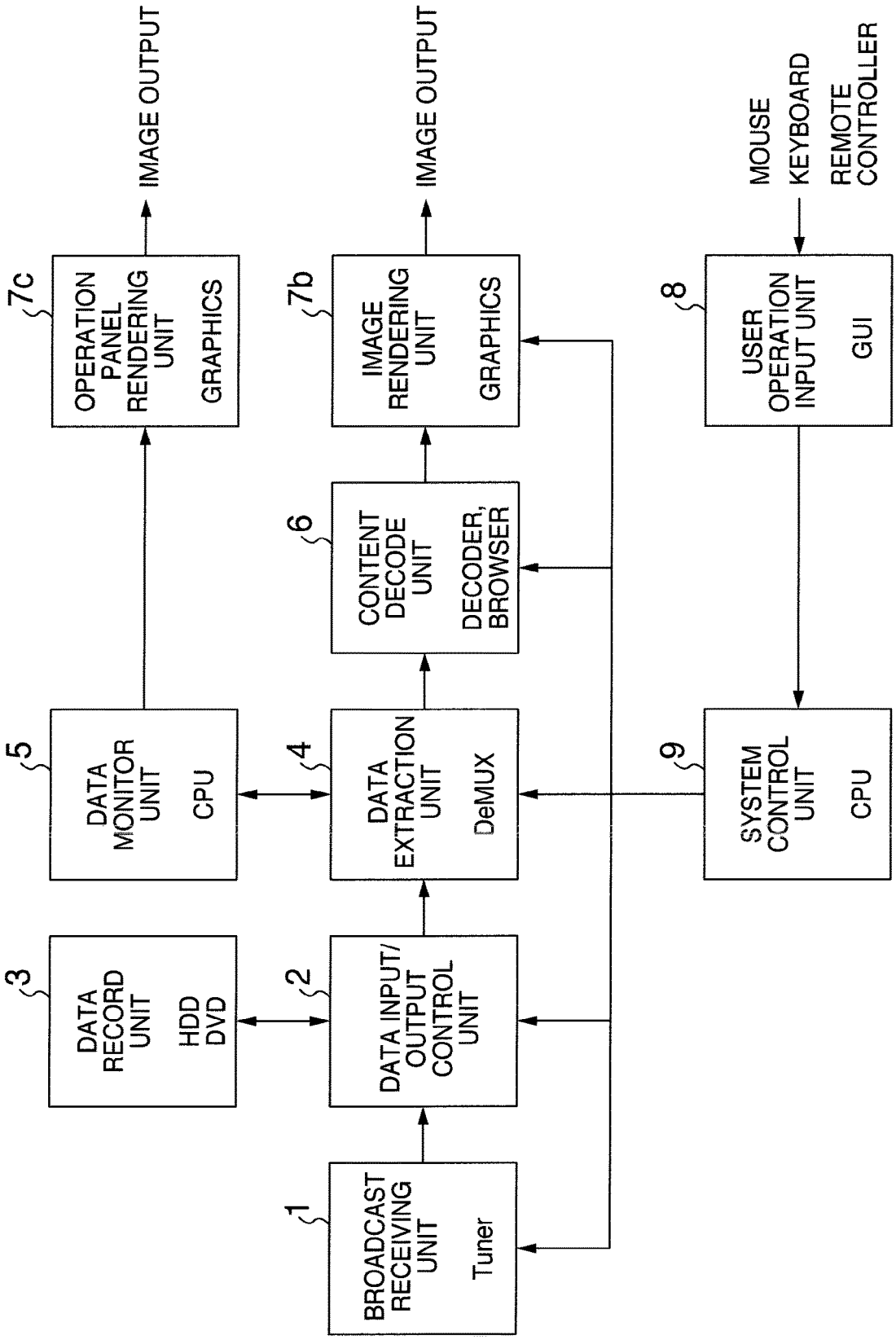
BROADCAST RECEIVING UNIT
Tuner
1
DATA INPUT/ OUTPUT CONTROL UNIT
2
DATA RECORD UNIT
HDD
DVD
3
DATA EXTRACTION UNIT
DeMUX
4
DATA MONITOR UNIT
CPU
5
CONTENT DECODE UNIT
DECODER, BROWSER
6
IMAGE RENDERING UNIT
GRAPHICS
7b
IMAGE OUTPUT
OPERATION PANEL RENDERING UNIT
GRAPHICS
7c
IMAGE OUTPUT
USER OPERATION INPUT UNIT
GUI
8
MOUSE
KEYBOARD
REMOTE CONTROLLER
SYSTEM CONTROL UNIT
CPU
9

FIG. 10

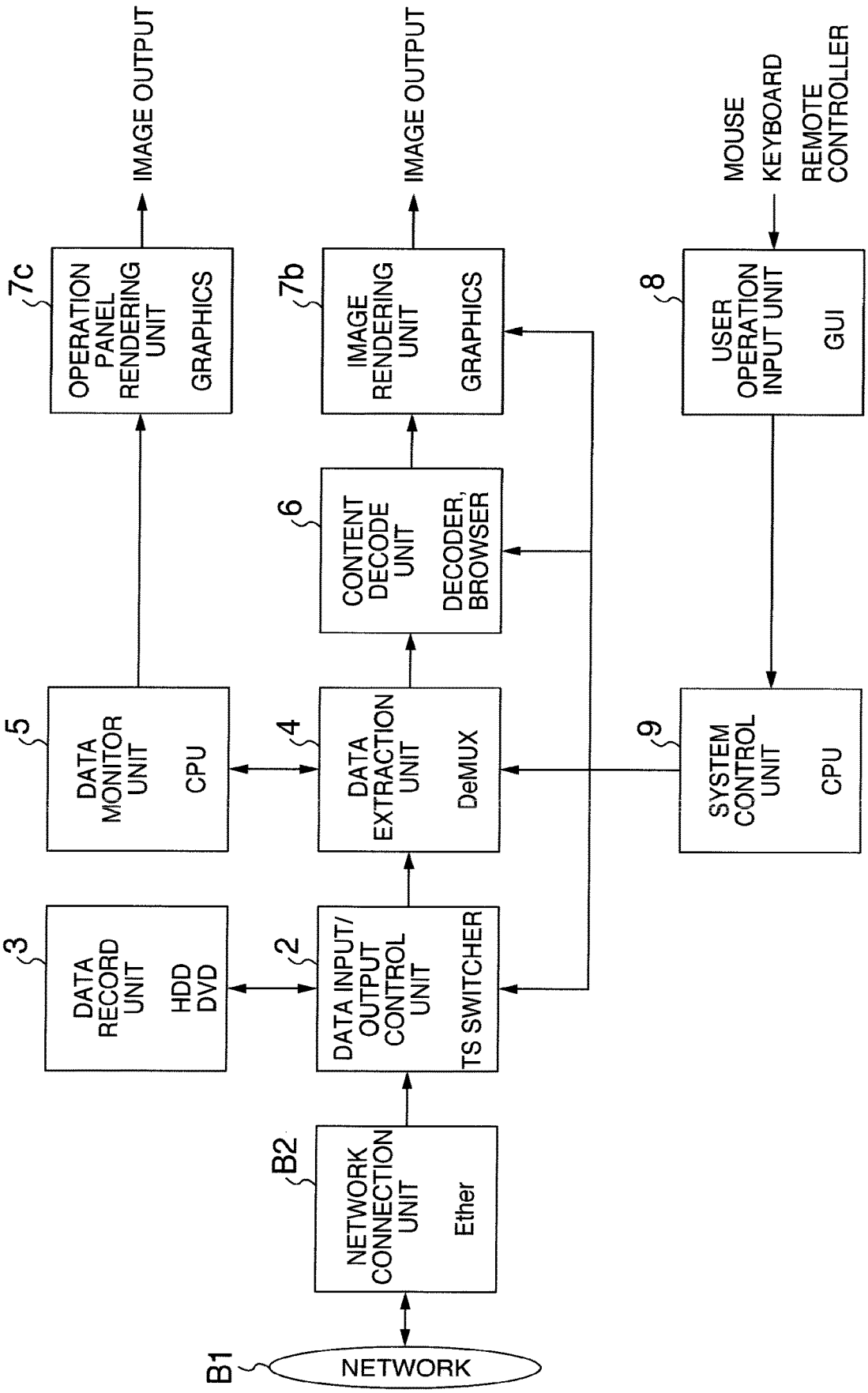
IMAGE OUTPUT
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER
7c
OPERATION PANEL RENDERING UNIT
GRAPHICS
7b
IMAGE RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
6
CONTENT DECODE UNIT
DECODER, BROWSER
5
DATA MONITOR UNIT
CPU
4
DATA EXTRACTION UNIT
DeMUX
9
SYSTEM CONTROL UNIT
CPU
3
DATA RECORD UNIT
HDD
DVD
2
DATA INPUT/ OUTPUT CONTROL UNIT
TS SWITCHER
B2
NETWORK CONNECTION UNIT
Ether
B1
NETWORK

FIG. 11

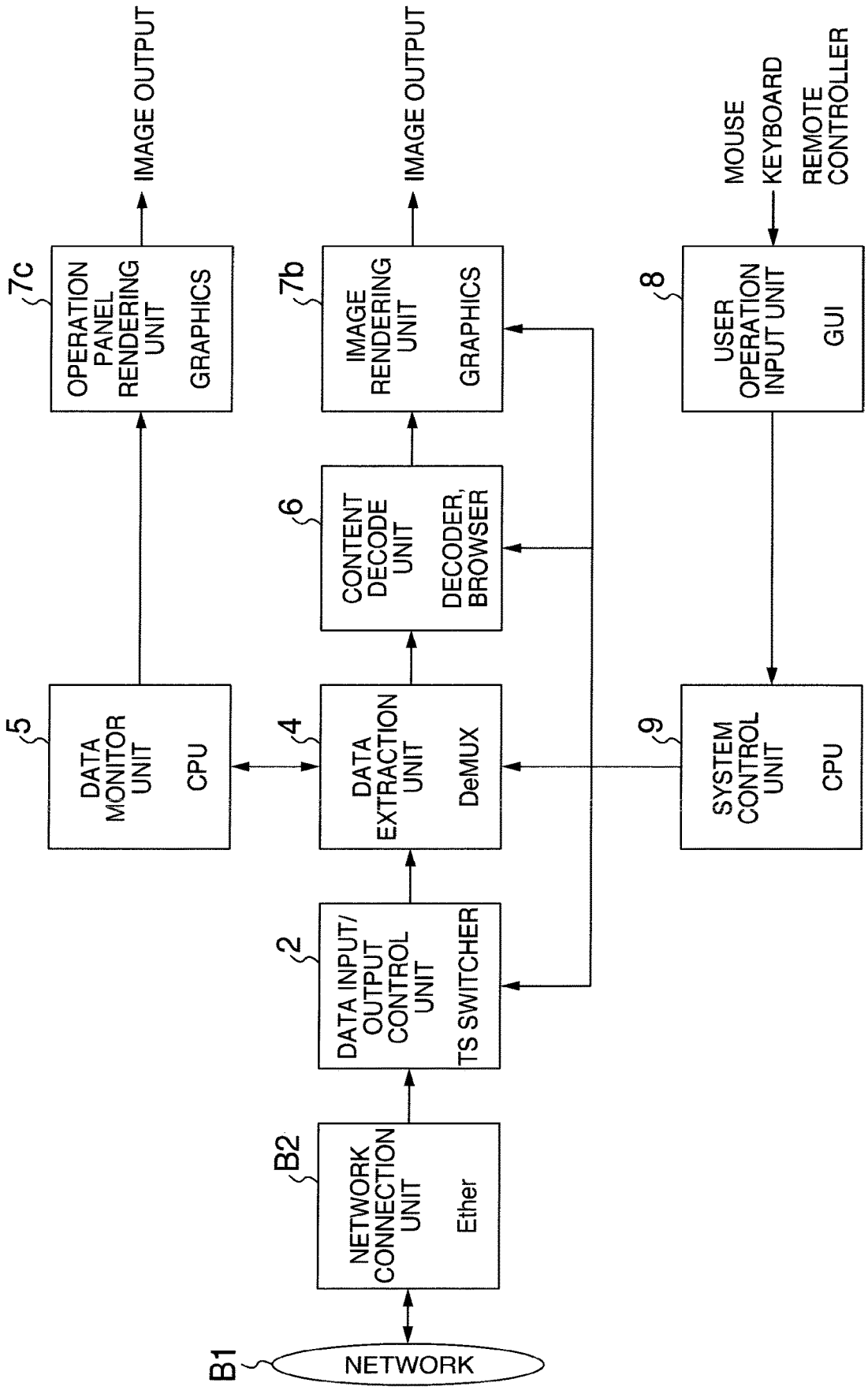
B1
NETWORK
B2
NETWORK CONNECTION UNIT
Ether
2
DATA INPUT/ OUTPUT CONTROL UNIT
TS SWITCHER
4
DATA EXTRACTION UNIT
DeMUX
5
DATA MONITOR UNIT
CPU
6
CONTENT DECODE UNIT
DECODER, BROWSER
7b
IMAGE RENDERING UNIT
GRAPHICS
7c
OPERATION PANEL RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
9
SYSTEM CONTROL UNIT
CPU
IMAGE OUTPUT
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER

FIG. 12

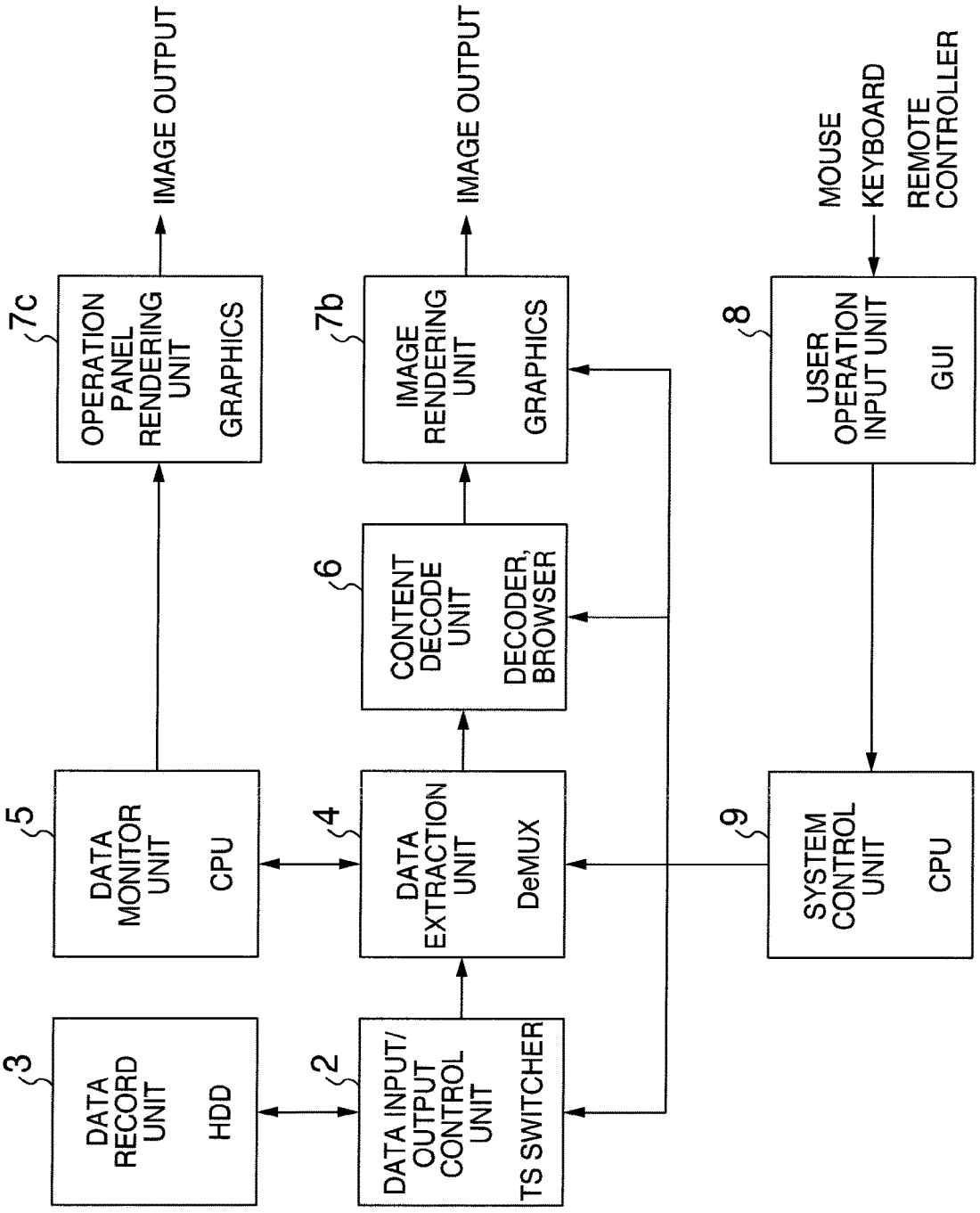
IMAGE OUTPUT
IMAGE OUTPUT
MOUSE
KEYBOARD
REMOTE CONTROLLER
7c
OPERATION PANEL RENDERING UNIT
GRAPHICS
7b
IMAGE RENDERING UNIT
GRAPHICS
8
USER OPERATION INPUT UNIT
GUI
6
CONTENT DECODE UNIT
DECODER, BROWSER
5
DATA MONITOR UNIT
CPU
4
DATA EXTRACTION UNIT
DeMUX
9
SYSTEM CONTROL UNIT
CPU
3
DATA RECORD UNIT
HDD
2
DATA INPUT/ OUTPUT CONTROL UNIT
TS SWITCHER

FIG.13

ITEM	CONTENTS
RECORD TIME DAY	2005/7/7
INFORMATION ON CONTENTS OF DATA BROADCAST	NEWS
APPRECIATION TERM	2005/7/14
VIEW HISTORY (IMAGE)	80 % DONE
VIEW HISTORY (DATA BROADCAST)	NONE

MULTIMEDIA PLAYER DISPLAYING OPERATION PANEL DEPENDING ON CONTENTS

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation of U.S. application Ser. No. 15/670,155, filed Aug. 7, 2017, which is a continuation of U.S. application Ser. No. 15/287,074, filed Oct. 6, 2016, now U.S. Pat. No. 9,743,129, which is a continuation of U.S. application Ser. No. 13/443,955, filed Apr. 11, 2012, now U.S. Pat. No. 9,489,985, which is a continuation of U.S. application Ser. No. 11/508,209, filed Aug. 23, 2006, now U.S. Pat. No. 8,170,394. This application relates to and claims priority from Japanese Patent Application No. 2005-248576, filed on Aug. 30, 2005. The entirety of the contents and subject matter of all of the above is incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present invention relates to image rendering techniques for an apparatus which reproduces digital contents multiplexing a plurality of contents having different information, and more particularly to image rendering techniques for reproduction control of digital contents by using user operation interfaces.

A conventional digital broadcasting compatible HOD/DVD decoder which is a digital content reproduction apparatus requires, in addition to channel tuning, reproduction control keys for linear contents such as video and audio, the keys including "reproduce", "stop", "fast forward", "fast backward", "temporary stop" and other operation keys. The apparatus further requires "up", "down", "right", "left", "decide" and four-color keys for operation control of data broadcasting. In order to deal with all functions, a number of remote keys are required. It takes learning time in order for a user master an operation method, or there is an issue of not easy to use.

As described in JP-A-2005-73022, there is known a broadcast receiving apparatus which provides a user with illumination of a usable key of a remote controller in accordance with information on digital contents. Typical apparatus which perform reproduction control by graphical user interface (GUI) digital include a digital broadcasting compatible personal computer and a DVD reproduction compatible personal computer. In these apparatus, reproduction keys for linear contents and interactive contents are displayed on a screen and unusable keys are disabled so that it is possible to improve user easy to use performance. However, in order to display all keys, a large panel rendering area is required. Since linear contents and interactive contents are multiplexed and transmitted for digital broadcasting, these contents are also recorded in a multiplexed state.

SUMMARY OF THE INVENTION

The apparatus described in JP-A-2005-73022 is required to mount all keys so that a remote controller having a large area is used. Similarly, the apparatus using GUI is also required to display all keys so that a wide operation panel rendering area is used.

Information on data added digital broadcasting includes up-to-date news, weather forecast and the like. There arises an issue of a lapse of an appreciation term, when reproduction is made.

It is therefore an object of the present invention to display automatically only usable operation keys in accordance with information on digital contents. Accordingly, a user operation learning time can be shortened, since the panel rendering area is made small, a mouse motion distance can be shortened, and an easy to use performance can be improved. It is an object of the present invention to provide a digital content reproduction apparatus capable of having a relatively large image display area by making small a panel rendering area. It is another object of the present invention to provide a digital content reproduction apparatus capable of reproduction within an appreciation term by monitoring information on digital contents.

According to the digital content reproduction apparatus of the present invention, a plurality of user operation interfaces of the same size are provided, information on digital contents is monitored, and upon occurrence of a change in the information, the user operation interfaces are automatically and exclusively displayed in the same panel rendering area so that only usable operation keys can be displayed. Information on digital contents is monitored and display is controlled in accordance with digital content attributes.

According to the present invention, a plurality of user operation interfaces of the same size are provided, information on digital contents is monitored, and upon occurrence of a change in the information, the user operation interfaces are automatically and exclusively displayed in the same panel rendering area so that only usable operation keys can be displayed and a user operation learning time can be shortened.

According to the present invention, since the panel rendering area is made small, a mouse motion distance can be shortened so that a user easy to use performance can be improved.

According to the present invention, since the panel rendering area is made small, the image display area can be made relatively large.

According to the present invention, only information within an appreciation term can be presented by controlling the display state in accordance with information on digital contents.

Other objects, features and advantages of the invention will become apparent from the following description of the embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram showing the structure of a digital content reproduction apparatus according to an embodiment of the present invention.

FIG. **2** is an illustrative diagram showing the layout of a screen of the apparatus shown in FIG. **1**.

FIG. **3** is an illustrative diagram showing a linear content operation panel of the apparatus shown in FIG. **1**.

FIG. **4** is an illustrative diagram showing an interactive content operation panel of the apparatus shown in FIG. **1**.

FIG. **5** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention.

FIG. **6** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention.

FIG. **7** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention.

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FIG. **8** is an illustrative diagram showing the layout of screens of the apparatus shown in FIG. **9**.

FIG. **9** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention.

FIG. **10** is a diagram showing the structure of a digital content reproduction apparatus according to the embodiment of the present invention.

FIG. **11** is a diagram showing the structure of a digital content reproduction apparatus according to the embodiment of the present invention.

FIG. **12** is a diagram showing the structure of a digital content reproduction apparatus according to the embodiment of the present invention.

FIG. **13** is an illustrative diagram showing digital content attributes according to another embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

Embodiments of the present invention will be described in detail with reference to the accompanying drawings.

FIG. **1** is a diagram showing the structure of a digital content reproduction apparatus according to the embodiment of the present invention.

Referring to FIG. **1**, the digital content reproduction apparatus records broadcast data received at a broadcast receiving unit **1** in a data record unit **3** with involvement of a data input/output control unit **2**. The data input/output control unit **2** reads data from the data record unit **3** and supplies the read data via a data extraction (demultiplex) unit **4** to a content decode unit **6** which decodes the supplied data and sends the decoded data to an image rendering unit **7**. A data monitor unit **5** always monitors information on digital contents in the data extraction unit **4**, and in accordance with a change in the information, instructs the image rendering unit **7** to perform rendering of an user operation interface corresponding to the information on the contents. The decoded contents and the user operation interface are superposed and output as image data by the image rendering unit **7**. A user input to the displayed user operation interface from a mouse, a keyboard or a remote controller is sent to a user operation input unit **8** which transfers the user operation information to a system control unit **9**. In accordance with the user operation information, the system control unit **9** controls the broadcast receiving unit **1**, data input/output control unit **2**, data extraction unit **4**, content decode unit **6** and image rendering unit **7**.

Next, description will be made on the user operation interface during digital broadcast reproduction.

FIGS. **2** to **4** show image display states during digital broadcast reproduction. A monitor A**1** has a content display area A**2** and an operation panel display area A**3**. During reproduction of linear contents such as moving image contents, a linear content operation panel A**4** is displayed in the operation panel display area A**3**, the linear content operation panel providing functions of reproduce, stop, temporary stop, fast forward, fast backward, previous skip, next skip and the like.

During reproduction of interactive contents such as data broadcast contents, an interactive content operation panel A**5** is displayed in the operation panel display area A**3**, the interactive content operation panel providing functions of numerical keys from 0 to 9, up/down/right/left keys, a decide key, blue/red/green/yellow keys and other keys.

The linear content operation panel A**4** and interactive content operation panel AS are displayed exclusively and are not displayed at the same time. The functions provided by the linear content operation panel A**4** and interactive content operation panel A**5** are not limited to those described above, but the functions may be increased or decreased in accordance with the apparatus function.

Next, by taking Japanese terrestrial digital broadcasting as an example, description will be made on a specific digital content monitoring method.

TV type services, data broadcasting services and data added TV services are defined for Japanese terrestrial digital broadcasting (Association of Radio Industries and Businesses: Terrestrial Digital Television Broadcasting Operational Guideline TR-B14). Program specific information (PSI) on digital broadcasting contains a program map table (PMT). PMT contains a data encode descriptor which contains an auto_start_flag.

In data added TV services, if the auto_start_flag is "1", data broadcasting is automatically displayed, whereas if it is "0", data broadcasting is displayed upon instruction from a user. The data monitor unit monitors the auto_start_flag, and when the flag becomes "1", the interactive content operation panel A**5** is displayed, and when the flat becomes "0", the linear content operation panel A**4** is displayed.

In this embodiment, the linear content operation panel and interactive content operation panel are provided, information on digital contents is monitored, and upon occurrence of a change in the information, the panels are automatically and exclusively displayed in the operation panel display area A**3** of the same panel rendering area size. Accordingly, only usable operation keys can be displayed, a user operation learning time can be shortened, since the panel rendering area is made small, a mouse motion distance can be shortened, and an easy to use performance can be improved. Further, since the panel rendering area is made small, the image display area can be made relatively large.

In this embodiment, although terrestrial digital broadcasting has been described, the embodiment is also used for reproduction of other digital contents. Also in this case, the operation panel can be switched automatically by monitoring the content switching flag.

FIG. **5** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention. Description will be made on only different points from the description described so far.

In the above description, although data is supplied to the apparatus by using broadcasting waves, in this embodiment, digital content services via a network B**1** are assumed. In this case, data can be acquired via a network connection unit B**2** connected to the network B**1**. The data input/output control unit **2** and other succeeding units are similar to those described above, and the description thereof is omitted.

FIG. **6** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention. Description will be made on only different points from the foregoing description.

In the foregoing description, although data acquired by the network connection unit B**2** connected to the network B**1** is recorded in the data record unit **3**, in this embodiment, video on demand (VOD) type services are assumed and a data record unit is not provided in the reproduction apparatus. The data input/output unit **2** requests a VOD service center about necessary data via the network connection unit B**2** and network B**1**. The data input/output control unit **2** and other succeeding units are similar to those described above, and the description thereof is omitted.

FIG. **7** is a diagram showing the structure of a digital content reproduction apparatus according to another embodiment of the present invention. Description will be made on only different points from the foregoing description.

In the foregoing description, although data acquired by using broadcasting waves is recorded in the data record unit **3**, in this embodiment, the broadcast receiving unit **1** is not provided and only data recorded beforehand in the data record unit **3** is reproduced. This embodiment assumes an apparatus dedicated only to reproduction. The data input/output control unit **2** and other succeeding units are similar to those described above, and the description thereof is omitted.

FIG. **8** is an illustrative diagram showing the layout of screens of the apparatus shown in FIG. **9**. In the foregoing description, although a single monitor is used which has both the content display area and operation panel display area, in this embodiment, a first monitor A**6** has a content display area A**2** and a second monitor A**7** has an operation panel display area A**3**. If a remote controller or the like has the operation panel display area A**3**, the number of keys of the remote controller can be reduced. FIG. **9** is a diagram showing the structure of the digital content reproduction apparatus of this embodiment.

A different point from the foregoing description resides in that a content rendering unit **7***b* and an operation panel rendering unit **7***c* are independent. Other points are similar to the foregoing description, and the description thereof is omitted. FIGS. **10** to **12** show the structures that the content rendering unit **7***b* and operation panel rendering unit **7***c* are made independent as different from the foregoing description. Other points are similar to the foregoing description, and the description thereof is omitted.

FIGS. **10** to **12** are similar to those figures described above. In the foregoing description, although the data monitor unit monitors the auto_start_flag, in this embodiment, attributes of digital contents are recorded and a data broadcasting descriptive language BML (Broadcast Markup Language) is analyzed.

FIG. **13** shows examples of the attributes and language analysis results. Information on data added digital broadcasting includes up-to-date news, weather forecast and the like. These contents have a nature of an appreciation term and it is difficult to consider that these contents are referred to after, e.g., one month. In this embodiment, therefore, a content appreciation term is set beforehand in accordance with record days and times and information on the contents. If contents are outside the appreciation term, data broadcasting is not displayed even if the auto_start_flag is "1", but the linear content operation panel is displayed. If the contents are within the appreciation term and a user does not still view the contents, the data broadcasting is automatically displayed even if the auto_start_flag is "0" and the interactive content operation panel is displayed. Only new information can be presented for viewing, by controlling the display state in accordance with information on digital contents.

It should be further understood by those skilled in the art that although the foregoing description has been made on embodiments of the invention, the invention is not limited thereto and various changes and modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A digital content reproducing apparatus, comprising:

a network communication circuitry configured to receive digital contents and related information from an outside server;

a decoder configured to decode the digital contents received via the network communication circuitry;

a display; and

a controller configured to control reproduction of the digital contents decoded by the decoder and display of the reproduced digital contents on the display,

wherein the controller is configured to alternatively display either of a first operation panel including at least one of linear operation buttons, receiving user-instructions regarding linear reproduction functions of the reproduced digital contents, or a second operation panel including at least one of interactive operation buttons, receiving user-instructions of interactive functions to the outside server, together with the reproduced digital contents,

wherein the related information includes:

time related information which represents a time during which the reproduced digital contents and at least one of the interactive operation buttons are displayed, and

panel related information for deciding whether displaying the first operation panel including at least one of the linear operation buttons or the second operation panel including at least one of the interactive operation buttons,

wherein the controller, when controlling reproduction of the digital contents, is further configured to:

display at least one of the interactive operation buttons during the time represented by the time related information, and

other than the time represented by the time related information, display at least one of the linear operation buttons or at least one of the interactive operation buttons based on the panel related information.

2. The digital content reproducing apparatus according to claim **1**,

wherein the controller is further configured to display either the first operation panel or the second operation panel in a substantially same panel rendering area as alternative operation panels.

3. The digital content reproducing apparatus according to claim **1**,

wherein the controller is further configured to display either the first operation panel or the second operation panel in a lower part of the display.

4. The digital content reproducing apparatus according to claim **1**,

wherein the controller is further configured to adjust a rendering area size of the reproduced digital contents based on whether the display displays the first operation panel or the second operation panel.

5. The digital content reproducing apparatus according to claim **1**,

wherein the first operation panel or the second operation panel can be displayed independently from displaying the reproduced digital contents.

6. The digital content reproducing apparatus according to claim **1**,

wherein the controller is further configured to control to maintain a rendering area size of the reproduced digital contents, even when the first operation panel or the second operation panel is displayed.

7. The digital content reproducing apparatus according to claim **1**,

wherein all of one or more linear operation buttons and one or more interactive operation buttons provide mutually differing functions from each other.

8. The digital content reproducing apparatus according to claim **1**,

wherein the time related information is an appreciation term corresponding to one digital content of the digital contents.

9. The digital content reproducing apparatus according to claim **7**,

wherein the appreciation term is related to a predetermined date.

10. The digital content reproducing apparatus according to claim **2**, wherein the controller further configured to:

store the digital contents received from the outside server via the network communication circuitry into a storage; and

reproduce the digital contents stored in the storage.

11. The digital content reproducing apparatus according to claim **1**,

wherein the first operation panel is a linear operation panel in which all of one or more displayed buttons are linear operation button.

12. The digital content reproducing apparatus according to claim **1**,

wherein the second operation panel is an interactive operation panel in which all of one or more displayed buttons are interactive operation button.

13. The digital content reproducing apparatus according to claim **1**,

wherein the outside server is a video on demand server.

14. A digital content reproducing apparatus, comprising:

a network communication circuitry configured to receive digital contents and related information from a video on demand server;

a decoder configured to decode the digital contents received via the network communication circuitry;

a display; and

a controller configured to control reproduction of the digital contents decoded by the decoder and display of the reproduced digital contents on the display,

wherein the controller is configured to display at least one of linear operation buttons, receiving user-instructions regarding linear reproduction functions of the reproduced digital contents, or at least one of interactive operation buttons, receiving user-instructions of interactive functions to the video on demand server, together with the reproduced digital contents,

wherein the related information includes:

time related information which represents a time during which the reproduced digital contents and at least one of the interactive operation buttons are displayed, and

panel related information for deciding to display at least one of the linear operation buttons or at least one of the interactive operation buttons,

wherein the controller, when controlling reproduction of the digital contents, is further configured to:

display at least one of the interactive operation buttons during the time represented by the time related information, and

other than the time represented by the time related information, display at least one of the linear operation buttons or at least one of the interactive operation buttons based on the panel related information.

15. The digital content reproducing apparatus according to claim **14**,

wherein the controller is further configured to display at least one of the linear operation buttons or at least one of the interactive operation buttons in a lower part of the display.

16. The digital content reproducing apparatus according to claim **14**,

wherein the controller is further configured to control to maintain a rendering area size of the reproduced digital contents, even when at least one of the linear operation buttons or at least one of the interactive operation buttons are displayed.

17. The digital content reproducing apparatus according to claim **14**,

wherein all of one or more linear operation buttons and one or more interactive operation buttons provide mutually differing functions from each other.

18. The digital content reproducing apparatus according to claim **14**,

wherein the time related information is an appreciation term corresponding to one digital content of the digital contents.

19. The digital content reproducing apparatus according to claim **18**, wherein the appreciation term is related to a predetermined date.

20. The digital content reproducing apparatus according to claim **14**, wherein the controller further configured to:

store the digital contents received from the video on demand server via the network communication circuitry into a storage; and

reproduce the digital contents stored in the storage.

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