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(54) **Title:** EXPANDABLE ASYMMETRIC-CHANNEL MEMORY SYSTEM

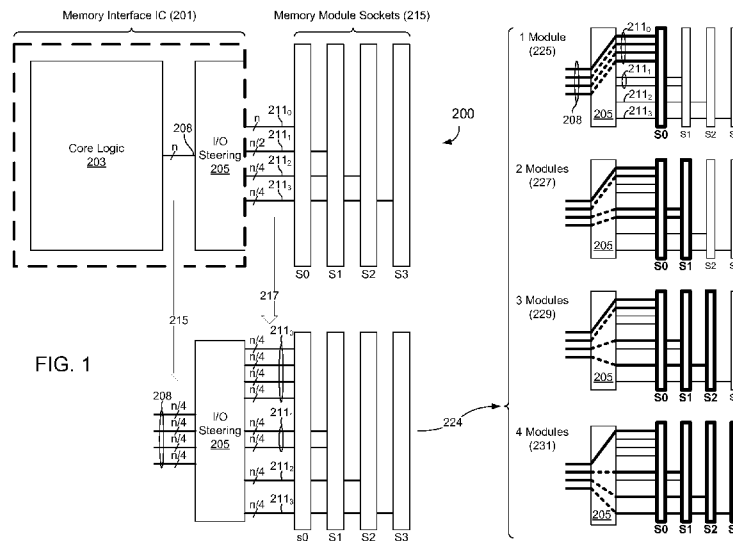


FIG. 1

(57) **Abstract:** An expandable memory system that enables a fixed signaling bandwidth to be configurably re-allocated among dedicated memory channels. Memory channels having progressively reduced widths are dedicated to respective memory sockets, thus enabling point-to-point signaling with respect to each memory socket without signal-compromising traversal of unloaded sockets or costly replication of a full-width memory channel for each socket.

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INTERNATIONAL SEARCH REPORT

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PCT/US2010/051318**A. CLASSIFICATION OF SUBJECT MATTER***G06F 13/14(2006.01)i, G06F 13/16(2006.01)i, G06F 13/38(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)

G06F 13/14; G06F 11/26; G11C 7/10; G01R 31/28; G06F 12/00; G06F 13/28; G06F 11/00

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

Japanese 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: signaling, link, path, interface, switch, node*, external, couple*, memory, integrated circuit

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0080261 A1 (SHAEFFER et al.) 03 April 2008 See the abstract; paragraphs [0063]-[0074], [0097]-[0102]; figures 1, 10, 11.	1-28
A	US 2008-0034130 A1 (PEREGO et al.) 07 February 2008 See the abstract; paragraphs [0038]-[0053], [0063]-[0072]; figures 3A, 3B, 5A.	1-28
A	US 2008-0104456 A1 (TALBOT GERALD R.) 01 May 2008 See the abstract; paragraphs [0021]-[0032], [0063]-[0074]; figures 1, 7.	1-28
PA	US 2010-0077267 A1 (PEREGO RICHARD E. et al.) 25 March 2010 See the abstract; paragraphs [0066]-[0079]; figures 8-10.	1-28
PA	US 2010-0211748 A1 (PEREGO RICHARD E. et al.) 19 August 2010 See the abstract; paragraphs [0072]-[0080]; figures 9,10;claims 40-44,103,104.	1-28

 Further documents are listed in the continuation of Box C. See patent family annex.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0080261 A1	03.04.2008	CN 101310338 A	19.11.2008
		CN 101715593 A	26.05.2010
		CN 101887743 A	17.11.2010
		EP 1929479 A2	11.06.2008
		JP 2009-510562 A	12.03.2009
		JP 2010-524089 A	15.07.2010
		US 2007-0070669 A1	29.03.2007
		US 2007-0088995 A1	19.04.2007
		US 2008-0144411 A1	19.06.2008
		US 2009-198924 A1	06.08.2009
		US 2010-146199 A1	10.06.2010
		US 7464225 B2	09.12.2008
		US 7562271 B2	14.07.2009
		US 7685364 B2	23.03.2010
		US 7729151 B2	01.06.2010
		WO 2007-038225 A2	05.04.2007
		WO 2007-038225 A3	05.04.2007
WO 2008-124503 A1	16.10.2008		
US 2008-0034130 A1	07.02.2008	EP 1587112 A2	19.10.2005
		EP 1587112 A3	21.06.2006
		EP 1587112 B1	20.08.2008
		EP 1890294 A2	20.02.2008
		EP 1890294 A3	30.04.2008
		US 2003-0061447 A1	27.03.2003
		US 2004-0186956 A1	23.09.2004
		US 2004-0256638 A1	23.12.2004
		US 2004-186956 A1	23.09.2004
		US 2004-256638 A1	23.12.2004
		US 2005-0007805 A1	13.01.2005
		US 2005-0010737 A1	13.01.2005
		US 2005-0041504 A1	24.02.2005
		US 2005-0044303 A1	24.02.2005
		US 2005-007805 A1	13.01.2005
		US 2005-010737 A1	13.01.2005
		US 2005-0149662 A1	07.07.2005
		US 2005-0156934 A1	21.07.2005
		US 2005-0166026 A1	28.07.2005
		US 2005-0193163 A1	01.09.2005
		US 2005-0207255 A1	22.09.2005
		US 2005-0210196 A1	22.09.2005
		US 2005-0223179 A1	06.10.2005
		US 2005-166026 A1	28.07.2005
		US 2006-0067141 A1	30.03.2006
		US 2008-0109596 A1	08.05.2008
		US 2008-034130 A1	07.02.2008
US 6502161 B1	31.12.2002		
US 7000062 B2	14.02.2006		
US 7003618 B2	21.02.2006		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/051318

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 7010642 B2	07.03.2006
		US 7017002 B2	21.03.2006
		US 7051151 B2	23.05.2006
		US 7062597 B2	13.06.2006
		US 7200710 B2	03.04.2007
		US 7206896 B2	17.04.2007
		US 7206897 B2	17.04.2007
		US 7266634 B2	04.09.2007
		US 7320047 B2	15.01.2008
		US 7356639 B2	08.04.2008
		US 7363422 B2	22.04.2008
		US 7404032 B2	22.07.2008
		US 7523248 B2	21.04.2009
		US 7526597 B2	28.04.2009
		WO 2005-116838 A1	08.12.2005
US 2008-0104456 A1	01.05.2008	US 7861140 B2	28.12.2010
US 2010-0077267 A1	25.03.2010	None	
US 2010-0211748 A1	19.08.2010	None	